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28598-A
DC(I) NO. 28761-A;

SPECIFICATION No. I.A. 1231

THIS SPECIFICATION IS THE PROPERTY OF THE DIRECTOR GENERAL OF INSPECTION AND MUST BE RETURNED TO THE CONTROLLER, CONTROLLERATE OF INSPECTION (AMMUNITION), KIRKEE, ON DEMAND.

2. THIS SPECIFICATION, or any patterns, drawings, or other information issued in connection therewith MAY ONLY BE USED FOR specific enquiries, tenders or orders placed by COMPETENT AUTHORITY. It is not to be used for any other purpose whatsoever WITHOUT THE SANCTION OF THE DIRECTOR GENERAL OF INSPECTION.

BANGALORE TORPEDO, SECTIONAL, 38 mm, 2 m (e)
EMPTY, 4 1/2 INCH, 6 FEET, MARK 2/I/

Specification to govern manufacture and inspection

APPROVED
(Dt. 31-7-67.)



Handwritten signatures and initials: S. H. K. PANDEY, M. A. K. M. S. (AMMUNITION), Controller of Insp.

O.P.C. SECTION
18-4-03
TSO 4098 OFK
dated: 9.4.03
852 QPC

SECTION I : GENERAL

1. The torpedoes must be manufactured in accordance with the drawing and component drawings.
2. Any sample lent to the manufacturer must be taken only as a general guide to workmanship and finish, and not as guide to dimensioning.
3. Any question relating to the drawing, sample, or this specification should be referred to the Controller, Controllerate of Inspection (Ammunition), Kirkee, or other Inspecting Officer duly authorised to act on behalf of him (hereinafter called the Inspecting Officer).
4. The manufacturer shall notify the Inspecting Officer when he is in a position to start work, and shall inform him of all sub-orders placed in connection with order as soon as they are placed, in order that arrangements may be made for tests where necessary of material or other inspection.
5. The inspecting officer, on receipt of the notification from the manufacturer may arrange to be represented at the works of the latter, or at those of his sub-manufacturers.

Handwritten notes: 21/4, Sri Saha, 21/4

Administrative stamp box with fields for Case No. and Encl. containing handwritten numbers 8 and 11.

Handwritten notes: 16, 2/-, सामान्य प्रशासन, 1971, नाम एवं पद

6. The manufacturer must not take into use any material before it has been accepted by the Inspecting Officer as satisfactory for the intended purpose.

7. Where the drawing or specification permits a choice of alternative materials or forms for particular components, the manufacturer is required to notify, in writing, to the Inspecting officer, which of the permitted alternatives he chooses to produce. If the choice of alternative is changed during the course of the order, the manufacturer shall again notify the Inspecting Officer of such change.

8. Application should be made to the Indian Standards Institution, Manak Bhavan, 9 Bahadur Shoh Zafar Marg, New Delhi - 1 for any British/Indian standard specification required.

SECTION II : COMPONENTS AND MATERIALS see page 2

1. The Bangalore Tornado will consist of the following components which must be manufactured from the material specified :

(f) *	Tube - 54/9632/E/648	Steel Tube to specn. IS 3074 - 1979 Grade CDS 1 'As drawn and normalised' or Grade CEW 1 'Annealed' Alternatively Steel Tube to specn. BS 6323 Pt 4 Grade CFS 3 'NBK' or BS 6323 Pt 6 Grade CEW 2 'NZF'
	Coupling - 54/9636/E/648	Steel Tube to specn. IS 3074 - 1979 Grade CDS 1 'As drawn and normalised' or Grade ERW 1 'As welded' or Grade CEW 1 'Annealed' Alternatively Steel Tube to specn. BS 6323 Pt 4 Grade CFS 3 'NBK' or BS 6323 Pt 5 Grade ERW 2 'NHM' or BS 6323 Pt 6 Grade CEW 2 'NZF'
	Nose coupling - 54/9642/E/648	Steel Tube to specn. IS 3074 - 1979 Grade CDS 1 'As drawn and normalised' or Grade ERW 1 'As welded' or Grade CEW 1 'Annealed' Alternatively Steel Tube to specn. BS 6323 Pt 4 Grade CFS 3 'NBK' or BS 6323 Pt 5 Grade ERW 2 'NHM' or BS 6323 Pt 6 Grade CEW 2 'NZF'

6. The manufacturer must not take into use any material before it has been accepted by the Inspecting Officer as satisfactory for the intended purpose.

