

RESTRICTED
(DRAFT/PROVISIONAL)
QUALITY ASSURANCE PLAN
FOR
(CYLINDER)
DRG. NO: 172.82.099SB
(LF NO: 6201082005)

No. HVF/T-72C/QAP/82/CYLINDER/391752-00

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QUALITY ASSURANCE (RIG-ASSEMBLY)
HEAVY VEHICLES FACTORY
AVADI, CHENNAI – 600 054

QUALITY ASSURANCE PLAN (QAP)

FOR

CYLINDER

DRG. NO: 172.82.099SB

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HEAVY VEHICLES FACTORY

AVADI, CHENNAI – 600 054

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1. IMPORTANT NOTE;

Note-1

This is only a provisional and will be amended from time to time according to the requirement. No addition, deletion and reproduction will be done without the permission of The General Manager, Heavy Vehicles Factory, Avadi, and Chennai – 54.

Note –2

Any instruction contained in this does not prejudice the terms and conditions of the contract what so ever. In case of any contradiction between the contents of this QAP and the clause in the contract, the latter will prevail.

Note-3

The stores should be manufactured strictly as per the drawings supplied by the Inspection Authority only and not as per the samples, if any received by the manufacturer for guidance purpose.

Note-4

Any amendment issued by the Inspection Authority shall be incorporated in the QAP and the records for the amendments carried out should be maintained as per the Performa at Appendix-“A”.

Note-5

In case of any contradiction between the contents of this QAP and drawings issued along with the contract, the latter will prevail.

2. INTRODUCTION;

- a) This quality plan lays down the inspection and testing procedure to be carried out on the **CYLINDER TO DRG.NO.172.82.099SB** being procured indigenously. This is prepared, based on the acceptance standards and inspection parameters laid down in collaborators documents and on the inspection test standards followed in respect of similar indigenous items.
- b) This QAP is the property of Government of India and is liable for amendments as and when required. The General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054, is the inspecting Authority for this assembly. Any query / clarification on the content of this QAP shall be referred to this Factory. Any departure from these instructions is allowed only after written approval from the above authority. Notwithstanding the tests indicated in this QAP, the inspecting Officer has the right to carry out any test to check conformance to the paper particulars quoted in the Supply Order, which he may consider necessary to satisfy himself about the stores which he has to accept.

3. AIM:

The QAP is aimed at standardizing the Inspection procedure and acceptance norms for **CYLINDER TO DRG. NO.172.82.099 SB**. It also aims at giving adequate information to the manufacturer on the quality requirements so that the required quality control methods are established. This is also meant to guide authorized Inspection Officer in his routine inspection and to set out main points to which his attention must be drawn to ensure that the accepted stores meet the stipulated standards.

4. SCOPE:

This QAP outlines in general terms, the checks and methods to be used during inspection of **CYLINDER TO DRG.NO.172.82.099 SB** including the technical requirements of the drawings. The recommended Quality Plan stipulated herein is mandatory and should be strictly adhered to.

Note:

- i. Tender enquiry (TE) and supply order (S.O) will be issued with QAP stating that inspection will be done as per QAP.
- ii. In case of TE, It is responsibility of the vendor to obtain the copy of QAP and give the statement of compliance that vendor will abide by the QAP in case supply order is placed.
- iii. In case of S.O, it is the responsibility of the vendor to obtain copy of QAP and give the statement of compliance that the vendor will follow QAP. However, GM/HVF reserves the right to revise/update the QAP from time to time.

5. DOCUMENTS:

- a) On placement of firm supply order, one set of certified drawings will be forwarded to the Contractor. One set of relevant specification and technical instructions on the subject item can be obtained from AHSP through DDO/HVF.
- b) Any clarification required on these documents should be obtained from the Inspecting Authority i.e. The General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054. Equivalents to the collaborators specifications and standards will be decided only by the Inspecting Authority and should not be unilaterally decided.
- c) The process instruction sheets supplied by the collaborators are available with the DDO/HVF, Avadi, Chennai for reference (i.e. Forging, casting, machining, extrusion, forming, manufacturing, heat treatment and plating process etc.) Where ever applicable.
- d) The supplier after scrutiny of the concerned process sheets and connected paper particulars should establish the necessary production and inspection facilities. Particularly the inspection test rigs, stands, fixtures, templates, gauges etc should be provided as recommended in these process sheets.

6. USED ON HIGHER ASSY:-

The CYLINDER ASSY DRG to DRG.NO.172.82.099 SB is used on T-72 & T-90 TANKS.

7. BILL OF MATERIAL;

Bill of material to be tabulated in a separate format (as per Annexure B) and duly signed by Authorized Firm's representative with Full name, Designation with Firm's Seal and to be submitted at the time of supply.

Sl. No.	DRG. No.	NOMENCLATURE	MATERIAL SPECIFICATIONS	QTY.	REMARKS
	172.82.099 SB & ITEM LISTS	CYLINDER DRG	--	--	Assy drg.
	172.82.099SB	SPECIFICATIONS	172.82.099 SB		Document
1	172.82.055sb-1	HEAD BODY WITH PIPE	--	1	Assy drg.
1.1	172.82.122-2	Head Body	BRASS ЛхМц59-1-1 GOST 15527-70	1	
1.2	155.59.481	Tube	COPPER GRADE M3 OR M2 DRAWN SOFT TO GOST 617-72	1	
2	172.82.057sb	Washer with Membrane	--	1	Assy drg.
2.1	172.82.130	Washer	20Xr3, GOST 5632-72	1	
2.2	172.82.132	Gasket	COPPER GRADE M3- M (M IS FOR SOFT) OF GOST 859-78	1	
2.1	172.82.133	Diaphragm	BRASS Л63-M, GOST 15527-70	1	
3	155.59.234sb	Pipe Union with Gasket	--	1	Assy drg.
3.1	155.59.587-1	PIPE UNION	BRASS C59-1 GOST 15527-70	1	
3.2	54.59.301	GASKET	COPPER M3 OR M1 & M2 AS PER GOST 859-78	1	

4	172.82.123-2A	Plug	STEEL 20X13, GOST 5638-72	1	
5	172.82.124Б	STRIKER	STEEL 20X13, GOST 3632-72	1	
6	172.82.125A	LOCKING RING	WIRE 1 H 12X18 HgT, GOST:18143-72	1	
7	172.82.127-1	NUT	STEEL 15, GOST 1050-74	1	USE WHEN SUPPLIED AS SPARES
8	172.82.141	STOPPER	ALUMINIUM ALLOY A1T GOST 4784-74	1	
19	172.82.224	STOPPER	RUBBER HO-68-1	1	
10	54.38.130	GASKET	SHEET АД1М GOST 21631-76	1	MAX .QTY
11	54.38.130-01	GASKET	SHEET АД1М GOST 21631-76	1	MAX .QTY
12	54.38.130-02	GASKET	SHEET АД1М GOST 21631-76	1	MAX .QTY
9	54.59.300	GASKET	FIBER SHEET Крт, GOST 14613-83	1	USE WHEN SUPPLIED AS SPARES
13	TY32ЦТBP-04-89	SEAL 10/6.5	TY32LTBP-04-89	1	
14	TY25-02.110459-85	PRESSURE INDICATOR CD	TY25-02.110459-85	1	
15	TY 14-3-321-74	CYLINDER K2-150Л-305	TY 14-3-321-74	1	
16	GOST 15899-93	KHLADON 114B2	GOST 15899-93	1.2	KG
17	GOST 792-67 KO 1.2	WIRE KO 1.2	GOST 792-67 KO 1.2	0.2	M
28	GOST 792-67 KO 1.2	WIRE KO 1	GOST 792-67 KO 1	0.2	M

Note: Vendor/Contractor may use approved alternate material issued by the tender/ supply order issuing authority in writing (if available).

8. CONDITIONS OF USE/STORAGE INSTRUCTIONS

This assy should be properly packed to protect from transits / handling damage and influence of atmospheric precipitations. In addition, the following parameters should be ensured: -

- a) The threaded parts are to be covered with suitable plastic caps to prevent damages.
- b) Each assy should be placed separately.
- c) The stores are to be suitably covered for preventing ingress of dust and dirty/entry of sunlight and moisture.
- d) The packaging slip shall contains
 - (i) Certificate of testing (NABL)
 - (ii) Pre-inspection report (PIR)
 - (iii) Guarantee/ Warranty Certificate
 - (iv) Service and maintenance instructions
 - (v) Delivery Slip with Inspector's Acceptance Mark.
 - (vi) Under taking certificate/certificate of conformance
- e) The stores are not permitted to be stored together with oils. Petrol, acids, alkaline and other substances to avoid damage to the metal / rubber components.

9. SAMPLING PLAN:

Sl. No.	Sampling Plan	Pilot *	Bulk
i.	Visual Inspection	100%	100%
ii.	Dimensional Checks	100%	General Inspection level II, single sampling, Normal Inspection, AQL 1.5 as per IS 2500 (Part-I)-2000
iii.	Material Checks	1 No	1 No for each batch of raw material or heat treatment lot as required by specification.
iv.	Acceptance test	100 %	100% as per drg / T.R points
v.	Fitment/ Performance test /trial	1 No	1 no. as and when required
vi.	Test stands/jigs/ fixtures/ gauges and calibration checks	100%	100%
vii.	Marking/ Identification	100%	100%
viii.	Packing/Preservation	100%	100%

* This clause is applicable if mentioned in supply order or project sanction order in case of Make-II.

Note:- A New supplier should supply bulk only after pilot sample inspection/ evaluation by HVF and obtain bulk production clearance from HVF.

10. VISUAL INSPECTION [Sampling plan as per Para- 9 (i)]

The stores are to be visually examined on 100 % of pilot /bulk and same should be free from any defects and all the finishing requirements shall satisfy

as indicated in technical conditions/requirements of the assy / components drawing respectively.

The components shall be checked for the following and should be free from the defects:

- Defects in construction
- Fitment of all components
- Dents, scratches and cracks etc
- Presence of foreign particles
- Moisture and dust
- Corrosion of metal parts
- Mechanical imperfections & distortion
- Any form of deterioration of material and finishing.

Packing and preservation should be ensured as per drawings/relevant TY specifications (To be ensured on receipt at consignee end).

11. DIMENSIONAL CHECKS [Sampling plan as per Para- 9 (ii)]

The dimensions of individual component, sub assy and major assy shall be checked and ensured as per respective drawings. Dimensional checks should be carried out as per sampling plan. However, the inspecting authority/rep. may at his discretion, tighten the inspection level and acceptance quality level on the critical items and adopt check point during manufacture.

11.1) CYLINDER DRG (172.82.099SBSB)

- a) The dimensions should be confirmed as per drawing specification.
- b) All the technical requirements (T.R) points to be ensured as drawing specification and as given below

- 1 *Dimensions for reference.
- 2 Fit the body of head, item 1, using lead monoxide diluted in natural drying oil to GOST 7931-76.
- 3 Before tightening, fit the striker in such away that the locking ring fits into the appropriate slots of striker and plug and reliably fixes the striker in the indicated position. After that apply grease on the inner taper of plug with graphite paste GOST 3333-80 and tighten fully.
- 4 Inscribe serial no. of cylinder and actual weight of cylinder (Error in measurement ± 0.005 kg) with all the parts excepting nut, item 7 and gasket, item 9 on the body of head (on the side opposite to filling pipe union) by etching or punching method in letter type ПО-5 GOST 2930-62.
- 5 Charge the cylinder with $(1.1^{+0.1})$ kg of chladon 114B2 GOST 15899-93. After filling the cylinder with chladon, add nitrogen GOST 9293-74 at pressure (7.0 ± 0.5) MPa (70 ± 5) kgf/cm² at $25 \pm 10^\circ\text{C}$ temperature.
- 6 Coating to be carried out as follows:
 Internal surface of cylinder, item 19, except thread with:
 Varnish ГФ-95 or ЛБС-1
 External surfaces of cylinder, item 19, except surfaces of stamp, with:
 Primer ФП-03K
 Enamel ПФ-115 or ПФ-223 red
 Surface of stamp – with:
 Varnish КО-85 or ГФ-95
 Outline of surface of stamp to be painted with:
 Enamel ПФ-223 or ПФ-115 yellow or
 Enamel ПФ-223 or ПФ-115 black or
 Enamel МС-17 black
 Dimensions of outline and width of line to be determined at the time of painting
 Inscribe inscriptions and paint outlines with:
 Enamel ПФ-223 or ПФ-115 yellow or
 Enamel ПФ-223 or ПФ-115 black or
 Enamel МС-17 black.
 Inscribe letters and digits of inscription in letter type ПО-8, ПО-12 and ПО-24 GOST 2930-62.
 Requirements are as per 520 TY5
- 7 Mount the pressure indicator, item 14 in the position indicated in the drawing by selecting gaskets, item 10, 11, and 12. Before fitment apply ANATHERM – 6B or ANATHERM – 18 TY 6-01-1215-79 or UNIGERM II TY 6-01-1309-85 to thread.
- 8 Weigh the charged and finally painted cylinder with inscription with all the parts, except nut, item 7 and gasket, item 9. Record the weight of cylinder (Error in measurement ± 0.005 kg) and date of weighing.
- 9 Test the charged cylinder for air-tightness:
 Hold it for four hours.
 Weigh.
 Apply soap water at the joints. There should not be any bubbles.
 Test for air-tightness by heating in water or air for four hours at $(95 \pm 5)^\circ\text{C}$. Cylinder head should not be dipped in water.
 Weigh. Difference in measurement is permissible upto ± 0.005 kg.
- 10 Check error of pressure indicator before filling cylinder as per drawing 155.59.233sb-1.
- 11 Other requirements are as per specification 520 TY1.

11.2) HEAD BODY WITH PIPE (172.82.055SB-1SB)

- a) All the dimensions should be confirmed as per drawing specifications.
- b) All technical requirements (T.R) points to be ensured as per drawing and as given below;

1. Dimensions for reference.
2. //K 62-0.5 or // 060-1 GOST 16130-90.
3. Other requirements are as per 520.TY1.

11.3) HEAD BODY (172.82.122-2)

- a) All the dimensions should be confirmed as per drawing specifications.
- b) All technical requirements (T.R) points to be ensured as per drawing and as given below

1. Alternate material-brass //M4 58-2 GOST 15527-70.
2. * Dimensions, surface finishing and tolerance for shape and location of surface to be ensured by tool.
4. Tapped thread may be made as per gauge made as per template or cylinder value.
6. Tolerance for alignment of surfaces B and F relative to surface A should not exceed 0.25 mm. MMC tolerance.
7. On surface E, tool marks are permitted.
8. For inscribing serial number of cylinder and its weight, flat may be formed with width not exceeding 10 mm for the entire length.
9. Other requirements as per 520.TY1.

11.4) TUBE (155.59.481)

- a) All the dimensions should be confirmed as per drawing specifications.
- b) All technical requirements (T.R) points to be ensured as per drawing and as given below

1. The tube should be smooth and should not have dents, cracks and fissures.
4. The tube may be manufactured from pipe K2-M-10x1 GOST 617-72.

11.5) WASHER WITH MEMBRANE (172.82.057SB)

- a) All the dimensions should be confirmed as per drawing specifications.

- b) All technical requirements (T.R) points to be ensured as per drawing and as given below

AFTER PUNCH LOCKING, TURNING THROUGH OF COMPONENT 172.82.132 RELATIVE TO COMPONENT 172.82.130 IS NOT ALLOWED.