7. Where the drawing or specification permits a choice of alternative materials or forms for particular components, the manufacturer is required to notify, in writing, to the Inspecting officer, which of the permitted alternatives he chooses to produce. If the choice of alternative is changed during the course of the order, the manufacturer shall again notify the Inspecting Officer of such change.

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SECTION II : COMPONENTS AND MATERIALS

1. The Bangalore Tornado will consist of the following components which must be manufactured from the material specified :

- | | |
|--|--|
| Tube - S4/9632/E/648 | Steel Tube to specn BS 980 ERW 1 * (P) |
| Coupling - S4/9636/E/648 | or IS-3074 - 1965 ERW 1 |
| Clip - S4/9638/E/648 | Steel tube to specn BS 980 ERW 1 |
| Nose Block & Nose Coupling assembly S4/9625/SE/648. | or IS -3074 - 1965 ERW 1 (P) |
| Nose Block - S4/9641/E/648 | Spring steel to BS 1445 EN 42 C or 42J. (P) |
| Nose coupling - S4/9642/E/648 | to specn BS 5770 Pt 3 |
| Base - S4/9640/E/648 | Grade C.S.H.T 80 Range 10Y 2. |
| Cover S4/9634/E/648 | Hardwood, Dry, well seasoned, |
| Tube - S4/9635/E/648 | free from saps, shakes, knots |
| Cover - S4/9637/E/648 | and other defects. |
| | Steel tube to specn BS 980 * |
| | ERW 1 or IS - 3074 - 1965 - (P) |
| | ERW 1 |
| | Moulded Phenolic Gr. T 27/6 to |
| | specn. CS 1790 & B 9112 for |
| | Grade T mouldings natural colour. |
| | or moulding powder (phenolic) Gr. I |
| | to specn. IND/ME/550. |
| | Steel BS 970 EN 3A or 3C. |
| | Brass to STA 7-CZ 1 or CZ 5 or |
| | DEF 105 A May 60 or copper to |
| | STA7 C1 or C2 or STA 17 fully |
| | annealed. |
| | Steel BS 970 EN 3A or 3C. |

2. Unless otherwise stated in the order the manufacturer will be required to supply the following materials which must comply with the requirements laid down in the appropriate current approved specifications, copies of which will be issued to the manufacturer :

Vernish Stoving Ammunition

Paint, Ready mixed, finishing ammunition Air drying or Stoving Matt Finish, Green Brunswick Deep (colour No. ISC 227).

Paint ready mixed finishing, ammunition, air drying, semi-glossy finish, red oxide (colour No. ISC 446).

Paint ready mixed, marking ammunition, air drying semi-glossy finish, yellow golden (colour No. ISC 356) and white.

Lacquer, clear phenol formaldehyde type A, B, C or D.

Lenoline or Mineral Jelly; Protective PXI to specn. DEF 2331.

Rhodamine

Cement rubber/resin

Trichloroethylene 50/50

Mixture of white & solvent naphtha (spirit

Emulsion, Hydrocarbon with water

Cement RD 1286.

3. The manufacturer will also supply any other materials necessary for the completion of the order.

SECTION III; TESTS

1. Before manufacture starts, when tests are specified, the material must be submitted in batches to the Inspecting Officer for testing purposes.

2. A test batch must consist of material made under uniform conditions as regards composition, foundry and manufacturing process and heat treatment except as provided in this specification or authorised by the Inspecting Officer.

3. No mechanical work, heat treatment or other operation which may modify the physical properties of the material may be carried out after it has been submitted for mechanical test unless authorised by the Inspecting Officer.

4. A test piece from each batch of tubing may be subjected to a flattening test to within two thirds of its internal diameter. Should the test pieces reveal any defects, the batch represented will be rejected.