11.6) WASHER (172.82.130)

- a) All the dimensions should be confirmed as per drawing specifications.
b) All technical requirements (T.R) points to be ensured as per drawing and as given below

1. MAY BE MANUFACTURED FROM STEEL GRADES: 30X12 GOST 5632-72

1.1 WASHER MAY BE MANUFACTURED FROM ALTERNATIVE MATERIAL

① STAINLESS STEEL AISI-304 AND HARDNESS OF FINISHED PRODUCT AS 250 BHN(max)

2. AS FAR AS SURFACE IS CONCERNED THE FOLLOWING IS ALLOWED:

A) RUN-OUT OF SPHERE R13 NOT TO EXCEED 0.2mm

B) RUN-OUT OF SURFACE Ø11 NOT TO EXCEED 0.3mm

C) END-PLAY OF SURFACE 'A' NOT TO EXCEED 0.3mm

3. TO BE HEATED IN BLANK HARDNESS - BHN 302-255
(DIA OF IND. 3.5-3.9)

4. NOT TO BE MARKED

SURFACE FINISH:-

▽3 (▽) :- REPRESENTS THE SURFACE FINISH TO BE OBTAINED IN Ra VALUE 20µ max ON THOSE SURFACES WHERE SURFACE FINISH IS NOT SPECIFIED.

▽5 :- REPRESENTS SURFACE FINISH Ra VALUE 5 MICRONS(max)

▽7 :- REPRESENTS SURFACE FINISH Ra VALUE 1.25 MICRONS

• DRG. REDRAWN ON DT. 15.12.98

• DRG BASED ON ORIGINAL DRG. No. 172.82.130

11.7) GASKET (172.82.132)

- a) All the dimensions should be confirmed as per drawing specifications.
b) All technical requirements (T.R) points to be ensured as per drawing and as given below

1. MAY BE MANUFACTURED FROM COPPER GRADES M1-M, M2-M GOST-859-66

2. DIFFERENCE IN BODY THICKNESS ALONG WIDTH OF COMPONENT MAY NOT EXCEED 0.2mm

3. GASKET MAY BE MANUFACTURED FROM ALTERNATIVE MATERIAL
[i.e. COPPER GRADE ATP TO IS: 1972-77]

4. SURFACE FINISH

- i) $\nabla 1(\nabla)$:- REPRESENTS SURFACE FINISH $\nabla 1$ (80 MICRONS) ON THOSE SURFACES WHERE SURFACE FINISH IS NOT SPECIFIED.
- ii) $\sim$:- REPRESENTS SURFACE FINISH 50 MICRONS.
- iii) $\Delta 6$:- REPRESENTS SURFACE FINISH 2-5 MICRONS

11.8) DIAPHRAGM (172.82.133)

- a) All the dimensions should be confirmed as per drawing specifications.
 - b) All technical requirements (T.R) points to be ensured as per drawing and as given below
 - 1. MAY BE MANUFACTURED FROM BRASS GRADES: A6 34 T-H GOST-15527-70, A63-OT-H GOST-15527-70 OR A63 T-H, IN THIS CASE BRASS GRADE A63-T-H SHOULD BE ANNEALED.
 - 3. SURFACE OF THE DIAPHRAGM SHOULD BE CLEAN AND SMOOTH WITHOUT FILM, CRACKS, BUBBLES, EXFOLIATION, ROUGH SCORES, DENTS AND OTHER DEFECTS.
 - 4. TO BE ANNEALED AFTER STAMPING
 - 5. DIAPHRAGM MAY BE MANUFACTURED FROM ALTERNATIVE MATERIAL i.e. COPPER SHEET Gd ATP OR DPA TO IS: 1972-77
- HARDNESS SHOULD BE 80 HV(min) ON FINISH PRODUCT.

SURFACE FINISH

- 133 $\sim$:- REPRESENTS R_a VALUE OF SURFACE ROUGHNESS MAXIMUM 80 MICRON ON THOSE SURFACE WHERE SURFACE FINISH IS NOT SPECIFIED.

11.9) PIPE UNION WITH GASKET (155.59.234SB)

- a) All the dimensions should be confirmed as per drawing specifications.
- b) All technical requirements (T.R) points to be ensured as per drawing and as given below
 - 1. Dimension for reference.
 - 2. Gasket item 2, should not fall out. For that, the edges of pipe union, item 1 should be subjected to tight slightly at diametrically opposite points.
 - 3. Other requirements are as per 520.TY1.

11.10) PIPE UNION (155.59.587-1)

- a) All the dimensions should be confirmed as per drawing specifications.

- b) All technical requirements (T.R) points to be ensured as per drawing and as given below.

1. Alternate material brass //M458-2, //63 GOST 15527-70.
2. * Surface finish should be ensured by tool.
3. Tool marks on surface ξ are allowed.
4. Other requirements are as per 520.TY1.

11.11) GASKET (54.59.301)

- a) All the dimensions should be confirmed as per drawing specifications.
- b) All technical requirements (T.R) points to be ensured as per drawing and as given below

1. There should not be burrs.
2. To be annealed in blank.
3. Not to be stamped.
4. While making component from rod with the dimension of $\phi 7-0.1$, machining should not be done along $\phi 7\text{mm}$.
5. The gasket may be manufactured from copper rod of grades M1 and M2 GOST 859-66 and from rod M3.Tkp.H-M7 GOST 1535-71.

11.12) PLUG (172.82.123-2A)

- a) All the dimensions should be confirmed as per drawing specifications.
- b) All technical requirements (T.R) points to be ensured as per drawing and as given below

1. BHN 225---302 (DIA OF INDN.3.6 TO 3.5) - TO BE CHECKED IN BLANK.
2. ALTERNATE MATERIAL - STEEL, GRADE 30x13 GOST 5632-72.
3. ON SURFACE α SEPERATE MARKS WITHIN THE LIMIT OF RZ 20 HEIGHT ARE ALLOWED.
4. ON SURFACE Γ TOOL MARKS ARE ALLOWED.
5. POSITION OF SLOT 74 14 AND HOLES $\phi 3\text{H } 14$ - ARBITRARY.
- 6 COATING : CHEMICAL PASSIVATION.
- 7 OTHER REQUIREMENT SHOULD COMPLY WITH 520.TY1.

11.13) STRIKER (172.82.124 B)

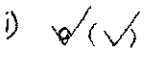
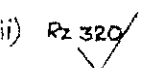
- a) All the dimensions should be confirmed as per drawing specifications.

- b) All technical requirements (T.R) points to be ensured as per drawing and as given below
1. *DIMENSION FOR REFERENCE.
 2. BHN 321 TO 269 TO BE CHECKED IN BLANK.
 3. ALTERNATE MATERIAL: STEEL TRADE 30x13, 12x13 GOST 5632-72.
 4. COATING : CHEMICAL PASSIVATION.
 5. COMPONENT MAY BE POLISHED WITH ELECTROLYTIC METHOD AFTER ELECTRICALISATION DIAMETER Ø 17 MAY BE INCREASED BY 0.02 MM BEYOND TOLERANCE OTHER DIMENSIONS AFTER ELECTRICALISATION NEED NOT BE CHECKED.
 6. OTHER REQUIREMENT SHOULD COMPLY WITH 520 TY 1.

11.14) LOCKING RING (172.82.125A)

- a) All the dimensions should be confirmed as per drawing specifications.
- b) All technical requirements (T.R) points to be ensured as per drawing and as given below
1. ALTERNATE MATERIAL :- WIRE 1-H-12 x 18 HGT GOST 18143-72.
 2. WHEN DRAWING FACES OF RING TOGETHER AGAINST THE STEP, RING SHOULD NOT HAVE RESIDUAL DEFORMATION.
 3. RINGS SHOULD BE MADE OVAL.
 4. COATING : CHEMICAL PASSIVATION.
 5. * DIMENSIONS FOR REFERENCE.

SURFACE FINISH

- i)  :- REPRESENTS SURFACE FINISH TO BE OBTAINED WITHOUT REMOVAL OF MATERIAL ON THOSE SURFACES WHERE SURFACE FINISH IS NOT SPECIFIED.
- ii)  :- REPRESENTS THE Rz VALUE OF SURFACE FINISH TO BE OBTAINED BY ANY PRODUCTION METHOD IS NOT MORE THAN 320 MICRONS.

11.15) NUT (172.82.127-1)

- a) All the dimensions should be confirmed as per drawing specifications.
- b) All technical requirements (T.R) points to be ensured as per drawing and as given below
- c) Cracks and ruptures are not allowed.
- d) Reset of the requirements as per 520.TY1

1. MAY BE MANUFACTURED FROM STEEL GRADES FROM 20 TO 35 OPEN HEARTH STEEL 40 GOST 1050-74.
2. RUN-OUT OF $\varnothing 18.5$ SURFACE RELATIVE TO THREAD NOT TO EXCEED 0.6 mm.
3. SHIFT OF AXES OF $\varnothing 2$, HOLES FROM TRUE POSITION NOT TO EXCEED 1 mm.
4. RUN-OUT OF THREAD RELATIVE TO $\varnothing 35$ SURFACE NOT TO EXCEED 0.6 mm.
5. SHIFT OF AXIS OF HEXAGON BAR RELATIVE TO AXIS OF $\varnothing 18.5$ HOLE NOT TO EXCEED 0.5 mm.
6. COATING: Zn 6 CHROMATIZING. PRESENCE OF ZINC IN HOLES $\varnothing 2$ SHOULD NOT BE CHECKED.
- 10) 7. ~~COATING: PAINT IN COMPLIANCE WITH EXISTING SPECIFICATIONS.~~
- 10) 8. PAINT THE SURFACE " 5 " ONLY AS PER THE REQUIREMENTS OF ASSY DRAWING.

11.16) STOPPER (172.82.141)

- a) All the dimensions should be confirmed as per drawing specifications.
- b) All technical requirements (T.R) points to be ensured as per drawing and as given below

SCALE 2:1

SURFACE ROUGHNESS

RA - INDICATES R_a VALUE OF SURFACE FINISH IN MICRON WHERE THE SURFACE FINISH IS NOT SPECIFIED.

BO - INDICATES R_a VALUE OF SURFACE FINISH MAY BE AROUND

KNURLING

PITCH (P) = 1mm KNURLING HEIGHT (H) = 0.50 ANGLE (A) = 90°

1 MAY BE MANUFACTURED FROM ALUMINUM ALLOY R 601 GOST 4784-74

2 1.50 TO 5.00 DEPTH BEFORE ANNEALING

3 ON SURFACE & THERE MAY BE CENTER DUE TO DRILLING & IS MAX

11.17) STOPPER (172.82.224)

- a) All the dimensions should be confirmed as per drawing specifications.
- b) All technical requirements (T.R) points to be ensured as per drawing and as given below

1. Alternate. Material- sheet of any grade TY 005216-99.
2. * Dimensions for reference.
3. Shrinkage of edges not to be checked.
4. Cuts and surface ruptures is not allowed.
5. Other requirements as per TY 005216-99.

11.18) GASKET (54.38.130)

- a) All the dimensions should be confirmed as per drawing specifications.
- b) All technical requirements (T.R) points to be ensured as per drawing.

11.09 GASKET (54.38.130-01)

- a) All the dimensions should be confirmed as per drawing specifications.
- b) All technical requirements (T.R) points to be ensured as per drawing.

11.10 GASKET (54.38.130-02)

- a) All the dimensions should be confirmed as per drawing specifications.
- b) All technical requirements (T.R) points to be ensured as per drawing.

11.11 GASKET (54.59.300)

- a) All the dimensions should be confirmed as per drawing specifications.
- b) All technical requirements (T.R) points to be ensured as per drawing and as given below

1. Cracks and fissures are not allowed.
2. Other requirements are as per 520.TY1.

11.12 SEAL 10/6.5 (TY32LTBP-04-89)

- a) All the dimensions should be confirmed as per TY32LTBP-04-89 specifications.

11.13 PRESSURE INDICATOR CД (TY25-02.110459-85)

- a) . All the dimensions should be confirmed as per drawing TY25-02 110459-85 specifications.

11.13 CYLINDER K2-150 Л-305 (TY 14-3-321-74)

- a) All the dimensions should be confirmed as per drawing TY 14-3-321-74 Specifications.

11.14 KHLADON 114B2 (GOST 15899-93)

- a) Halon 1301 gas should be confirmed as per Specification.

11.15 WIRES KO 1.2 & KO 1 (GOST 792-67 KO 1.2 & KO 1)

- a) All the dimensions should be confirmed to KO 1.2 & KO 1 as per drawing GOST 792-67 specifications.

12) MATERIAL CHECKS [SAMPLING PLAN AS PARA – 9 (iii)]

Material specimen /test bars of the components shall be in conformity as per the material mentioned in the relevant documents/drawings as per the bill of materials (BOM). NABL test reports for all the parameters as per relevant specifications to be submitted. Test samples to be submitted by the vendor to HVF, if required. The material check will be carried out as per sampling plan. However, if the manufacturer proposes any alternative material at the stage of tender enquiry, the same has to be approved and a written concurrence should be obtained from AHSP through DDO/HVF, before usage of such materials.

12.01) HEAD BODY WITH PIPE (172.82.055SB-1)

- a) The component should be manufactured as per Specification.
- b) The chemical composition and mechanical properties should be confirmed as per Specification.

12.02) HEAD BODY (172.82.122-2)

- a) The component should be manufactured as per Specification.
- b) The chemical composition and mechanical properties should be confirmed as per drg./Specification.

1. Alternate material-brass /IMu 58-2 GOST 15527-70.

12.03) TUBE (155.59.481)

- a) The component should be manufactured as per Specification.
- b) The chemical composition and mechanical properties should be confirmed as per drg./Specification.

EXPLANATORY NOTES TO TECH. CONDITIONS.

TUBE SHOULD BE MANUFACTURED FROM COPPER OF GRADE M3 OR M2 DRAWN SOFT TO GOST 617-72.

CHEMICAL COMPOSITION AS PER GOST 652-79 (AS REFERRED IN GOST 617-72)

GRADE	Cu+Ag NOT LESS THAN %	IMPURITIES % max								
		Bi	Sb	ARSENIC	Fe	Ni	Pb	Sn	S	O
M3	99.5	0.003	0.05	0.01	0.05	0.20	0.05	0.05	0.01	0.08
M2	99.7	0.002	0.005	0.01	0.05	0.20	0.01	0.05	0.01	0.07

MECHANICAL PROPERTIES

GRADE	TENSILE STRENGTH, kg/cm^2	PERCENTAGE ELONGATION
M3	20 min.	35 min.
M2	20 min.	35 min.

SURFACE FINISH

~ 1 - REPRESENTS SURFACE FINISH OF R_a VALUE 80 MICRONS ON THOSE SURFACES WHERE SURFACE FINISH IS NOT SPECIFIED.

12.04 WASHER WITH MEMBRANE (172.82.057SB)

- The component should be manufactured as per Specification.
- The chemical composition and mechanical properties should be confirmed as per drg./Specification.

12.05 WASHER (172.82.130)

- The component should be manufactured as per Specification.
- The chemical composition and mechanical properties should be confirmed as per drg./Specification.

EXPLANATORY NOTES TO TECHNICAL CONDITIONS

- 1) WASHER SHOULD BE MANUFACTURED FROM STEEL GRADE 20 X 13 OR 30 X 13 TO GOST 5632-72

CHEMICAL COMPOSITIONS %

CONTENTS OF ELEMENTS %	GRADES	
	20X13	30X13
CARBON	0.16 - 0.25	0.26 - 0.35
SILICON (max)	0.8	0.8
MANGANESE (max)	0.8	0.8
CHROMIUM	12.0 - 14.0	12.0 - 14.0
IRON	BASE	BASE
SULPHUR (max)	0.025	0.025
PHOSPHORUS (max)	0.030	0.030

1A) ALTERNATIVELY WASHER SHOULD BE MANUFACTURED FROM
STEEL AISI - 304

CHEMICAL COMPOSITION %

CARBON (C)	— 0.08 (max)
MANGANESE (Mn)	— 2.00 (max)
SILICON (Si)	— 1.00 (max)
CHROMIUM (Cr)	— 18.00 to 20.00
NICKEL (Ni)	— 8.00 to 10.50

12.06 GASKET (172.82.132)

- The component should be manufactured as per Specification.
- The chemical composition and mechanical properties should be confirmed as per drg./Specification.