5. A percentage of the spring clips, to be taken at the discretion of the Inspecting Officer, will be opened out 5 (five)

times so that the ends are 38 mm apart. After ~~the first~~ ^{Five} openings there must be no appreciable set in the spring.

6. Test samples will invariably be selected by the Inspecting Officer or his representative.

7. The manufacturer will be required to supply, free of charge the necessary materials for testing together with any apparatus required for the purpose of carrying out any tests stipulated in this specification.

8. When samples of ingredients or of prepared compositions are selected for chemical test, the Inspecting Officer may require the bulk represented to be bonded or sealed pending the results of the test.

9. Occasional check tests may be made upon the material or materials being employed by the manufacturer or sub-manufacturer, to ensure that the conditions in the various specifications are being observed. Should it be found that the material so treated does not comply with the prescribed conditions, the bulk represented by the sample tested will be rejected.

SECTION IV : CONSTRUCTION

1. The Bangalore Torpedo must not be built up or repaired in any way not provided for by the drawing or this specification unless authorised by the Inspecting Officer.

2. The components, generally, will be formed to the shape and dimensions as shown on the relevant drawings and must be free from all defects, burrs and sharp edges.

3. The slots in the tubes and couplings will be spaced round the circumference in such a manner that no slot will fall on the weld where welded tube is used.

4. The coupling will be secured to the cover in the position shown on the drawing by a continuous fillet weld. The weld must be free from pockets and of as smooth appearance as possible and without overlap and be to the satisfaction of the Inspecting Officer. Then the coupling with cover is screwed to the tube.

5. The Nose Block will be driven into position in the Nose Coupling and secured by the screws, care being taken to ensure the nose block is not damaged in the process.

SECTION V : PROTECTIVE TREATMENT

1. All surfaces must be clean and free from rust before phosphate treatment, and application of lacquer and paint or electro-tinned, as applicable.

2. Should, for any reason, rust be present in any components, which are to be phosphated/electro tinned as per the relevant drawings, the same shall be derusted by an approved process.
3. The tube, sleeve, clip, coupling, cover tube etc. must be thoroughly degreased by an approved process. After degreasing, the store will not be touched by hand until the protective treatment is complete. Any necessary movement of the store will be carried out using clean lifting devices or by operatives wearing clean gloves.
4. Phosphating/electro tinning will be carried out immediately after degreasing in accordance with specn No. IA 1279 or any other approved phosphate process and electro-tinning to specn No. DTD 924, process A respectively.
5. Painting and/or application of lacquer or varnish shall be carried out immediately after phosphate treatment masking the threaded portion, faces and internal machined portions of the components which are not to be painted, lacquered or varnished. The unpainted portions will be finally greased by brushing with or dipping in a solution of protective PXI or coated with mineral jelly or lanoline.
6. After phosphating, the tube (Pt No. TX 301) will be internally treated with lacquer clear phenol formaldehyde type, A, B C or D with Rhodamine B base or varnish stoving ammunition and stoved, while the external surface will be evenly and effectively painted with a priming coat of paint, ready mixed, finishing, ammunition, air drying, semi-glossy finish, red oxide (Colour No. ISC 446) followed by one finishing, coat of paint, ready mixed, finishing ammunition, air drying, matt finish, Green Brunswick Deer (colour No. ISC 227).
7. The coupling (Pt No. TX 592) will be phosphated and internal surface will be coated with Varnish, stoving Ammunition and stoved. The external surface will be coated with priming coat of Paint, Ready mixed, Finishing, Ammunition, Air Drying, Semi-glossy Finish, Red Oxide (colour No. ISC 446) followed by one finishing coat of paint, Ready mixed, finishing, ammunition, Air, drying, Matt Finish, Green Brunswick Deer (colour No. ISC 227).
8. Internal machined surfaces and threads of cover (Pt No. TX 300) to be masked during painting and finally greased by brushing with or dipping in a solution of protective PXI or coated with lanoline or mineral jelly.
9. The cover (Pt No. TX 298) and tube (Pt No. TX 299) should be cleaned to specn DTD 901 and electro tinned to specn. DTD 924, process A.
10. Other components, which are required to be painted, will be painted as per the relevant drawings.