EXPLANATORY NOTES TO TECHNICAL CONDITIONS

1. GASKET SHOULD BE MANUFACTURED FROM COPPER GRADE M3-M
(M IS FOR SOFT) OF GOST-859-78.

THE CHEMICAL COMPOSITION IS AS GIVEN BELOW:-

Cu + Ag	— 99.5 % (min)
<u>IMPURITIES</u>	
BISMUTH	— 0.003 % (max)
ANTIMONY	— 0.05 % (max)
ARSENIC	— 0.01 % (max)
IRON	— 0.05 % (max)
NICKEL	— 0.2 % (max)
LEAD	— 0.05 % (max)
TIN	— 0.05 % (max)
SULPHUR	— 0.01 % (max)
OXYGEN	— 0.005 % (max)

2. GASKET MAY BE MANUFACTURED FROM COPPER GRADE M1-M, M2-M OF
GOST 859-78.

THE CHEMICAL COMPOSITION IS AS GIVEN BELOW

CHEMICAL COMPOSITION	COPPER GRADE	
	M1-M	M2-M
Cu + Ag	99.9 % (min)	99.7 % (min)
<u>IMPURITIES</u>		
BISMUTH	0.001 % (max)	0.002 % (max)
ANTIMONY	0.002 % (max)	0.005 % (max)
ARSENIC	0.002 % (max)	0.01 % (max)
IRON	0.005 % (max)	0.05 % (max)
NICKEL	0.002 % (max)	0.2 % (max)
LEAD	0.005 % (max)	0.01 % (max)
TIN	0.002 % (max)	0.05 % (max)
SULPHUR	0.002 % (max)	0.01 % (max)
OXYGEN	—	0.07 % (max)
ZINC	0.004 % (max)	—

3. ALTERNATIVELY GASKET MAY BE MANUFACTURED FROM COPPER GRADE ATP TO IS: 1972-77. THE CHEMICAL COMPOSITION AND PHYSICAL PROPERTIES AS GIVEN BELOW:-

CHEMICAL COMPOSITION IN %

COPPER + SILVER	—	99.20 (min)
ARSENIC	—	0.20 - 0.50
ANTIMONY	—	0.01 (max)
BISMUTH	—	0.005 (max)
IRON	—	0.02 (max)
LEAD	—	0.02 (max)
NICKEL	—	0.15 (max)
SELENIUM & TELLURIUM	—	0.03 (max)
TIN	—	0.03 (max)
OXYGEN	—	0.10 (max)

PHYSICAL PROPERTIES

TENSILE STRENGTH - 205 N/mm² (21 Kg/mm²) (min)

ELONGATION % - 75 (min)

HARDNESS - 60 HV (max)

12.07) DIAPHRAGM (172.82.133)

- The component should be manufactured as per Specification.
- The chemical composition and mechanical properties should be confirmed as per drg./Specification.

EXPLANATORY NOTES TO TECH. CONDITIONS:-

DIAPHRAGM SHOULD BE MANUFACTURED FROM BRASS OF GRADE N 63 SOFT TO GOST 15527-70

CHEMICAL COMPOSITION

BASIC ELEMENTS %		ADMIXTURE % (max)					
COPPER	ZINC	LEAD	IRON	ANTIMONY	BISMUTH	PHOSPHORUS	TOTAL
62.0 - 65.2	REMAINING	0.07	0.2	0.005	0.002	0.01	0.5

- ALTERNATIVELY DIAPHRAGM SHOULD BE MANUFACTURED FROM COPPER SHEET Gd ATP OR DPA OF IS: 1972-77

CHEMICAL COMPOSITION IN %

	GRADE ATP	GRADE DPA
COPPER + SILVER	99.20 (min)	99.20 (min)
ARSENIC	0.20 - 0.50	0.20 - 0.50
ANTIMONY	0.01 (max)	0.01 (max)
BISMUTH	0.005 (max)	0.003 (max)
IRON	0.02 (max)	0.03 (max)
LEAD	0.02 (max)	0.010 (max)
NICKEL	0.15 (max)	0.15 (max)
SELENIUM & TELLURIUM	0.03 (max)	0.02 (max)
TIN	0.03 (max)	0.01 (max)
OXYGEN	0.10 (max)	—
PHOSPHORUS	—	0.015 - 0.10
TELLURIUM	—	0.01 (max)
TOTAL OF ALL IMPURITIES EXCLUDING SILVER, NICKEL, ARSENIC & PHOSPHORUS	—	0.07 (max)

HARDNESS SHOULD BE 60 HV (min) ON FINISH PRODUCT.

12.07) PIPE UNION WITH GASKET (155.59.234SB)

- The component should be manufactured as per Specification.
- The chemical composition and mechanical properties should be confirmed as per drg./Specification.

12.09) PIPE UNION (155.59.587-1)

- The component should be manufactured as per Specification.

- b) The chemical composition and mechanical properties should be confirmed as per drg./Specification.

Alternate material is given below.

1. Alternate material brass //M458-2, //63 GOST 15527-70.

12.10) GASKET (54.59.301)

- a) The component should be manufactured as per Specification.
b) The chemical composition and mechanical properties should be confirmed as per drg./Specification.

EXPLANATORY NOTES TO TECH. CONDITIONS

- 1 GASKET SHOULD BE MANUFACTURED FROM COPPER GRADE M3 OR M1 & M2 AS PER GOST 859-78

CHEMICAL COMPOSITION

CONTENTS OF ELEMENTS	GRADES		
	M1	M2	M3
Cu + Ag NOT LESS THAN	99.9	99.7	99.5
IMPURITIES NOT MORE THAN			
BISMUTH	0.001	0.002	0.003
ANTIMONY	0.002	0.005	0.05
ARSENIC	0.002	0.01	0.01
IRON	0.005	0.05	0.05
NICKEL	0.002	0.20	0.2
LEAD	0.005	0.01	0.05
TIN	0.002	0.05	0.05
SULPHUR	0.004	0.01	0.01
OXYGEN	—	0.07	0.08
ZINC	0.004	—	—
PHOSPHORUS	—	—	—

2 SURFACE FINISH

▽3 — REPRESENTS SURFACE FINISH R_a VALUE 20 MICRONS ON THOSE SURFACES UNLESS OTHERWISE SPECIFIED.

- c) Alternate material is given below.

The gasket may be manufactured from copper rod of grades M1 and M2 GOST 859-66 and from rod M3.Tkp.H-M7 GOST 1535-71.

12.11) PLUG (172.82.123-2A)

- a) The component should be manufactured as per Specification.
b) The chemical composition and mechanical properties should be confirmed as per drg./Specification.

ALTERNATE MATERIAL - STEEL, GRADE 30x13 GOST 5632-72.

- The component should be manufactured as per Specification.
- The chemical composition and mechanical properties should be confirmed as per drg./Specification.

c) Alternate material is given below.

ALTERNATE MATERIAL: STEEL TRADE 30x13, 12x13 GOST 5632-72.

- The component should be manufactured as per Specification.
- The chemical composition and mechanical properties should be confirmed as per drg./Specification.

RING LOCKING SHOULD BE MANUFACTURED FROM COLD HARDENED WIRE GRADE 12 X 18 H 17
OF GOST 18143-72.

Fe	S	P	C	Si	Mn	Cu	Ni	Ti
BASE	0.020% (max)	0.035% (max)	0.12% (max)	0.8% (max)	2.0% (max)	0.0-0.50%	0.0-9.5%	0.5-0.5%

ULTIMATE TENSILE STRENGTH (10 kgf/mm ² (min))	PERCENTAGE ELONGATION FOR GAUGE LENGTH L=100mm 20 % (min)
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DIMENSIONS

i) DIA OF WIRE :- 1.0 mm

(ii) TOLERANCE ON DIA (FOR STANDARD ACCURACY) :- $+0.04 \text{ mm}$
 -0.03 mm

THE CHEMICAL COMPOSITION CONFORMS TO GOST 5632-72 IS AS FOLLOWS:

Fe	S	P	C	Si	Mn	Cr	Ni	Ti
BASE	0.020% (max)	0.035% (max)	0.12% (max)	0.8% (max)	2.0% (max)	17.0-19.0% (max)	9.0-11.0% (max)	0.5-0.8% (max)

ULTIMATE TENSILE STRENGTH $150 \text{ kgf/mm}^2 \text{ (min)}$	PERCENTAGE ELONGATION FOR GAUGE LENGTH $L=100\text{mm}$ $20 \% \text{ (min)}$
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1) ✓(✓) :- REPRESENTS SURFACE FINISH TO BE OBTAINED WITHOUT REMOVAL OF MATERIAL ON THOSE SURFACES WHERE SURFACE FINISH IS NOT SPECIFIED.

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c) Alternate material is given below.

ALTERNATE MATERIAL :- WIRE 1-H-12 x 18 HQT GOST 18143-72.

12.14) NUT (172.82.127-1)

- a) The component should be manufactured as per Specification.
- b) The chemical composition and mechanical properties should be confirmed as per drg./Specification.

MATERIAL:-
STEEL 15, GOST 1050-74

c) Alternate material is given below:

1. MAY BE MANUFACTURED FROM STEEL GRADES FROM 20 TO 35 OPEN HEARTH STEEL 40 GOST 1050-74.

12.15) STOPPER (172.82.141)

- a) The component should be manufactured as per Specification.
- b) The chemical composition and mechanical properties should be confirmed as per drg./Specification.

EXPLANATORY NOTES TO TECHNICAL CONDITIONS

STOPPER SHOULD BE MANUFACTURED FROM ALUMINIUM ALLOYS D1 T OR D16 T OF GOST-4784-74.

CHEMICAL COMPOSITION

ELEMENT %	GRADE D1	GRADE D16
ALUMINIUM	BASE CONSTITUENT	BASE CONSTITUENT
COPPER	3.0 4.8	3.8 4.90
MAGNESIUM	0.4 0.8	1.2 1.80
MANGANESE	0.4 0.8	0.3 0.90
IMPURITIES (MAX)		
IRON	0.7	0.5
SILICON	0.7	0.5
NICKEL	0.1	0.1
ZINC	0.3	0.3
TITANIUM	0.1	0.1
OTHER IMPURITIES EACH INDIVIDUALLY	0.05	0.05
TOTAL	0.10	0.10

MECHANICAL PROPERTIES AS PER GOST 21488-76 (AS REFERRED IN GOST 4784-74)

GRADE OF AL ALLOY	MATERIAL CONDITION	CONDITION OF TEST SPECIMENS	TENSILE STRENGTH 6 U kg/mm ²	YIELD POINT 60.2 kg/mm ²	% ELONGATION 6 E
D1	HARDENED NATURALLY AGED	HARDENED NATURALLY AGED	38.0	22.0	12.0
D16	WITHOUT HEAT TREATMENT	d0	43.0	30.0	10.0

c) Alternate material is given below:

MAY BE MANUFACTURED FROM ALUMINIUM ALLOY A 16 T GOST 4784-74.

12.16) STOPPER (172.82.224)

- a) The component should be manufactured as per Specification.
- b) The physico- mechanical properties should be confirmed as per drg./Specification.

Sheet 254310-4 TY 005216-99
Rubber HO-68-1

- c) Alternate material is given below:

Alternate. Material- sheet of any grade TY 005216-99.

12.17) GASKET (54.38.130)

- a) The component should be manufactured as per SHEET АД1М GOST 21631-76.

- b) Alternate material is given below.

ALTERNATIVE MATERIAL : SHEET АДМ OR SHEET АОМ
GOST 21631-76.

ALT. MATL: GRADE 19500 TO IS: 737-86.

- c) The chemical composition and mechanical properties should be confirmed to SHEET АД1М as per GOST 21631-76.

12.18) GASKET (54.38.130-01)

- a) The component should be manufactured as per SHEET АД1М GOST 21631-76.

- b) Alternate material is given below.

ALTERNATIVE MATERIAL : SHEET АДМ OR SHEET АОМ
GOST 21631-76.

ALT. MATL: GRADE 19500 TO IS: 737-86.

- c) The chemical composition and mechanical properties should be confirmed to SHEET АД1М as per GOST 21631-76.

12.19) GASKET (54.38.130-02)

- a) The component should be manufactured as per SHEET АД1М GOST 21631-76.

- b) Alternate material is given below.

ALTERNATIVE MATERIAL : SHEET АДМ OR SHEET АОМ
GOST 21631-76.

ALT. MATL: GRADE 19500 TO IS: 737-86.

- c) The chemical composition and mechanical properties should be confirmed to SHEET АД1М as per GOST 21631-76.

12.20) GASKET (54.59.300)

- a) The component should be manufactured as per Specification.
b) The chemical composition and mechanical properties should be confirmed as per drg./Specification.

EXPLANATORY NOTES TO TECHNICAL CONDITIONS.

GASKET SHOULD BE MANUFACTURED FROM FIBRE BOARD SHEET OF GRADE ФМК (ФПК) TO GOST 14613-69, PROPERTIES ARE GIVEN BELOW.

PARAMETERS	NORMS
1. MINIMUM DENSITY IN g/cm^3 OF FIBRE BOARD OF NOMINAL THICKNESS OF 2mm	1.15
2a) ULTIMATE TENSILE STRENGTH kgf/cm^2 IN MACHINE DIRECTION NOT LESS THAN	500
b) IN TRANSVERSE DIRECTION, NOT LESS THAN	400
3 ADHESIVE STRENGTH IN gf/cm , NOT LESS THAN	170
4 ZINC CHLORIDE CONTENT BY WEIGHT %, NOT MORE THAN	0.20
5 ASH CONTENT BY WEIGHT %, NOT MORE THAN	2.0
6 WATER ABSORPTION IN % AFTER 24 HOURS, NOT MORE THAN	60
7 COLOUR	NATURAL FIBRE COLOUR

12.21) SEAL 10/6.5 (TY32Utp-04-89)

- a) The component should be manufactured as per Specification.
b) The chemical composition and mechanical properties should be confirmed as per drg./Specification.

12.22) PRESSURE INDICATOR CD (TY25-02.110459-85)

- a) The component should be manufactured as per TY25-02.110459-85.
b) The chemical composition and mechanical properties should be confirmed to drg./Specification.

12.23) CYLINDER K2-150Л-305 (TY 14-3-321-74)

- a) The component should be manufactured as per TY 14-3-1469-87.
b) The chemical composition and mechanical properties should be confirmed as per drg./Specification.

12.24) KHLADON 114B2 (GOST 15899-93)

- a) Halon 1301 gas should be manufactured as per Specification IS 15220-2002.
b) The chemical composition and testing parameters should be confirmed as per Specification IS 15220-2002.

12.25) WIRES (GOST 792-67 KO 1.2 & KO 1)

- a) The component should be manufactured as per as per STEEL 20X13 GOST 5632-72.
- b) The chemical composition and mechanical properties should be confirmed to STEEL 20X13 as per GOST 5632-72.