SECTION VI : MARKING

1. The Bangalore Torpedo will be stencilled with the markings and in the position indicated on the drawing with Paint, Ready, mixed, Markings, Ammunition, Air drying, Semi-glossy Finish, Yellow golden (colour No. ISC 356).

SECTION VII : DELIVERY

1. The Bangalore Torpedo Tubes will be packed in the clamps provided and delivered in lots of 1,000 plus quantity required for filled proof as directed.
2. The Nose Plug and coupling assemblies will be suitably packed and marked and delivered as directed.

SECTION VIII : MAIN EXAMINATION

1. The several components of the Bangalore Torpedo, at all stages of manufacture or after completion, both before and after delivery, shall be subjected to examination and where necessary grouping by the Inspecting Officer and must be finally approved by him. Any item which is not finished to the satisfaction of the Inspecting Officer or which has any flaw or imperfection, will be rejected.
2. If, at any time during examination, defects are found which amount to more than 5 percent of the number examined, provided that this number is over one fifth of a lot, the following procedure will be employed :
 - (a) If the defect is rectifiable, further examination will be suspended. The whole of the lot must be re-examined by the manufacturer and those items which can be rectified may be brought upto the approved design by the manufacturer. The lot may be re-submitted for examination. No lot may be re-submitted more than once under this paragraph.
 - (b) If the defect is not rectifiable, the lot will be rejected.

SECTION IX : REPLACEMENT BY MANUFACTURER

1. When finished or partly finished components are expended or damaged in test, retest or examination as stipulated in this specification or elsewhere as a condition of acceptance, the manufacturer supplying the components shall be required to

Swid-KS-

G2448/2446

QPC

supply, replace or repair, free of charge, the components so expended or damaged which become the property of the Government.

Kirkee, Poona-3

Sd/- x x x

(GV COELHO)

DSS

for CHIEF INSPECTOR OF ARMAMENTS

Dt.

QPC

NOTES :

(i) This specification is to be returned to the Controller, Controllerate of Inspection (Amn), Kirkee, immediately on submission of tender or completion of order.

(ii) This specification only holds good for particular order for which it was issued.

Correct copy of the sealed specification at this date.

M. Vijayakumar

CMC VIJAYAKUMARAN

Kirkee, PUNE - 3

BY ASSTT. CONTROLLER
for CONTROLLER OF INSPECTION (AMN)

Dated : 09 APRIL 2003

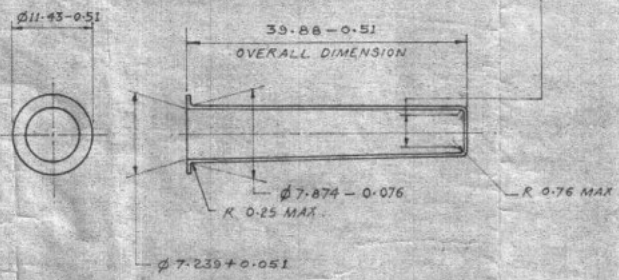
O. P. C. SECTION
O. F. KHEMARAJ, BHALPUR
Received 18-4-03
TSO 4098/OFK
09.04.2003
852/QPC/1

TX 299

ON LYPJ DIMENSIONS ARE IN MM

D.C.I. 26324 A

6.274 + 0.076 I/D AT IMAGINARY INTERSECTION OF BORE AND INSIDE OF BASE



MATERIAL :-

BRASS TO STA 7-CZ 1 OR CZ 5, OR DEF 105 A MAY 60 OR COPPER TO STA 7 CI OR C2, OR STA 17.
 FULLY ANNEALED.
 ALL SPEC ARE TO LATEST ISSUES.
 REMOVE ALL BURRS & SHARP EDGES, RESULTING RADII AND/OR CHAMFERS NOT TO EXCEED 0.127.
 TO BE PRODUCED FROM SHEET OR STRIP 0.483-0.051 THICK.
 DIMENSIONS APPLY AFTER PLATING.