13. Weighment Test reports to be submitted for the following stages in Tabular Format :

1. After Filling of Halon 1301 gas, List of Cylinders to be prepared along with Mother Cylinder Nos., Qty. of Cylinder Assy, Cylinder Sl. Nos., Valve Sl. Nos. Wt. of empty Cylinder Assy (Kg.), Wt. of Cylinder Assy after Halon 1301 filling before N2 Pressurizing (Kg.), Wt. of Halon 1301 Filled (Kg.), Super Pressurized Cylinder Assy. With Nitrogen at a pressure of 70+5 kg/Cm2, Filled wt. of Cylinder Assy. After N2 pressurizing (Kg.), Filled Wt. of Cylinder Assy. After 55+/- 5 deg. C test (Kg.), Difference in filled Wt. before and after 55+/- 5 deg. C test (Difference should not be more than +/- 0.005 Kg.) to be submitted to HVF.
2. Final Weighment list – List of Cylinders to be prepared along with Mother Cylinder Nos., Qty. of Cylinder Assy., Cylinder Sl. Nos., Valve Sl. Nos., Tare Wt.(Kg.), Gross Wt. (Kg.), Gross Weight after N2 Pressurizing (Kg.), Final Tare Wt. (Kg.), Wt. of Halon 1301 Gas Filled (Kg.) and Final Gross Weight (Kg.).
Note: Tare weight – Weight of Cylinder (Without paint), Valve (except component 172.82.127-1 and 54.59.300), Wire Lock and Seal. Gross Weight = Tare Weight + Weight of Halon 1301 gas. Final Tare Wt. = Tare Weight of Cylinder after painting, Stenciling, Varnishing on outer surface of cylinder along with component 155.38.278-A (Packing) without Halon 1301 gas. Final Gross Wt.= Final Tare Weight of Cylinder + Halon 1301 gas.
3. Break up details of consumption of Halon 1301 gas in Kgs. From the Mother Cylinder to FF Cylinders for various Supply Orders to be prepared by Firm and is required to be submitted to HVF.

14) PERFORMANCES/ ACCEPTANCE TEST:

CYLINDER to DRG (172.82.099SBSB)

After the assembly and charging of Halon 1301 and supercharged with Nitrogen gas (assembled complete in all respects) should be tested for Performance at HVF by Witness/Verification (once or as and when required basis) by the firm representatives in co-ordination with HVF team of inspectors at HVF.

15) FITMENT / PERFORMANCE TEST/TRAIL:

- a) Pilot samples should be checked for fitment / Performance test to ascertain the efficacy of the system under different operating conditions by fitting in higher assembly and repeating it for functional checks & performance to be monitored, wherever required.

- b) Bulk supply may be subjected to performance trial in higher assembly in case of repeated failure/defects during exploitation.

16) TEST STANDS/JIGS/FIXTURES/GAUGES & CALIBRATION CHECKS:

- a) The supplier / Contractor should manufacture a suitable Test Stand/ jigs/ fixtures & mandrels and gauges to carry out pressure test/quality checks and to ensure conformance of components/assy as per drawing specification / T.R points and process sheet (if applicable).
- b) The supplier/contractor should submit calibration reports for instruments/fixtures/gauges etc., which are used during inspection activities.

17) MARKING/IDENTIFICATION CHECKS:

For traceability, marking of part No., Manufacturer name, supply order No, Serial No/Qty, batch No. and manufacture date & year are to be carried out in all components. Suitable method of marking can be adopted, provided the above details are legible. Inscription if any as called for in the relevant drawing is also to be carried out.

18) PRESERVATION CHECKS:

- a) Preservative coatings are to be strictly adhered to as called for in the drawing. However, equivalent BIS Standards can also be followed, subject to the thickness of the coating is maintained as per the drawing.
- b) Other preservations as necessary to prevent damages due to moisture and dust during process, storage and transit are to be carried out. Conventional methods can also be resorted to.

19) PACKING CHECKS:

- a) Components / Assemblies are to be packed separately to avoid damages during transit / handling of the same. Part No. and No. of sets are to be marked on the packing.
- b) Packing and preservation should be ensured as per drawings/relevant TY specifications (To be ensured on receipt at consignee end).

20) DOCUMENTATION:

- a) Firm has to maintain all the documents as per QAP with respect to the SI.No. to have traceability.
- b) Vendor has to submit Bill of materials, Material test reports, Class 'C' /Endurance test reports (wherever specified in drg/TY specification/QAP) and Complete PIR (pre-inspection report) at the time of offering the item for inspection. HVF will commence the inspection only after scrutiny of these documents.

- c) Pre inspection reports (PIR) of firm such as,
 - 1. Chemical analysis, Mechanical properties obtained from NABL as per bill of material (BOM) with respect to material specification.
 - 2. Pre-forming process report as per process sheet
 - 3. Coating certificates, hardness report, heat treatment certificates (wherever applicable)
 - 4. Calibration reports of instruments and gauges,
 - 5. 100% Dimensional inspection reports (including T.R points)
 - 6. Performance/Functional test reports are to be submitted.
- d) The testing/inspection responsibility to test all the parameters as per QAP and drawing specifications as mentioned in Annexure -A (enclosed).

21) REFERENCES:

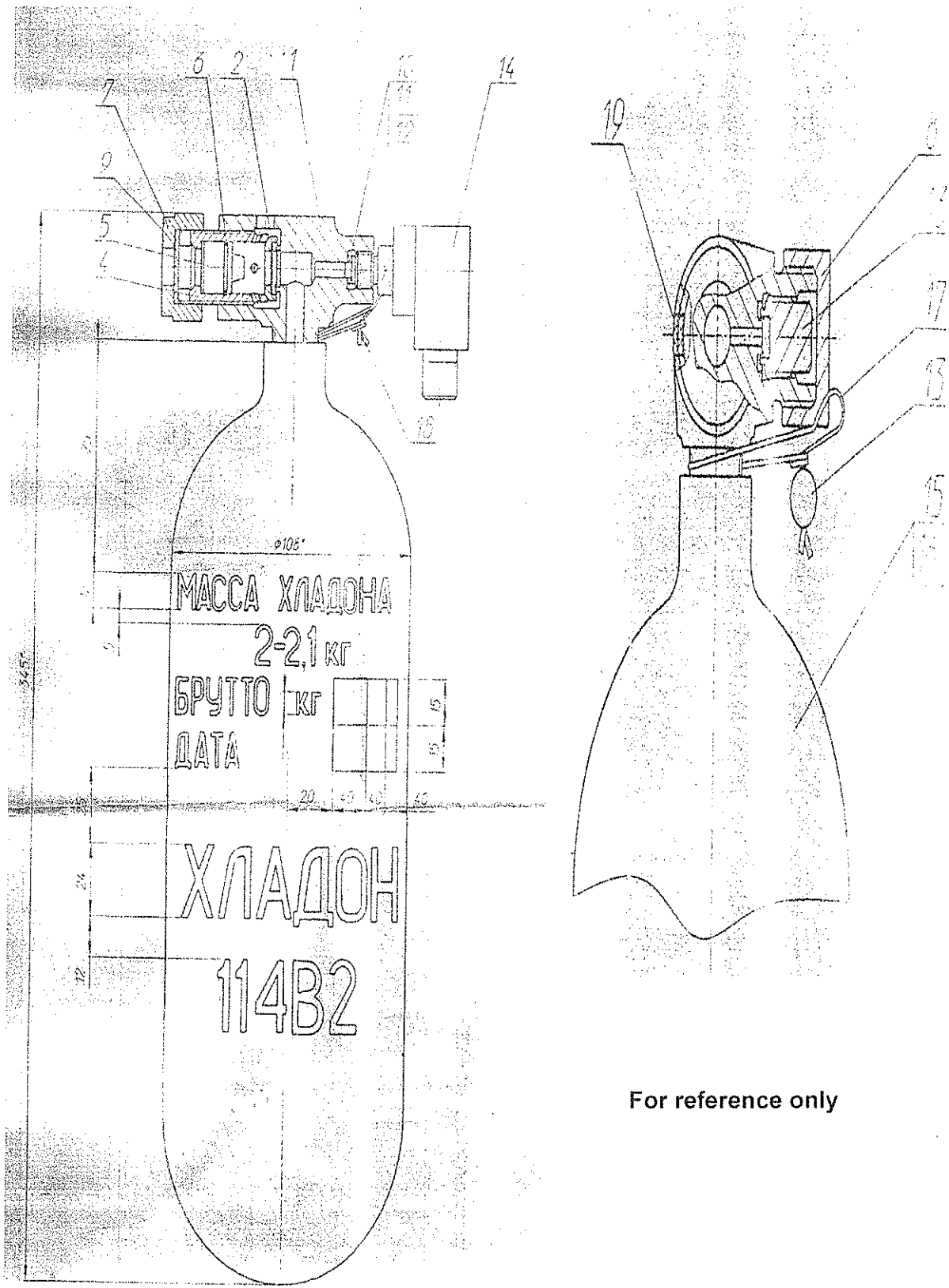
- a) Refer all drawings to 172.82.099SBSB (Drawing dated 20.09.2011).
- b) Refer all material specifications like GOST, IS, & TY... etc. Refer to dimensional and material checks clauses in this QAP.

22. CYLINDER DRG (172.82.099SB)

ANNEXURE-A:

SL. NO	CATEGORY	TESTS/INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
					Firm	HVF	DGQA	
1.	Pre inspection reports (PIR) of firm	Firm has to produce all the document as per QAP	As per the relevant drawing and QAP.	Conform to drawing and QAP as per bill of material	P	V	R	100% by firm/ vendor.
2.	Bill of material (BOM)	Firm has to prepare the BOM as per QAP	QAP Para no: 7 or item list.	Conform to QAP	P	V	R	100% by firm/ vendor.
3.	Dimensional checks	Dimensions as per the drawing	drawing/QAP Para no: 11	Conform to QAP Para no 11	P	W/P	R	100% by firm/ vendor, SP followed by HVF.
4.	Material tests	Chemical composition & Mechanical Properties	As per the relevant drawing and QAP	conform with QAP and Drawings	P	W/V	R	Refer note.
5.	Performance Test	One Cylinder per S.O./One per Mother Cylinder	As per Specification 155.59.233sb-1 TY	As per Specification 155.59.233sb-1 TY	W/V (once or as and when require basis)	W/V	W/V	At Buyers premises/Firm's premises
6.	Hardness check	Hardness	As per the relevant drawing and QAP para:11	conform with QAP and Drawings	P	W/P	R	100% by firm/ HVF.
7.	Functional/Performance Tests	Pressure Test and Functional tests	As per the relevant drg. And Specification	As per the relevant drg. And Specification	P	W/V	R	100% by Firm and HVF.
8.	Acceptance test	Weightment Test	QAP Para no 13	conform to QAP Para no 13	P	W/P	R	100% by firm/ HVF.
9.	Coating checks	Coating	QAP Para no 11	conform to QAP Para no 11	P	V	R	100% by firm/ vendor.
10.	Marking / Identification checks	Marking / traceability	QAP Para no 17	Conform to QAP Para no 17	P	V	R	100% by firm/ vendor.
11.	Preservation & packing checks	Preservation & packing	QAP Para no 18 & 19	Conform to QAP Para 18 & 19	P	V	R	100% by firm/ vendor.
Note: 1. One sample per heat/batch shall be tested under NABL Lab/Govt. Approved lab by firm. In case of non-compliance to standards entire lot will be rejected or not to use in production further. 2. For cross conformation, manufacturer has to submit test samples / HVF will draw samples from supplied lot on receipt for Witnessing (W) at HVF premises. In case of non-compliance to standards entire lot will be rejected.								

23. FIG. CYLINDER DRG (172.82.099SBSB)



For reference only

24) RECORD OF AMENDMENTS

Sl. No	Amendment No. & date	Amended by	Date of Insertion	Initial

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फैक्स / Fax : 020-27283208
ई मेल / Email : cqafeaundh-dgqa@nic.in
वेबसाइट / Website : www.dgqadefence.gov.in

भारत सरकार / Government of India
रक्षा मंत्रालय(गु.आ.म.नि.) / Ministry of Defence (DGQA)
गुणवत्ता आश्वासन नियंत्रणालय (अग्निशमन उपस्कर) /
Controllerate of Quality Assurance (Fire Fighting Equipmer
औंध कैंप, पुणे-४११०२७ / Aundh Camp, Pune - 411027

CQAFFE/QA/FPS/6419/T-90

08 May 2025

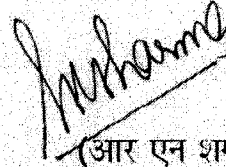
The Sr General Manager,
HVF, Avadi, Unit of AVNL,
Avadi, **Chennai – 600 054**

(email : info@avnl.co.in, hvf.ofb@nic.in, ddohvf.ofb@ofb.gov.in,
dbhattacharya@ord.gov.in, nsraguraman@ord.gov.in, muralik@avnl.co.in)

FWD OF PROVISIONALLY APPROVED ATP FOR T-90 FIRE FIGHTING CYLINDERS

1. Refer :-
 - (a) HVF letter No 65014/HVF/DDO/2025-26/FFE-Cyl/ATP dt 28 Apr 2025.
 - (b) CQA(FFE) letter of even No dt 24 Apr 2025.
2. Provisionally approved ATP No CQAFFE/ATP/FIRE FIGHTING CYLINDERS T-90(IND)/2025/083 for Fire Fighting Cylinder Assy to Drg No 155.59.233 SB-1SB and Drg No 172.82.099SB used in Fire Protection System of Tank T-90 is enclosed for further necessary action.

Encl :- As above



(आर एन शर्मा / R N Sharma)

ले कर्नल / Lt Col

उप नियंत्रक / Dy Controller

कृते नियंत्रक / for Controller

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CQAFFE/ATP/FIRE FIGHTING CYLINDERS T-90 (IND) /2025/083



R N Sharma

Lt Col R N Sharma
Dy Controller
CQA (FFE)
Aundh Camp, Pune-27
Dt. 06 May 2025

**ACCEPTANCE TEST PROCEDURE
FOR
FIRE FIGHTING CYLINDER ASSY TO DRG. NO. 155.59.233 SB-
1SB CYLINDER AND DRG. NO. 172.82.099SB USED IN FIRE
PROTECTION SYSTEM (33C13-1) OF TANK T-90 S/SK**

PREPARED BY

HVF, AVADI, UNIT OF AVNL,
AVADI, CHENNAI – 600 054

(This document consist of 43 pages including cover page)

PROVISIONALLY APPROVED BY

GOVERNMENT OF INDIA
MINISTRY OF DEFENCE
DGQA
CONTROLLERATE OF QUALITY ASSURANCE
(FIRE FIGHTING EQUIPMENT)
AUNDH CAMP, PUNE 411027
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CQAFPE/ATP/FIRE FIGHTING CYLINDERS T-90 (IND) /2025/083AMENDMENT/ERRATA SHEET:

AMENDMENT LIST

SRL NO	DATE	DETAILS OF AMENDMENTS	REMARKS



CQAFPE/ATP/FIRE FIGHTING CYLINDERS T-90 (IND) /2025/083

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1.0 INTRODUCTION

This ATP is prepared for the guidance of the Quality Assurance (QA) officer of the Seller (S) and the Buyer (B) for requirements of techniques for the manufacture of T-90 Fire Fighting Cylinders to Drg No 155.59.233 SB-1SB, 172.82.099SB. The details of Cylinders aspects mentioned in the specification 155.59.233sb-1 TY is the final product confirmation requirements. All test procedures will be carried out by the Seller (S) as per the requirement of ATP as per the process mentioned in the Drg No 155.59.233 SB-1SB and 172.82.099SB.