ACTUAL SIZE

DRW		SDI	CND	SDI	TRD	ROT	COMP	ASBY	DRG
2-11-58		RETRACED WITHOUT CHANGE			SCALE - 2:1		TX 36 SA		
PREVIOUS D.C.I. 26324 A, 26324 A, 30291 A & 31105 A		C.D. MAN		OVC	D.O.	EST MASS: 1.6g		DESIGNER'S REF	
R.NE DATE AUTHORITY		REVISION		FOR C.I. (A)		DATE - 10-2-59		S4/3635/E/648	
DRG SEALED - 11-8-59. K 1481 (FOZES 1723), 27-2-64 (PROV)		MATE - AS ABOVE		PROTECTIVE FINISH - CLEAN TO SPEC. DTD		90] ELECTRO TIN TO SPEC. DTD 984 PROCESS A		PART NO	
								TX 299	
								D.S. CAT NR	
								ANSP - C.I.(A), KIRKEE.	

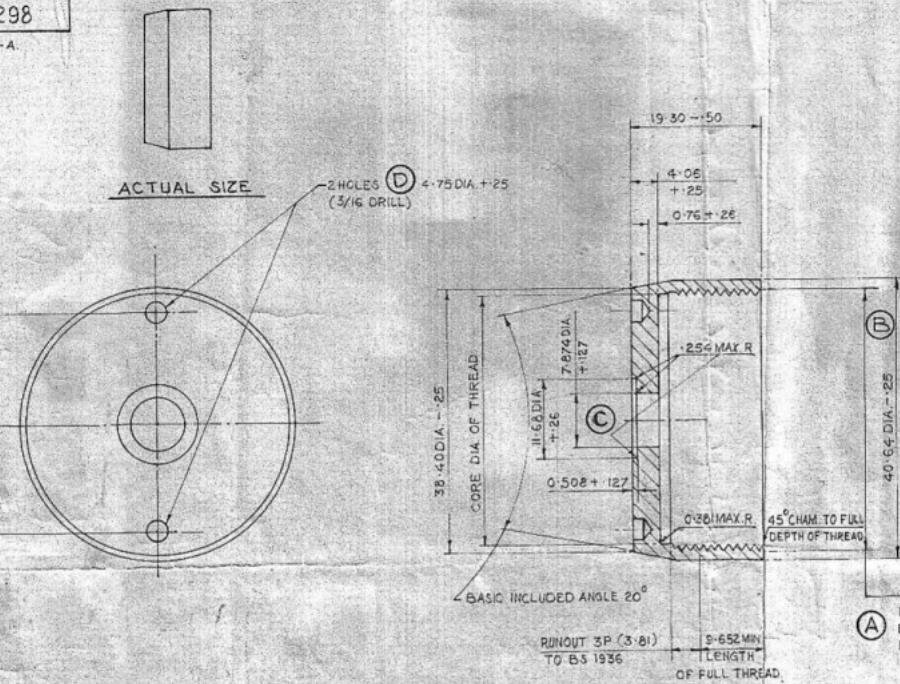
TUBE

X 36 SA

TX 298
6324-A

15

FOR EXPLANATION OF DIMENSIONING ETC, SEE
THIRD ANGLE PROJECTION DIMENSIONS ARE IN MM.



GEOMETRICAL TOLERANCES				
GROUP	FEATURE	CHARACTERISTIC	TOLERANCE	DATUM
1	DIA. B	CONCENTRICITY	0.127 DIA (M.M.C.)	THREAD A
2	DIA. C	CONCENTRICITY	0.051 DIA (M.M.C.)	THREAD A
3	HOLES D	POSITION	0.076 DIA (M.M.C.)	HOLE C.

3.2 μm ALL OVER.
REMOVE ALL BURRS AND SHARP EDGES,
RESULTING RADII AND/OR CHAMFERS NOT
TO EXCEED .45.

ALL SPECS ARE TO LATEST ISSUE.
DIMENSIONS APPLY AFTER PLATING.

PROTECTIVE FINISH:-
CLEAN TO SPECN. DTD. 901
ELECTRO-TIN TO SPEC. DTD. 924 PROCESS A.

THREAD 1/2-20UNS-2B
MAJOR DIA. 38.10 MIN.
EFF. DIA. 37.274 ± 0.157
MINOR DIA. 36.726 ± 0.152

RETRACED WITHOUT CHANGE.			
PREVIOUS D.C. (1) HQS-26924-AP-30291-A		SD/-	
AUTHORITY ZONE	NATURE	SIG.	SIG.
	AMENDMENTS	AHSP	D.O.

PROTECTIVE FINISH:- AS ABOVE.	MATERIAL:- STEEL B.S. 970 EN. 3A OR 3C.	ASSLY DRG:-
TOLERANCES:-	ESTIMATED MASS:- 63.5 GRAM.	INSP INSTRS:-
	SCALE:- 1:1	DRAWN CHECKED TRACED TRN CHD
		SD/- SD/- KMK JJK
		CHIEF D. MAN GROUP OFFICER
		D.O.C.I. (A)

COVER

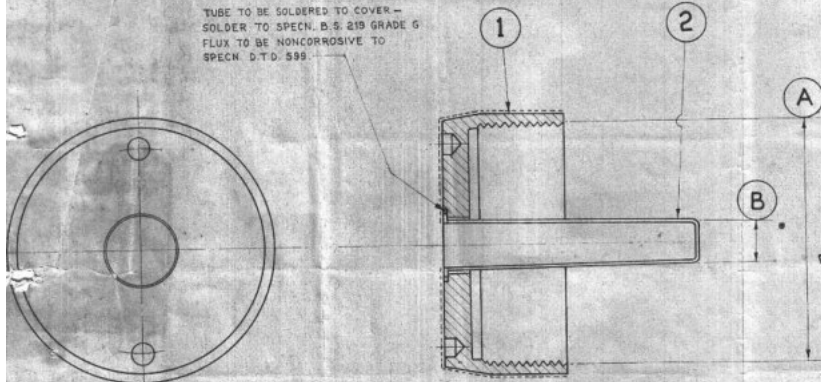
APPROVED	SD/-
DATE:- 10-2-59	FOR C.I. (A)
A.R. & D.E. M.O.F.S.	
DESIGNER'S REF:-	
34/9634/E/648	
DETAIL NO:-	
PART NO	
TX 298	

ON TX TO CE.

TX 36 SA

2364-A

TUBE TO BE SOLDERED TO COVER -
SOLDER TO SPECN. B. 5. 219 GRADE 6
FLUX TO BE NONCORROSIVE TO
SPECN. D.T.D. 599



TOLERANCES

FOR EXPLANATION OF DIMENSIONING ETC., SEE
THIRD ANGLE PROJECTION.

DIMENSIONS ARE IN mm

SCHEDULE OF COMPONENTS

ITEM NO	DRAWING NO	DESIGNATION	NO OFF	DESIGNER'S REF.
1	TX 298	COVER	1	S4/9634/E/648
2	TX 299	TUBE	1	S4/9635/E/648

ORIFICE OF ITEM 2 TO BE PLUGGED WITH A SUITABLE STOPPER.

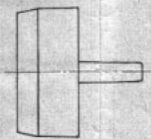
+ FACES MARKED.....TO BE PAINTED WITH ONE PRIMING COAT & ONE FINISHING COAT OF PAINT. FINISHING, AMMUNITION TO SPECN DEF. 1048

COLOUR
PRIMING COAT OF PAINT, READYMIXED, FINISHING, AMMUNITION,
AIR DRYING, SEMI-GLOSSY FINISH RED OXIDE (COLOUR NO 15C 446)
FOLLOWED BY ONE FINISHING COAT OF PAINT, READY MIXED FINISHING,
AMMUNITION, AIR DRYING, MATT FINISH, GREEN BRUNSWICK DEEP (COLOUR
NO 15C 227). THE PAINTS ARE TO CONFORM TO SPECN ISIBS (AS APPLICABLE
FOR DEFENCE USE) AND COLOUR NO. AS PER SPECN ISIBS. REMAINING FACES TO BE MASKED DURING PAINTING &
FINALLY GREASED BY BRUSHING WITH PROTECTIVE PXI TO SPECN. DEF 2331
OR COATED WITH LANOLINE OR MINERAL JELLY THE PLUG IS THEN TO BE
REMOVED.