2.0 TEST MATRIX. The Tests which will be conducted witnessed and reviewed by the Seller (S) or Buyer (B) as per the matrix. Acceptance Test Plan is given in Table 1

Table 1

Srl No	Parameter	Test conducted	Test witnessed*	Test re-viewed
1.1.1	Visual inspection and conformity with the ownership documents	S	S	B & S
1.1.2	Record details of pressure warning Device manufactured by indian OEM Record as per Table 2	S	S	B & S
1.1.3	Hydrostatic stretch test of cylinders as per the Scheme of BIS and certification record as per Table 3	S	S	B & S
1.1.4	Removal of moisture and record as per Table No 4	S	S	B & S
1.1.5	Varnish coating process Record as per table 5	S	S	B & S
1.1.6	Assembling of Cylinder with Head Body and record as per Table 6	S	S	B & S
1.1.7	Testing of Halon 1301and record as per Table 7	S	B	B
1.1.8	Filling of Halon 1301as per Table 8	S	B	B
1.1.9	Leakage check after filling of cylinder and record as per Table 9	S	B	B
1.1.10	Performance Test	S	B	B
1.1.11	Marking	S	S	B
1.1.12	Sealing	S	S	B
1.1.13	Packing	S	S	B
1.1.14	Warranty	S	S	B

* All Tests witnessed by "S", if NABL certified. Other wise, wherever applicable to be witnessed by buyer.

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The need of preparing the ATP is to manufacture, assemble the components of indigenously available along with Halon 1301 (For C1,C2,C3 & C4), Reference CFEES letter No CFEES/FCPC&HB/Halon/01/19, dt. 14 Jun 2019 for C1, C2 and CQA(FFE) Letter No CQAFFE/FPS/6378/HMC-HVF, Dt 13.10.2020 for C3, C4 based CFEES scientific inputs for filling of indigenous extinguishers/equipment.

To undertake the manufacture, assembly and filling of Halon 1301 gas, the Seller should have valid license issued by PESO, Nagpur under the control of PESO to stock, test and fill gas Cylinder, Head Body and Pressure Warning device as per the requirement of the Cylinder Rules.

This ATP is prepared for acceptance of items and services, developed indigenously along with alternate Fire Extinguisher gas from DRDO Lab CFEES, Delhi (Halon 1301 in place of Khlodon 114B2 & 13B1), in the FFE Cylinder (indigenously developed) as filled condition.

3.0 RECORD OF TABLES.**Record Details of Pressure Warning Device**

Table 2

Srl No	Ser No Of Head Body	Head Cleaning Confirmation	Body Thread Confirmation	Remarks

Hydrostatic Stretch Test Of Cylinders for (C1,C2, C3, C4):

Table 3

Srl No	Date	Cylinder Number	Specified Pressure and Duration of Test	Observed Pressure and Duration of Test	Ok/Not Ok
			240 Kg/cm ² for 30 Sec		

Removal of Moisture and Record

Table 4

Srl No	Cylinder Number	Specified Temperature and time	Observed Temperature and Time	Date of Dry up

Internal Varnish Coating Process

Table 5

Srl No	Cylinder Number	Process as Per Drawing/ Alternate Approved by AHSP (Elmotherm)	Process Confirmation by Recording Sample Thickness	Remarks

Assembling of Cylinder with Head Body

Table 6

Srl No	Cylinder Number	Head Body Number	Remarks

Testing of Halon 1301

Table 7

Srl No	Parameter	Specified Values (As per IS:15220-2002)	Observed Values (Refer Test Protocol)

Filling of Halon Type _____

Table 8

Srl No	Cylinder Number	Weight of Empty Cylinder Assy with Head Body in kg	Weight of Charged Cylinder Assy with Head Body in kg	Weight of Halon type _____, Charged in Kg	Fill the Pressurized with Dry Nitrogen at Pressure of _____ kgf/cm2	Ok/ Not ok

Leakage Check After Filling of Cylinder

Table 9

Srl No	Cylinder Number	Date	Observations

Pressure Warning Device:- Pressure warning device, tech specification Ty25-02.110459-85 extract to be referred for the guidance of the Quality Assurance (QA) Officer of the Seller and the Buyer for requirements of techniques for manufacturing and assembly of Pressure Warning Device Ty25-02.110459-85. This is to be conducted over and above the procedure enumerated in the following ATPs:

- (a) HVF/ATP/155.59.233SB-1SB/REFILLING/001, Rev.00 for manufacture, assembly and filling of gas with Cylinder to drg. No. 155.59.233SB-1SB used with FIRE PROTECTION SYSTEM (39L13-1) of TANK T-90 S/SK
- (b) HVF/ATP/172.82.099CB/Refilling/003, rev 00, for servicing/rectification and Refilling of Cylinder to Drg No 172.82.099SB used with System (39L13-1) of TANK T-90 S/SK.
- (c) HVF/ATP/TY25-02.110459-85/Refilling/001Rev 00,for Serving / Certification of Pressure Indicator TY25-02.110459-85

All test procedures will be carried out (100%) by the Seller as per the requirement of ATP for the compliance of process mentioned in the drawing number 155.59.233SB-1SB, 172.82.099SB and TY25-02.110459-85. The tests which will be conducted, witnessed and reviewed by the Seller (S) or Buyer (B) as per the matrix, Acceptance Test Plan given in Table 10.

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Table 10

Srl No	Parameter	Test Conducted	Test Witnessed *	Test Re-viewed
1.6.1.1	Visual inspection and conformity with the ownership documents	S	S	B & S
1.6.1.2	Record of Pressure Warning Device (PWD) Markings as per table 11	S	S	B & S
1.6.1.3	QA checks before fitting to cylinder	S	S	B & S
1.6.1.4	Preliminary check with Multimeter as per Para 1.6.3	S	S	B & S
1.6.1.5	Functional Test of PEW using Jig and record as per table 12&13	S	S	B
1.6.1.6	Insulation Resistance and record as per Table 14	S	S	B
1.6.1.7	High Voltage Test as per Table 15	S	S	B
1.6.1.8	Assembling of PWD with Head Body and record as per Table 16	S	B	B
1.6.1.9	QA check after filling of cylinder and record as per Table 17 & 18	S	B	B
1.6.1.10	Environmental Test of PWD as per TY (refer para 3 of specification TY 25-02.110461-85)	S	B	S
1.6.1.11	Marking	S	S	S
1.6.1.12	Sealing	S	S	S
1.6.1.13	Packing	S	S	S
1.6.1.14	Warranty	S	S	S

* All Tests witnessed by "S", if NABL certified. Other wise, wherever applicable to be witnessed by buyer.

Record of Pressure Warning Device (PWD) Markings:

Table 11

Srl No	PWD No	PWD Markings	Cylinder No	Head No	Body	Remarks



CQAFPE/ATP/FIRE FIGHTING CYLINDERS T-90 (IND) /2025/083Functional Test of PWD Using Jig and Record:

Table 12

Srl No	PWD Number	Cylinder Pressure set at 90 to 100 kgf/cm ²	Light Indicator in The Jig	Remarks

Table 13

Srl No	PWD Number	Cylinder Pressure set 17 to 23 kgf/ cm ²	Light Indicator in the Jig	Remarks

Insulation Resistance:

Table 14

Srl No	PWD Number	Body & Pin 1	Body & Pin 2	Pin 1 & 2	Temperature & RH	Remarks

High Voltage Test:

Table 15

Srl No	PWD Number	Body & Pin 1	Body & Pin 2	Pin 1 & 2	Temperature & RH	Remarks

Assembling of PWD with Head Body:

Table 16

Srl No	PWD Number	Srl	Cylinder Number	Head Body number	Remarks

QA Check After Filling of Cylinder:

Table 17

Srl No	PWD Number	Cylinder Pressure set at 70 kgf/cm ² (+5kgf/cm ²) for C1, C2 and 600psi (-60psi) for C3, C4	Light Indicator in The Jig	Remarks

Table 18

Srl No	PWD Number	Cylinder Pressure set 17 to 23 kgf/ cm ²	Light Indicator In The Jig	Remarks

Preliminary Check with Multimeter:-

PWD pins configuration to be checked (Uncharged & Charged)
 Pin 1 & 2 normally open uncharged condition
 Pin 1 & 3 normally closed uncharged condition
 Pin 1 & 2 normally closed at charged condition (reference only)
 Pin 1 & 3 normally open at charged condition
 Pin 1 & 2 at 90 to 100 kgf/cm² (check as per Functional test para.....)
 Pin 1 & 3 at 17 to 23 kgf/cm² (check as per Functional test para.....)
 Pin 4 dummy.

Insulation Resistance:

The Electrical insulation resistance between separate circuits (Body to Pin No1, 2) and between these circuits and body (between Pin No. 1 to Pin No.2) not less than 20 Mega ohms @ 500 V, at Temperature $20 \pm 5^\circ \text{C}$ and relative humidity of ambient air up to 80 %.

High Voltage Test:

Note : All safety norms as per the Standard Operating Procedure to be taken by the QA Officer before undertaking Electrical Tests.

High Voltage Test 500 V AC, 50 Hz frequency of practical sinusoidal shape. It should not flash once/break down between non-connecting terminal & Body to terminal for 1 minute.

The Electrical insulation between separate electrical circuits (Body to Pin No. 1,2) and between these circuits and body (between Pin No. 1 to Pin No.2) should withstand the effect crest value of testing voltage 500 V AC, 50 Hz.

Functional Test of PWD using Jig:

A schematic diagram of Jig is given at Appendix 'A'. Determination of (setting) PWD is carried out on the system specified in Appendix 'B' (or Annexure 'A' of 155.59.233SB-1SB TY). For this smoothly increase the pressure in measuring chamber of PWD up to (9.5 ± 0.5) MPa [(95 ± 5) kgf/cm²], during this the lamp L1 should glow and lamp L2 glows off. The lamps are switched ON in 27 ± 5 VDC through the pressure switch terminals.

Reduce the pressure by the reading of master pressure gauge, determine the pressure at that moment of operating pressure PWD. The operating of PWD is fixed or set on glows off the lamp L1 and lamp L2 glowing.

The PWD is considered as serviceable if the setting of PWD is (2 ± 0.3) MPa [(20 ± 3) kgf/cm²]. The checked PWD is fitted in the cylinder being charged.

Assemble the PWD to the pressure source (Cylinder with calibrated Pressure gauge) and bring pressure up to 90 to 100 kgf/cm².

Performance Test.

Performance of the PWD is ensured before fitment of the same using the calibrated test Jig as per the Circuit given at Appendix 'B' and hence, separate test is not conducted.

(i) Fitment trial will be conducted by Seller as per the requirement of ATP for manufacture, assembly and filling of gas with Cylinder to drg No 155.59.233SB-1SB used with FIRE PROTECTION SYSTEM (33L13-1) of TANK T-90 S/SK and

(ii) For manufacture, Assembly and Gas Filling of Cylinder to drg No 172.82.099SB used with System (33L13-1) of TANK T-90 S/SK.

Environmental Test of PWD as per TY (Refer Para 3 of Specification TY 25-02.110461-85), details mentioned in Appendix-'C'.

MARKING**(a) Valve Body [as per clause (B) (G)] :**

Ensure that following markings are punched on the opposite to the charging side.

- (i) Srl No
- (ii) Month & Year
- (iii) Trade mark of the firm
- (iv) Mass of Head Body assy.

(b) Cylinder [as per clause (D) (F)]:

(i) For C1, C2: Total empty weight of the assy with all its components except components 155.26.901 and 155.59.338 shall be punched on head body opposite to charging side.

(ii) For C3 & C4: Total empty weight of the assy with all its components except components 172.82.127-1 and 54.59.300 shall be punched on head body opposite to charging side.

SEALING (as per Clause (E) (F):

After completion of testing/inspection each assy shall be sealed as shown in the drg (C1&C2-155.59.233SB & C3&C4 – 172.82.099 SBSB).

CQAF/ATP/FIRE FIGHTING CYLINDERS T-90 (IND) /2025/083**2.0 Station List for Cylinders:****2.1. Cylinder 155.59.233 SB-1SB (C1&C2):**

Srl No	Item	Drawing	Qty	Remarks
1	Pipe Union with Gasket	155.59.234cb	1	
2	Head body	155.59.581-1	1	The External Taper for Valve Body to Drg No 155.59.581-1. Thread W30.3, as per GOST 9909-81.
3	Plug	155.59.582-1	1	
4	Striker	155.59.583b	1	
5	Washer	155.59.584-2	1	
6	Diaphragm	155.59.585-2	1	
7	Locking Ring	155.59.586	1	
8	Gasket	155.59.589-1	1	
9	Stopper	172.82.141	1	
10	Sealing	155.38.278-A	1	
11	Nut	155.26.901	1	
12	Gasket	54.59.338	1	
13	Gasket	54.38.130	1	
14	Gasket	54.38.130-01	1	
15	Gasket	54.38.130-02	1	
16	Seal 10/6.5	TY32LTBP-04-89	1	
17	Pressure Indicator (Pressure Warning Device)	TY25-02.110459-85	1	
18	Halon 1301	IS:15220-2002	2.0 Kg	To be ensured by weight measurement, Test Report and SDoC by the Seller
19	Cylinder	Cylinder K2-14.7 TY 14-3-1469-87 (6224/A)	1	
20	Dry Nitrogen	GOST 9293-74 or Indian Specification	*	*Super Pressurized at 70+5 kgf/ cm ² as per 155.59.233SB-1TY Specification.
21	Wire	KO-1 or KO-1.2 to GOST 792-67	0.2 m	

CQAFPE/ATP/FIRE FIGHTING CYLINDERS T-90 (IND) /2025/083

2.2. Station List for Cylinder 172.82.099SB (C3&C4):

Srl No	Item	Drawing	Qty	Remarks
1	Head body with pipe	172.82.055sb-1	1	The external taper for Valve body to Drg No 172.82.122-2 (used on 172.82.055sb-1) to be Type4, taper 1:8 (SIZE-I) as per IS:3224.
2	Washer with membrane	172.82.057 sb	1	
3	Pipe union with gasket	155.59.234 sb	1	
4	Plug	172.82.123-2A	1	
5	Striker	172.82.124 B	1	
6	Locking Ring	172.82.125 A	1	
7	Nut	172.82.127-1	1	
8	Stopper	172.82.141	1	
9	Gasket	54.59.300	1	As per the requirement of adjustment of item 14.
10	Gasket	54.38.130	1	
11	Gasket	54.38.130-01	1	
12	Gasket	54.38.130-02	1	
13	Seal 10/6.5	TY32LTBP-04-89	1	
14	Pressure indicator C _d (Pressure Warning Device)	TY25-02.110459-85	1	
15	Cylinder K2-150л-305	TY 14-3-321-74	1	
16	Halon 1301	IS:15220-2002	1.4 kg (+) 0.1 kg	Ensured by weight measurement Test report and SDoC by the Seller.
17	Wire KO 1.2	GOST 792-67	0.2 m	
18	Wire KO 1	GOST 792-67	0.2 m	
19	Stopper	172.82.224	1	
20	Dry Nitrogen	GOST 9293-74 or Indian Specification	*	* Super pressurized at 600 (- 60) psi

3.0 Test Equipment and Accessories Required Before Gas Filling :

Srl No	Description	Calibration/Facility Approval	Remarks
1	DC Light for Visual Inspection Inside the Cylinder		
2	Thread Gauge		
3	Hydrostatic or Hydrostatic Stretch Test		
4	Internal Coating Process Certification		
5	Furnace Facility		
6	Torque Wrench		
7	Halon Filling Facility		

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8	Cylinder for drawing Halon Sample as per the IS Stipulation		
9	Nitrogen Supercharging Facility		
10	Electronic Weighing Scales with 1 Gram Least Count		
11	Paint Process Certification		
12	Marking and Stencil		
13	Jig for Puncturing Test		