ALL SPECNS. ARE TO LATEST ISSUES.

GEOMETRIC TOLERANCES

GROUP	FEATURE	CHARACTERISTIC	TOLERANCE	DATUM
1	DIA. B.	CONCENTRICITY	±0.25 DIA. (M.M.C)	THREAD A.



ACTUAL SIZE

PROTECTIVE FINISH - AS ± ABOVE.

MATERIAL -

ESTIMATED MASS - 65.6 g

SCALE - 2/1

ASSLY DRG -

INSP. INSTRS -

DRAWN

CHECKED

TRACED

TRN. CHD.

SD/-

SD/-

J.A.K.

ZAS

CHIEF D' MAN

GROUP OFFICER

D.O.C.I. (A)

APPROVED

SD/-

27-8-56

A.P. & D. ESTD. M. OF S.

DESIGNER'S REF.

S4/9633/SE/648

DETAIL NO

PART NO

TX 36 SA

C.I.(A). KIRKEE.

84 D.C.I. 33647-A	NOTE RE. COLOUR AMENDED		
76	RETRACED WITHOUT CHANGE.		
TE	PREVIOUS: C.I. (A) 33647-A, 28342-A, 30291-A, 31165-A	STG.	SIG.
	NATURE		
	AMENDMENTS	AHSP.	D.D.
G. SEALED - 27-2-64. (Prov)			
D.O.C.I. (A)			

COVER, TUBE.

FX 8/10 (24)

MONITORING INSTRUCTIONS FOR INSPECTION OF MATERIAL**Item:**Ref: **OFK S.O. LP-15- - /PV/** dated .12.2015

1. The monitoring instruction will be treated as a part of the Supply Order.
2. Inspection of subject store will be carried out as per supply order clause either at firm's premises or at OFK after receipt of bulk consignment.
3. Before commencement of production, the supplier will submit following documents;
 - (a) All the raw material test report from NABL Accredited Laboratory.
 - (b) Copy of Raw material purchased invoice.After verification of the documents at (a) & (b) above, Bulk Production Clearance (BPC) will be accorded for commence of production.
4. While offering the subject store for inspection following documents necessarily be submitted along with inspection call/bulk receipt inspection;
 - (a)Pre- Inspection Report
 - (b)Raw material consumption Report
 - (c)Guarantee/ Warranty Certificate
 - (d)Qty. tendered for inspection
5. Before offering the material for inspection, the firm will carry out the pre-inspection. If the Pre-Inspection Report of the materials offered, meet the specified Quality Requirement, OFK will depute Representative to carry out Inspection at firm's premises and draw samples from the offered lot of material.
6. The drawn samples will be subjected to requisite tests at OFK and based on the satisfactory Test Report store will be accepted and Inspecting Officer will issue Inspection Note. The payments will be admissible to supplier after delivery of the stores at OFK and Final Inspection.
7. The packing shall be as specified in the material specification. If not specifically mentioned the material shall be supplied in suitable boxes/container to avoid transit hazard/damage. If other than specified packing is intended to be used, approval of type of proposed packing need to be obtained from Inspecting Officer of OFK.
8. **Consignee End Inspection:** Notwithstanding above, the materials shall be subjected to Receipt Inspection at consignee end and consignment found having deviation/departure from drawing & specification shall be Rejected. The supplier shall be duty bound to replace/rectify the consignment as per the merit of the case.
9. **General Instruction:** It will be the responsibility of supplier to submit all the documents and arrange to provide required manpower, calibrated gauges & measuring instruments to facilitate inspection and to ensure for smooth conduction of inspection activities by OFK representative at firm's premises. The decision of Inspector/OFK shall be final and binding.
10. Advance Sample Quantity: _____.

(Kailash Chand)
Asstt. Works Manager
For Sr. General Manager

Special Instruction for Proof Requirement

Store	Lot Size	Remarks
Banglore Terpedo	1003 (Including proof sample Qty.)	Lot will be accepted based on the satisfactory performance in proof.