3.1 Test Equipment and Accessories Required for Pressure Warning Device (Before fitting to cylinder) :

Srl No	Description	Calibration/Facility Approval	Remarks
1	Rust, Grease and Dust cleaning solution and compressed air		
2	Furnace Facility		
3	Multimeter		
4	Megger 500 V for IR		
5	High Voltage Tester		
6	Torque Wrench		
7	Pressure Gauge		
8	Compressed Air/Nitrogen		
9	Jig for Pressure Switch Test		
10	Lead Sealing Device		
11	Specification for Pressure Warning Device Ty25-02.110459-85		
12	Specification for Cylinder 155.59.233SB-1 TY		
13	Specification for Cylinder		

4.0 REFERENCE DOCUMENTS:-

- Specification 155.59.233sb-1 TY.
- Drawings of 155.59.233SB-1SB and 172.82.099SB
- Specification JSS-55555 :2020 Revision no.4) (L2J table)
- Specification Ty 25-02.110459-85
- REFILLING/RECTIFICATION ATP No HVF/ATP/155.59.233SB-1SB / REFILLING / 001
- REFILLING / RECTIFICATION ATP No HVF / ATP / 172.82.099CB / REFILLING / 003
- SERVICING/CERTIFICATION OF PWD ATP No HVF/ATP/TY25-02.110459-85/REFILLING/00

5.0 TEST SCHEDULE

Srl No	Item	Drawing/Specification No	Tests	Remarks
(1)	(2)	(3)	(4)	(5)
(i)	Raw materials	As per list attached (Appx. 'D')	(A) From each lot tendered, samples shall be drawn and tested for chemical composition and mechanical properties (As per Appx 'D') (B) Raw materials used to be specified in ATP for each sub-assy / component along with alternate materials suggested / approved by AHSP, if any.	Low carbon & structural steels need not be tested for chemical and mechanical properties.
(ii)	Components	Components of 188.82.SP-3 (as per Appx. 'D')	(A) <u>Visual Inspection</u> : 100% components shall be checked for material defects like cracks, blow holes, porosity, dents, damaged threads, colour codes, paints finish etc.	
			(B) <u>Coating</u> : (i) 100 % components shall be checked for protective coating including painted components. (ii) 5% of each type of plated components from each lot shall be checked for coating thickness by coating thickness gauge.	Coating thickness shall not be less than the value specified in the drg
			(C) <u>Dimensional check</u> : (i) 10% subject to minimum 5 Nos. from the lot shall be checked for dimensions including run out, parallelism etc. (for cylinder refer para Clause 5(iii)(C)(B) inspection for detailed check).	'GO' and 'NO-GO' gauges shall be used. For deviations for dimension
			(D) <u>Hardness</u> : (i) 5% of the components picked up at random shall be checked for hardness as per drawing.	
(iii)	Assemblies	(A) <u>Band Assembly</u> : a) 172.82.027 CB	(A) <u>Visual inspection 100%</u> : Check for completeness, soundness of welding, workmanship, crack etc.	
		b) 172.82.026 CB	(B) <u>Dimensional Check</u> : 5% Assemblies shall be checked for overall dimensions as per the drawing	

CQAFPE/ATP/FIRE FIGHTING CYLINDERS T-90 (IND) /2025/083

			<u>(C) WEIGHT:</u> Mass shall be checked and noted	Mass should not be more than that specified in the drawing.
		(B) Head Body (Valve Assembly) for C1, C2 and C3 & C4	(A) <u>Visual Inspection (100%)</u> (i) Check for workmanship and surface-crack of body head 155.59.581-1 & 172.82.055cb-1cb. Check for any damage of thread. (ii) The external taper thread of Valve head body to drg. No. 155.59.581-1 is W30.3, Type 2, Taper 3:25 as per GOST 9909-81. (for C1,C2 cylinders) (iii) The external taper thread for Valve body to Drg No. 172.82.122-2 to be Type4, taper 1:8 (SIZE-I) as per IS:3224-79. (for C3,C4 cylinders) (B) <u>Hydraulic Test 100%</u> shall be tested at a hydraulic pressure of 200 kgf/cm ² for 3 to 5 minutes. (For Body 155.59.581-1 & Head body 172.82.055cb-1cb)	Head Body shall be free from any surface cracks and thread damage. There should not be any leakage or drop in pressure during this period. There should not be any leakage at the soldering point.
			(C) <u>Leakage Test 100 %:</u> Head body assy 172.82.055cb-1cb & 155.59.581-1 shall be checked for air tightness pneumatically at a pressure of 0.5 to 1 kgf/cm ² .	
			(D) <u>Pneumatic Test 100%</u> Each Head body Assy, after assy, (Body 155.59.581-1 & Head body 172.82.055cb-1cb) shall be subjected to pneumatic test at 150 kgf/Cm ² (for C1, C2) and 90 kgf/Cm ² (for C3, C4) by dipping in water bath for a duration of 3 minutes. This can be combined with testing of valve assy with cylinder as per Clause 5(iii) (D) (C) or by any other arrangement made by the firm.	
			(E) <u>Weight 10%</u> Mass of the assembly shall be checked.	Mass should not be more than that specified in the drg.

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			(F) <u>Performance Test:</u> 1% of the head body assy subject to minimum 4 Nos. from each lot offered shall be subjected to performance test in conjunction with performance testing of Squib as given in Clause 5 (iii) (G) (D). In this case Head Body assy shall be assembled with cylinder and the cylinder assy shall be filled with Nitrogen / air at a pressure of 70^{+5} kgf/cm² in case of C1&C2 cylinders (Quick Acting Cylinders) & 42 kgf/cm² in case of C3 & C4 cylinders.	(a) During assy. of components of head body, ensure that "Union with Gasket" 155.59.234CB is not tightened and kept loose. This is to be tightened only after filling the cylinder with Halon 1301 (BTM). (b) During assy. of components of Head body, ensure that the Plug 155.59.582-1 (for C1, C2) and Plug 172.82.123-2A (for C3, C4) is tightened only up to 5 to 6 kgf-m.
			(G) <u>Marking 100%</u> Ensure that following markings are punched on the opposite to charging side (i) Srl No (ii) Month & Year (iii) Trade mark of the firm (iv) Mass of Head Body assy.	
		(C) Cylinder Ty 14-3-321-74)-For C3&C4 Cylinders and Cylinder 6224/A (K2-14.7 TY 14-3-1469-87) -	(A) <u>Visual Inspection 100%:</u> Check the internal and external surfaces of cylinders are free from blowholes, laps, cracks, dents etc.	All tests are to be carried out at cylinder manufacturer's place.
			(B) <u>Dimensional check:</u> (a) 10% of the bulk shall be checked for the following dimensions: (i) Outer diameter	

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		For C1, C2 -cylinders	(ii) Taper thread with 'GO' & 'NO-GO' gauge (iii) Neck diameter (b) 100% of the bulk shall be checked for the following. (i) Overall length 320^{+2}_{-6} mm for &C3&C4 cylinders and $310^{+2}_{-1.5}$ for C1&C2 cylinders (Ref: drg No 6224/A). (ii) Bottom thickness with ultrasonic tester.			
			(C) <u>Mechanical and Chemical Test</u> : (a) One cylinder from each lot shall be selected at random and test specimens made from this cylinder and tested for the following as per IS:7285-88: (i) Ultimate tensile strength : 70kgf/cm ² (min) for C3 & C4 cylinders.65 kgf/mm ² for C1&C2 cylinders. (ii) Yield strength: 48 kgf/ cm ² (min) – for C3&C4 cylinders. 38 kgf/mm ² for C1&C2 cylinders. (iii) Relative Elongation % : 20 for C3 &C4 cylinders. 15 for C1&C2 cylinders. (iv) Impact strength (charpy value) : kgfm/cm ²			
				Mean of 3 speci mens	Individual specimen	
			Longitudinal	3.5	2.3	
			Transverse	1.7 5	1.15	
			(v) Bend test			
			(b) <u>Chemical analysis</u> : Shall be carried out from the samples selected from Mechanical test.			
			(D) <u>Mass of cylinder 100%</u> : Mass of each empty cylinder shall be checked and ensured that the mass is within 4.0 kg to 4.5 kg for C3 & C4 cylinders and 4.5 Kgs max for C1 & C2 Cylinders. This mass shall be punched on the body of the Cylinder. Auth. Letter No. CQAFE/FPS/6346/SPECN/Review			
			(E) <u>Volume 5%</u> :			Volume of

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		Volume of cylinder shall be checked by filling water.	cylinder should be within $1.8^{+5\%}$ litre for C3&C4 cylinders. 1.8 litres min for C1&C2 cylinders.
		(F) <u>Hydrostatic Stretch Test:</u> For C1, C2 and C3, C4: Qty. 02 Nos. of finish cylinders other than those selected for mechanical & chemical test shall be subjected to Hydrostatic Stretch Test at a pressure of 240 kgcm^2 in accordance with IS:7285-1988, after the pressure is reached, it shall be maintained for at least 30 sec. To ensure complete expansion.	Permanent stretch of the cylinder shall not exceed 10% of the total stretch.
		(G) <u>Bursting Test:</u> One cylinder from the first batch of each S/O shall be subjected to an internal hydrostatic pressure till it bursts as per IS: 7285-88. The reading shall be noted.	Ensure that the burst of cylinder is without fragmentation.
		(H) <u>Leakage Test 100%:</u> After the hydrostatic stretch test, the cylinders found acceptable shall be tested to a pneumatic pressure of 150 kgf/cm^2.	No leakage or drop in pressure is allowed.
		(J) <u>Marking 100%:</u> Cylinders shall be checked for following markings punched on the cylindrical part of the neck. This area shall be painted for easy identifications. Ensure that a band with black enamel is made just below these marking. The surface inside this band is required to be coated with colour less varnish. (a) Manufacturer's Trade mark (b) Srl No Of Cylinder (c) Cylinder Volume and Weight (d) Type of Heat Treatment 'N' may be punched for the Process "Normalizing" (e) Working Pressure and Hydraulic Test (f) Date of Manufacture/ Testing.	

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		(K) <u>Internal Varnish Coating 100%</u> Internal surfaces of the cylinders shall be applied with Bakelite varnish after the surface is made free from moisture, dust & scale. The Bakelite varnish (Gr. LBS-1 of GOST: 901-78) shall have following properties: (i) Colour: Reddish to Reddish Brown (ii) Not containing suspended particles (iii) Weight fraction of resin: 50-60% (iv) Viscosity (dynamic) in milli Pascal second 60-1000. (v) Wt. Fraction of free Phenol % : 10.0 (max) (vi) Time of gelatination sec : 50-120 OR <u>Alternative Internal Varnish:</u> Dr. Beck's varnish grade : Elmotharm F-50, which is equivalent to the Bakelite Hylam Varnish, the specification is as under: (i) Colour : Ruby red (clear liquid) (ii) Not containing suspended particles. (iii) Solid content : 49-51% (iv) Viscosity at 20°C, DIN 53211/CUP No. 4-65-85 sec. (v) Gelling time at 120°C – 100 min. (vi) Drying in thin layer – 100 mm. (vii) Curing time – 12 hrs. At 120°C	(a) Grade of indigenous equivalent Bakelite varnish & the process of application shall be got approved from the Inspection authority i.e. CQA(FPE), Pune-27. (b) Thickness of coating shall be 25 microns (min).
		(L) <u>Painting :</u> Ensure that the external surface of all cylinders is initially applied with a primer coating of aluminium red oxide to IS: 5660-70.	

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		(D) <u>Cylinder Assy C3 & C4</u> <u>Cylinders & C1 & C2</u> <u>(Quick Acting)</u> <u>Cylinders</u>	(A) <u>Visual Inspection 100 %:</u> (a) After the cylinder inspection and determining the depth of cylinder, the head body assys. Shall be fitted to the cylinder. During the fitment, see that the gap between the end of siphon pipe and bottom end (internal) of cylinder is not kept more than 6 mm (in case of C3, C4). The engagement of taper thread of head body shall be taken into account to ensure the proper gap of 5+1 mm. (b) Ensure Srl No Of head body assy and cylinder are matching.	(a) Teflon tape can be used for assembly of valve with cylinder. (b) Ensure that torque applied during assy of head body assy with cylinder is 20 to 30 kgf.m for C1,C2 and 12kgf.m (max) for C3,C4. (c) Tool guide to drawing No. FESK-0199 shall be used for tightening of Plug 172.82.123-2A, 155.59.582-1
			(B) <u>Cleaning of Cylinder :</u> Internal surfaces of cylinder shall be cleaned with the spirit before assembling with valve assy. For this pour 200 gm of spirit into the cylinder, shake well and pour out. Same spirit can be used for cleaning three more cylinders.	
			(C) <u>Pneumatic Test 100% :</u> Cylinders Assy shall be tested for air tightness pneumatically at a pressure of 60 kgf.cm ² (min) by dipping in water bath for a duration of 3 minutes.	(a) Leakage of air is not allowed. (b) Ensure that union 155.59.234 SB is not tightened during this test. (c) In case of any leakage observed through

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			Plug/discharge side ensures that torque not more than 5-6 kgfm is applied on Plug 172.82.123-2A(for C3, C4 cylinders) & 155.59.582-1 (for C1&C2 cylinders)
			(D) <u>Certificate for Filling :</u> No objection certificate issued by PESO, Nagpur for Filling of Cylinder Halon 1301 for each Cylinder Inspected and cleared shall be Obtained from Cylinder Manufacturer.
			(E) <u>Other Type Tests for C1, C2 (to be conducted by Seller) (details mentioned in Appendix 'C') :</u> (a) Type Test (ie Class C Tests) as per clause (A) to be conducted one time per one supplier, (provided no design change is followed by the same supplier) for FFE T-90 Cylinders fitted with Valve and PWD will be performed in a NABL accredited lab by the Vendor. (b) Class 'C' tests (one in Hundred nos of PWD / one percentage of Order Qty of PWD) will be performed in a NABL accredited Lab by the Vendor.
			(F) <u>Markings :</u> For C1, C2:-Total empty weight of the assy with all its components except components 155.26.901 and 155.59.338 shall be punched on head body opposite to charging side. For C3 & C4:-Total empty weight of the assy with all its components except components 172.82.127-1 and 54.59.300 shall be punched on head body opposite to charging side.
		(E) Filling of Cylinder	(A) Filling of cylinder with Halon 1301 (BTM) and super pressurizing with

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		Assy (C1,C2& C3,C4)	<u>Nitrogen :</u> i) The cylinder assy (C1&C2) shall be filled with Halon 1301 (BTM); Qty. 1.9 to 2 kg and super pressurised with dry nitrogen at a pressure of 70^{+5}kgf/cm² ii) The Cylinder assy. (C3&C4) shall be filled with Halon 1301 (BTM); Qty. 1.4 (+0.1kg) and super pressurised with dry nitrogen at a pressure of 42 kgf/ cm²	
			<u>(B) Leakage/Air Tightness Test:</u> Double sampling plan with inspection level V &AQL 1 % as per IS 2500. (a) The filled cylinders shall be kept for 4 hours and then checking the air tightness by applying soap water on all joints. No bubbles shall come out from any joint.	(a) Difference in weight before & after testing should be within ± 5 gram. (b) Ensure that the torque applied during tightening of union assy155.59.2 34SB is not more than 1 to 1.5 kgfm. In case of any leakage through charging side, further tightening is not permitted. In this case the gasket 54-59-301 is to be replaced.
			<u>(C) Performance Test:</u> Qty. one No. for Pilot Sample, Halon 1301 gas filled from one mother cylinder shall be checked for performance of filling by conducting test in conjunction with Clause.5 (iii) (G)(D).	

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			(D) <u>Painting</u> : The external surface of cylinder body is to be cleaned without removing the red oxide primer and final painting in Fire red to shade No. 536 of IS:5-78 is to be done.	The paint is to be offered for testing and approved before painting.
			(E) <u>Marking 100 %</u> : The following marking shall be done with screen printing white colour of suitable letter size except value of tare weight, gross weight and date of filling shall be written by hand painting in white colour : a) Part No. b) Cylinder assy c) S/O No. Dated d) Tare weight..... kg. e) Mass of Halon1301 :....tokg. f) Gross weightKg.>(*weigh & mark up to two decimal places). g) Date of filling : h) Manufacturer's Name :	
			(F) <u>Sealing 100 %</u> : After completion of testing/inspection each assy shall be sealed as shown in the drg. (C1&C2-155.59.233SB & C3&C4 – 172.82.099 SBSB)	
		(F) Halon 1301	<u>Testing of Halon 1301</u> : Sample (500 ml) from the bulk shall be drawn and tested for the following properties and shall confirm to requirements specified in Table 1 of IS: 15220-2002 <u>Halon 1301:</u> (a) Purity (b) Acidity (c) Water content, (d) Non-Volatile residue (e) Halogen Ion (f) Suspended Matter or sediment.	
		(G)Squib Assy PP-3 As per ARDE DRG NO. 1231 REV NO 1 (SQUIB-PP3)	(A) <u>Visual Inspection 100 %</u> : a) Ensure that the contact bolt is not rotating or having axial play within the insulating piece. b) Ensure that the contact bolt is not having any rotation or axial play within the cartridge case. c) Ensure that there is no loose	

		Ref: CQA(FFE) letter No. CQAF/QA/ GEN, dt. 10/01/2024.	connection/moulding by blowing air and no leakage of air is allowed. d) Both ends of bridge wire shall protrude outside slightly and should be visible with naked eyes (though not shown in drawing) to ensure tight contact with case after pressing.	
			(B) <u>Dimensional check 100 % :</u> Components shall be checked for overall dimensions. 100% Squibs shall be checked for body and head outside diameter which shall be within 11.95 (max) and 15.04 ^{+0.05} _{-0.03} respectively.	
			(C) <u>Resistance 100 % :</u> 100 % of the squib assy (empty) shall be checked for resistance. This should be between 0.25 to 0.45 ohm.	
			(D) <u>Performance test 1 %:</u> Squib shall be checked for performance by conducting puncturing test as per Clause 5 (iii) (E)(C).	
(iv)	Completeness	-	Completeness shall be checked as per schedule given in the supply order. List of assy/loose components of code 188.82SP-3 is given in Appx. 'D' to this ATP.	
(v)	Packing & Marking	-	(A) Check that the packing box is of sufficient strength to withstand road/rail hazards. See that the individual items are lubricated (wherever required), thread portions are properly protected, inspection mark made, open ends of pipes are plugged etc before packing. (B) <u>Packing:</u> The detailed packing of various components are as given below: (i) <u>Cylinder Assembly :</u> Cylinder Assembly (both, system and manual) shall be wrapped in corrugated sheet individually conforming to IS:2771-1990 (Part I&II). Four wrapped cylinder assembly of system/manual shall then be packed separately in vertical position (Cylinder with head upward position is not allowed for C1, C2 as per Tr Point No.10 of 155.59.233CB-1), in a wooden packing case of suitable size,	



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			style and class to IS : 1503-1988. The boxes shall have sufficient cushioning material both on top and bottom of the boxes and between the cylinders. Following marking shall be made on two adjacent sides of the boxes. "DO NOT DROP", "TOP " (ii) <u>Accessories:</u> Accessories duly covered individually with polythene sheet shall be packed in wooden packing case of suitable size, style & class of IS : 1503-1988.	
			(iii) <u>Squib Assmebly PP-3 :</u> The metal type packing box designed by Ordnance Factory, KHAMARIA, JABALPUR and duly approved by AIIW is to be followed.	
			(C) <u>Marking of Packages :</u> All the packing cases shall be marked with following information stencilled in black ink with 25 mm high characters / numerical : (i) Designation of the item packed: (ii) SO No and date: (iii) Firm's Name/Monogram: (iv) Consignee address & other details: (v) Qty/Weight : (vi) I/Note & date: (vii) Year of manufacture: (viii) Class & Style of packing case as c/s as per clause 10 of IS: 1503-1988.	
(vi)	Warranty	-	Stores supplied against the supply order shall be deemed to bear the warranty of the Seller against material, filling of gas and its performance for a period of 12 months from the date of receipt of store at consignee end. If during the specific period, the store supplied is found to be defective, the same shall be replaced immediately with serviceable store by the Seller at site free of any charges or as may be decided by the purchasing officer on the recommendation of consignee/QA authority.	

NOTE No 1: COMPONENT INSPECTION :

- (i) Samples from components may be tested for chemical analysis or any tests to confirm that the components belong to the lot cleared by the Inspecting Officer. This may be done at random on critical items at the discretion of the Inspecting Officer.
- (ii) Components cleared shall be marked with stage inspection mark or by any means for identification.

NOTE No 2: PERFORMANCE TEST/FITMENT TRIAL OF COMPONENT CODE:

One set of the complete assy from the first lot shall be subjected to performance, interchangeability and fitment at the discretion of the AHSP.

NOTE No 3 : Ensure that the discharged cylinders and the squibs used in the tests are replaced with filled cylinders and new squibs.

NOTE No 4 : Complete test values obtained during tests shall be forwarded to AHSP.

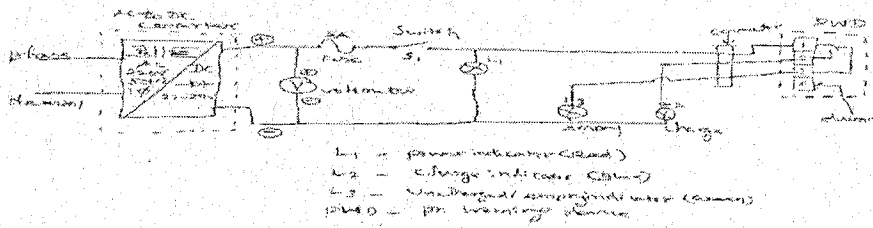
NOTE No 5 : Copy of no objection certificate issued by PESO, Nagpur for filling of cylinders with Halon 1301 gas shall be obtained from cylinder manufacturer. Copy of these certificates shall be enclosed with internal certificate/Inspection Note.

NOTE No 6 : List of all items accepted for each set shall be enclosed as Appx 'A' to the Inspection Note.

APPENDIX 'A'

TEST JIG FOR PRESSURE WARNING DEVICE TY25-02.110459-85

1.0 SCHEMATIC CIRCUIT DIAGRAM



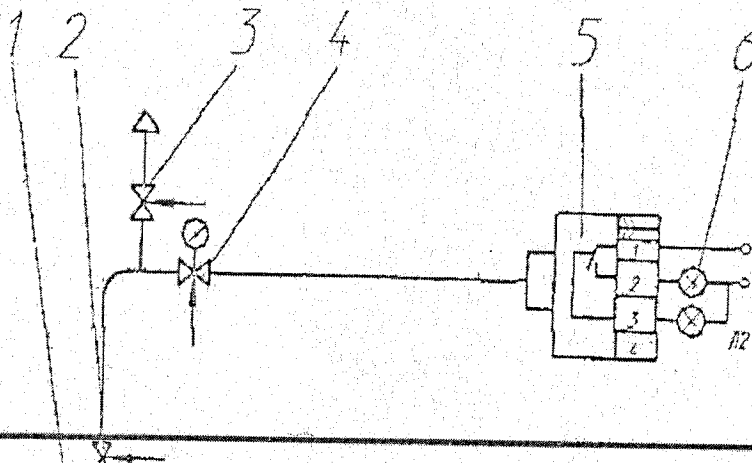
Note:

The use of L1, L2 and L3 to be corrected to the Jig and the ATP clause 3.7 during the QA of FIRST LOT by the AHSP.

Appendix 'B'

APPENDIX A

D.C voltage power
supply source
(27 ± 2) V



TEST SCHEDULE FOR TYPE TEST (i.e. Class 'C' Test) for T-90 FFE Cylinders Fitted with Valve & PWD and Separately Class 'C' Tests for Pressure Warning Devices.

Reference Documents:-

- (a) Specification 155.59.233sb-1 TY.
- (b) L2J table of JSS-55555 :2020 Fourth Revision.
- (c) Specification Ty 25-02.110459-85.

Sample selection:-

- (a) CYLINDER (155.59.233SB-1SB) –
Sample required – 01 No fitted with valve and PWD and filled with Halon 1301.
- (b) CYLINDER (172.82.099CB)
Sample required – 01 No fitted with valve and PWD and filled with Halon 1301.
- (c) Pressure Warning Device (PWD)(Ty 25-02.110459-85) independent to one fitted in cylinders :-
Sample required –
 - (i) 01 No PWD (For 10 tests).
 - (ii) 01 No PWD (For 01 test ie Mould Growth test).

(A) Type Test (i.e. Class C Tests) for FFE T-90 Cylinders fitted with Valve and PWD will be performed in a NABL accredited lab by the Vendor sequentially as mentioned in the below table :-

The Tests shall be carried out sequentially on FFE T-90 cylinders, filled with Halon 1301 and completely fitted with valve and pressure warning device :-

Sequ ence	Tests	Test Number as per L2J JSS 55555	Remarks
1	Vibration	28 (Level 1 Table 4.28-3)	Frequency 20-500 Hz Acceleration 0.005 m/s ² Frequency 500-2000 Hz falling from 0.005 at 500 Hz to 0.0005 at 2000 Hz Test duration in each axis 140 mins
2	High Temperature	17 (Procedure 6 Test condition M)	55 ⁰ C ± 3 ⁰ C for a period of 16 hours
3	Damp Heat	10	40 ⁰ C ± 2 ⁰ C & RH 93 ± 5% over a period of not less than one hour
4	Low Temperature	20 (Test condition J)	-20 ⁰ C ± 3 ⁰ C for a period of 24 hours
5	Altitude	03 (Procedure 5 Test condition (b) and A2)	-30 ⁰ C ± 3 ⁰ C Altitude 4160 m Air pressure 60 kpa for a period of 16 hours

6	Rapid Temperature Cycling	22 (Procedure 02)	40° C ± 3° C RH > 95% for 03 hours and 40° C for period of 03 hours (one cycle) For three cycles.
7	Dust	14	40° C ± 3° C, RH less than 50 % for duration 1 hr. 40° C ± 3° C, RH less than 50 % for duration 1 hr. (As per clause No. 2.5 and 2.5.1).
8	Bump	05	Peak acceleration 250 m/s ² Pulse duration - 6 (m/s) Number of Bumps - 4000 Equipment attached or installed in vehicles with full cross-country requirement
9	Corrosion (Salt)	09 (As per Procedure 2)	After completion of 08 Type tests along with FFE T-90 Cylinder, this test (9th test) will be done along with the PWD, on account of 12th Test for individual PWD (Dummy)

After each Environmental Test (Type Test) mentioned above, cylinders along with Valve and PWD shall be weighed and recorded as under :-

Cylinder Srl No	Initial Weight (in Kg) and Date	Weight (in Kg) After Test and Date	Difference of Weight (in grams)
155.59.233SB-1SB			
172.82.099CB			

Note :- The Vendor will video record the reading after each Environmental Test and after completion of all the Environmental Tests the final reading will be witnessed by QA Authority / Officer through VC. The Vendor to coordinate the same.



(B) The Class 'C' Tests will be Performed in a NABL Accredited Lab by the Vendor Sequentially as Mentioned in The Table Below, on Pressure Warning Device (PWD) Separately :-

Sequence	Tests	Test Number as per L2J JSS 55555	Remarks
1	Vibration	28(Level 1 Table 4.28-3)	Frequency 20-500 Hz, Acceleration 0.005 m/s^2 Frequency 500-2000 Hz falling from 0.005 at 500 Hz to 0.0005 at 2000 Hz Test duration in each axis 140 mins
2	High Temperature	17(Procedure 6 Test condition M)	$55^\circ \text{C} \pm 3^\circ \text{C}$ for a period of 16 hours
3	Damp Heat	10	$40^\circ \text{C} \pm 2^\circ \text{C}$ & RH $93 \pm 5\%$ over a period of not less than one hour
4	Low Temperature	20 (Test condition J)	$-20^\circ \text{C} \pm 3^\circ \text{C}$ for a period of 24 hours
5	Altitude	03(Procedure 5 Test condition (b) & A2)	$-30^\circ \text{C} \pm 3^\circ \text{C}$ Altitude 4160 m Air pressure 60 kpa for a period of 16 hours
6	Rapid Temperature Cycling	22(Procedure 02)	$40^\circ \text{C} \pm 3^\circ \text{C}$ RH $> 95\%$ for 03 hours and 40°C for period of 03 hours (one cycle) For three cycles.
7	Sealing	23(Procedure 1)	Air pressure equal to 25 kpa for 30 minutes. Air pressure reading at the end of 30 minutes period should not have fallen by more than 10 kpa.
8	Dust	14	$40^\circ \text{C} \pm 3^\circ \text{C}$, RH less than 50 % for duration 1 hr. (As per clause No. 2.5 and 2.5.1).
9	Tropical Exposure (28 Cycles)	27(Test condition B)	Temp $20^\circ \text{C} \pm 3^\circ \text{C}$ and chamber temp raised to $35^\circ \text{C} \pm 3^\circ \text{C}$ with RH 95 % period of 03 hours and maintained same for 12 hours. Temp of the chamber lowered to $20^\circ \text{C} \pm 3^\circ \text{C}$ period of 03 hours and same maintained of 06 hours (28 cycles)
10	Bump	05	Peak acceleration 250 m/s^2 Pulse duration - 6 (m/s) Number of Bumps - 4000 Equipment attached or installed in vehicles with full cross-country requirement
11	Mould Growth	21	(Dummy can be used)
12	Corrosion (Salt)	09(As per Procedure 2)	(Dummy can be used)

After each environmental test, PWD shall be checked for efficacy as per clause 1.6.6 of this ATP and recording the observation in Table 17 & 18 of this ATP.

Note :- The Vendor shall record the efficacy check of PWD after each & every Class 'C' Tests (Environmental test). The efficacy of PWD shall be checked with FFE Cylinder filled with Nitrogen gas. Record shall be produced by the vendor. After completion of all Class 'C' Tests, the final efficacy of PWD shall be witnessed QA Authority / Officer.

DETAILS OF ITEMS FOR RAW MATERIAL ANALYSIS:

CYLINDER TO DRG NO 155-59-233SB-1SB (QUICK ACTING CYLINDER- C1 & C2):

Srl No	Drawing No	Nomenclature	Assy/Sub Assy/Component	Specified Material	Alternate Material	Remarks
1	155.59.233 SB-1SB	Cylinder Assembly Drawing	Assembly	-	-	
2	155.59.233 SB-1	Cylinder	Assembly	-	-	
	K2-14.7 TY 14-3-1469-87	Cylinder	Component	-	37Mn JIS G 3429	
4	TY25-02.110459-85	Pressure Indicator Cd	Sub Assembly	-	PROPREITERY ITEM USED BY FIRM	
5	155.59.233 SB-1	Valve Assy	Assembly	-	-	
6	155.59.234 sbSB	Pipe Union With Gasket	Sub Assembly			
7	155.59.587 -1	Pipe Union	Component	Brass ПМu58-2, П63 GOST 15527-70	IS:319:2007 Gr. 1 (or) IS: 6912 Grade FMnB	
8	54-59-301	Gasket	Component	Copper Grade M3 OR M1 & M2 as per GOST 959 - 78	IS: 4171:1983 as manufactured condition (or) IS: 6912 Grade ETP or FRHC	
9	155.59.581 -1	Head Body	Component	Brass ЛMu 58-2, ЛC59-1 GOST 15527-70	IS:319:2007 Gr. 1. (or) IS: 6912 Grade FHTB1	
10	155.59.582 -1	Plug	Component	Steel 30X13 GOST 5632-72	IS: 6603 -2001 Grade X20Cr13 (or) AISI 410	
11	155.59.583 B	Striker / Punch	Component	Steel 30X13, 12X13 GOST 5632-72	IS: 6603 - 2001 Grade X20Cr13	

12	155.59.584 -2	Washer	Component	Steel 30X13 GOST 5632-72	IS: 6603 - 2001 Grade X20Cr13 (or) IS: 6603 - 2001 Grade X30Cr13	
13	155.59.585 -2	Diaphragm / Membrane	Component	Sheet Д Т 0.4 A63 GOST 931-90	Brass Sheet as per L63 Soft to GOST 15527-70 (or) IS:410-1977 Brass sheet grade CuZn37	
14	155.59.586	Locking Ring	Component	Wire 1-X- 12X18H9T GOST 18143-72	IS:6528-1995 Gr. X07Cr18Ni9 (or) IS: 4454 Part 4, Grade 1	
15	155.59.589 -1	Gasket	Sub Assy	Sheet ДМ 2 M1 GOST 495-92	IS:14811-2000, in 'O' condition for chemistry Specification IS:191-2007 Gr. Cu-FRTP-2 (or) IS: 191 - 2004 Grade Cu-ETP	
16	155 38 278-A	Packing	Component	RUBBER 3311 TY 005216-75	Polychloroprene Vulcanized Rubber	
17	172-82- 141	Stopper	Component	Aluminium Alloy Д16Т GOST 4784-74	Aluminium Grade 24345 to IS: 733: 1983 (or) IS: 733 Grade 24534 and 24345	
18	155.26.901	Head Nut	Component	Steel 15 (OR) Steel 20,35, 40 GOST 1050-88	EN 8 to BS: 970 (or) IS:1367 (Pt-8)-2000, property class:04	
19	54 38 130	Gasket	Component	Sheet АД1М GOST 21631 - 1976	IS: 737 - 2008 Gr 19000/19500 in 'O' condition as per HVF DDO section approval letter no 65013/HVF/DD O/23-24 dated 28.07.2023	

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20	54 38 130 - 01	Gasket	Component	Sheet АДІМ GOST 21631 - 1976	IS: 737 - 2008 Gr 19000/19500 in 'O' condition as per HVF DDO section approval letter no. 65013/HVF/DD O/23-24 dated 28.07.2023	
21	54 38 130 - 02	Gasket	Component	Sheet АДІМ GOST 21631 - 1976	IS: 737 - 2008 Gr 19000/19500 in 'O' condition	
22	54 59 338	Gasket	Component	Fibre 2 OCT 14613 -83	Hardware Item	
23	MISCELLE ANEOUS ITEMS:					
i)	155.38.278 -A	Sealing	Component	-	Hardware Item	
ii)	TY32- UTBP-04- 89	Seal 10 / 6.5	Component	-	Hardware Item	
iii)	GOST 792-67	Wire Ko 1.2 / Ko 1	Component	-	Stainless Steel To Aisi 1974 Type 304	

CYLINDER ASSEMBLY DRAWING, DRG NO 172.82.099SB (C3, C4):

Srl No	Drg No	Nomencla ture	Assy/Sub Assy/ Component	Specified Material	Alternate Material	Remar ks
1	172.82.099 SB	Cylinder Assy Drawing	Assembly			
2	K2-150L- 305 to spec TY- 14-3-321- 74	Cylinder	Component	-	37Mn JIS G 3429	
3	TY25- 02.110459 -85	Pressure Indicator Cd	Sub Assy	-	Propreitory Item Used By Firm	
I)	54.38.130	Gasket	Component	Grade Ad1m Gost 21631- 78	Grade Ad1m (Or) Aom To Gost 21631- 76 (Or) Is:737-2008	

					Condition 'O' Grade 19500	
II)	54.59.300	Gasket	Component	Fiber Sheet K ₁ II Gost 14613-83	Fibre Sheet, Hardware Item	
III)	172.82.123 -2A	Plug	Component	Steel 20x13 Gost 5638-72	Stainless Steel Aisi-304	
IV)	172.82.127 -1	Nut	Component	Steel 15 To Gost 1050-74	En8 To Bs:970	
V)	172.82.124 -B	Striker	Component	Steel 20x13 Gost 3632-72	Stainless Steel To Aisi 304	
VI)	172.82.125 -A	Ring Locking	Component	Wire 1 H 12x18hgt Gost 18143-72	Is: 4454 Part 4: 2001 Grade 1 (X07cr18ni9)	
VII)	172.82.141	Stopper	Component	Aluminium Alloy D1t Gost 4784-74	Is: 733 - 1983 Grade 24534 Or 24345	
VIII)	172.82.224	Stopper	Component	Ho 68-1, Ty 005216-75	Any Sheet Of Grade Ty 005216-75	
5	172.82.055 SB-1	Head Body With Pipe	Sub Assy	-	-	
I)	172.82.122 -2	Head Body	Component	Brass L59-1-1 To Gost 15227-70	Brass Lmu58-2 Gost 15227- 70 (Or) Bs 1001: 1960 (Or) Is: 6912 Grade Fhtb1	
II)	155.59.481	Tube	Component	M3 (OR) M2 DRAWN SOFT GOST 617-72	IS: 2501: 1995 GRADE ETP ANNEALED (O)	
6	172.82.057 CB	Washer With Diaphragm	Sub Assy	-	-	
I)	172.82.133	Diaphragm	Component	BRASS L63- M-1 TO GOST 15227-70	COPPER GRADE ATP OR DPA TO IS:1972-77	
II)	172.82.132	Gasket	Component	M1-M , M2-M TO GOST 859-86	COPPER GRADE ATP TO IS:1972- 77	



III)	172.82.130	Washer	Component	20X13 OR 30X13 TO GOST 5632- 72	STAINLESS STEEL AISI- 304	
7	155.59.234	Pipe Union With Gasket	Sub Assy			
I)	155.59.587 -1	Pipe Union	Component	BRASS L59-1 TO GOST 15227-70	IS: 6912: 2005 GRADE FMnB	
II)	54.59.301	Gasket	Component	COPPER GRADE M3 OR M1 & M2 TO GOST 859-78	COPPER GRADE ATP to IS: 6912- 85 (or) COPPER 99.5%, IS: 6912: 2005 GRADE ETP AND FRHC	
8		Miscellane ous Items:				
I)	TY32- UTBP-04- 89	Seal 10 / 6.5	Component		HRADWARE ITEM	
2)	GOST 792-67	Wire Ko 1.2	Component		STAINLESS STEEL TO AISI 1974 TYPE 304	
3)	GOST 792-67	Wire Ko 1	Component		STAINLESS STEEL TO AISI 1974 TYPE 304	

Appendix 'E'

DETAILS OF ITEMS COMPRISING FFE, CODE 82 NO.188.82SP-3 OF TANK T-90 FOR REFERENCE :

Srl No	Tree Level	Drawing No	Description	Spec	Used On	UR	Remarks
1	1	188.82SB-3	Fire Fighting Equipment		188.82SP-3	1	
2	1.01	176.82.006 SB	Bracket		188.82SB-3	1	
3	1.01.1	176.82.012	Strap		176.82.006 SB	1	
4	1.01.2	54.30.614	Boss		176.82.006 SB	2	
5	1.02	175.82.026 SB	Clip		188.82SB-3	2	
6	1.02.1	175.82.027 SB	Clip		175.82.026 SB	1	
7	1.02.1.1	175.82.069	Band		175.82.027 SB	1	
8	1.02.1.2	172.82.215	Lug		175.82.027 SB	1	
9	1.02.1.3	54.34.085	Front Clamp Shaft		175.82.027 SB	1	
10	1.02.2	172.82.098 SB	Clip		175.82.026 SB	1	
11	1.02.2.1	172.82.214	Band		172.82.098 SB	1	
12	1.02.2.2	172.82.215	Lug		172.82.098 SB	1	
13	1.02.2.3	54.34.084	Coupling Nut		172.82.098 SB	1	
14	1.02.3	172.82.054	Bolt		175.82.026 SB	1	
15	1.03	172.82.027 SB	Clip		188.82SB-3	1	
16	1.03.1	172.82.028 SB	Clip		172.82.027 SB	1	
17	1.03.1.1	172.82.056	Band		172.82.028 SB	1	
18	1.03.1.2	54.34.085	Front Clamp Shaft		172.82.028 SB	1	
19	1.03.2	172.82.029 SB	Clip		172.82.027 SB	1	
20	1.03.2.1	172.82.056	Band		172.82.029 SB	1	

21	1.03.2 2	54.34.084	Coupling Nut		172.82.029 SB	1	
22	1.03.3	172.82.054	Bolt		172.82.027 SB	1	
23	1.04	172.82.099 SB	Cylinder		188.82SB-3	2	
24	1.04.0 1	172.82.057 SB	Washer With Diaphrag m		172.82.099 SB	1	
25	1.04.0 1.1	172.82.130	Washer		172.82.057 SB	1	
26	1.04.0 1.2	172.82.132	Gasket		172.82.057 SB	1	
27	1.04.0 1.3	172.82.133	Diaphrag m		172.82.057 SB	1	
28	1.04.0 2	155.59.234 SB	Pipe Union With Gasket		172.82.099 SB	1	
29	1.04.0 2.1	155.59.587- 1	Pipe Union		155.59.234 SB	1	
30	1.04.0 2.2	54.59.301	Gasket		155.59.234 SB	1	
31	1.04.0 3	172.82.123- 2A	Plug		172.82.099 SB	1	
32	1.04.0 4	172.82.124 B	Striker		172.82.099 SB	1	
33	1.04.0 5	172.82.127- 1	Nut		172.82.099 SB	1	
34	1.04.0 6	172.82.141	Stopper		172.82.099 SB	1	
35	1.04.0 7	172.82.224	Stopper		172.82.099 SB	1	
36	1.04.0 8	54.38.130	Gasket		172.82.099 SB	1	
37	1.04.0 9	54.38.130- 01	Gasket		172.82.099 SB	1	
38	1.04.1 0	54.38.130- 02	Gasket		172.82.099 SB	1	
39	1.04.1 1	54.59.300	Gasket		172.82.099 SB	1	
40	1.04.1 2	10/6.5	Seal	TY:32.TsTBP .04-89	172.82.099 SB	1	
41	1.04.1 3	K2-150L- 305	Cylinder	TY:14-3-321- 74	172.82.099 SB	1	
42	1.04.1 4	CD	Pressure Warning	TY:25-02- 110459-85	172.82.099 SB	1	

43	1.04.1 5	KO-1	Wire L=(200)M m	GOST:792- 67	172.82.099 SB	1	
44	1.04.1 6	KO-1.2	Wire L=(200)M m	GOST:792- 67	172.82.099 SB	1	
45	1.04.1 7	114B2	Khladon	GOST:15899 -93	172.82.099 SB	0	Alternate gas Halon 1301 to IS:15220- 2002
46	1.04.1 8	172.82.125 A	Locking Ring		172.82.099 SB	1	
47	1.04.1 9	172.82.055 SB-1	Body, Head With Pipe		172.82.099 SB	1	
48	1.04.1 9.1	155.59.481	Pipe		172.82.055 SB-1	1	
49	1.04.1 9.2	172.82.122- 2	Body, Head		172.82.055 SB-1	1	
50	1.05	172.82.101 SB	Clip		188.82SB-3	1	
51	1.05.1	172.82.100 SB	Clip		172.82.101 SB	1	
52	1.05.1 .1	172.91.257 SB	Latch Assy.		172.82.100 SB	1	
53	1.05.1 .1.1	172.91.575	Loop		172.91.257 SB	1	
54	1.05.1 .1.2	172.93.002	Latch		172.91.257 SB	1	
55	1.05.1 .2	176.91.003	Shackle		172.82.100 SB	1	
56	1.05.1 .3	176.91.005	Shackle		172.82.100 SB	1	
57	1.05.1 .4	176.91.006	Clamp		172.82.100 SB	1	
58	1.05.1 .5	172.82.220	Boss		172.82.100 SB	1	
59	1.05.1 .6	172.93.225	Strap		172.82.100 SB	2	
60	1.05.1 .7	34.27.770-1	Hinge Pin		172.82.100 SB	1	
61	1.05.1 .8	34.27.771-1	Hinge Pin		172.82.100 SB	2	
62	1.05.1 .9	176.91.004	Shackle		172.82.100 SB	1	
63	1.05.2	172.82.223	Gasket 3x36x100		172.82.101 SB	1	Without Drawing
64	1.05.3	172.82.221	Gasket 3x36x110		172.82.101 SB	1	Without Drawing

65	1.05.4	172.82.222	Gasket 3x36x40		172.82.101 SB	1	Without Drawing
66	1.06	155.59.233 SB-1SB	Cylinder		188.82SB-3	2	
67	1.06.0 1	155.59.234 SB	Pipe Union With Gasket		155.59.233 SB-1SB	1	
68	1.06.0 2	172.82.141	Stopper		155.59.233 SB-1SB	1	
69	1.06.0 3	155.26.901	Nut		155.59.233 SB-1SB	1	
70	1.06.0 4	155.38.278- A	Packing Ring		155.59.233 SB-1SB	1	
71	1.06.0 5	155.59.581- 1	Body		155.59.233 SB-1SB	1	
72	1.06.0 6	155.59.582- 1	Plug		155.59.233 SB-1SB	1	
73	1.06.0 7	155.59.583 B	Punch		155.59.233 SB-1SB	1	
74	1.06.0 8	155.59.584- 2	Washer		155.59.233 SB-1SB	1	
75	1.06.0 9	155.59.585- 2	Membran e		155.59.233 SB-1SB	1	
76	1.06.1 0	155.59.586	Locking Ring		155.59.233 SB-1SB	1	
77	1.06.1 1	155.59.589- 1	Gasket		155.59.233 SB-1SB	1	
78	1.06.1 2	54.38.130	Gasket		155.59.233 SB-1SB	1	
79	1.06.1 3	54.38.130- 01	Gasket		155.59.233 SB-1SB	1	
80	1.06.1 4	54.38.130- 02	Gasket		155.59.233 SB-1SB	1	
81	1.06.1 5	54.59.338	Gasket		155.59.233 SB-1SB	1	
82	1.06.1 6	K2-14.7	Cylinder	TY:14-3- 1469-87	155.59.233 SB-1SB	1	
83	1.06.1 7	CD	Pressure Warning	TY:25-02- 110459-85	155.59.233 SB-1SB	1	
84	1.06.1 8	KO-1	Wire L=(200)M m	GOST:792- 67	155.59.233 SB-1SB	1	
85	1.06.1 9	KO-1.2	Wire L=(200)M m	GOST:792- 67	155.59.233 SB-1SB	1	
86	1.06.2 0	13B1	Khladon	TY:6-02- 1104-87	155.59.233 SB-1SB	0	Alternate gas Halon 1301 to IS:15220-2002

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87	1.06.2 1	13B1	Regenera ted Khladon	TY:2412-066- 04806898-98	155.59.233 SB-1SB	0	Alternate gas Halon 1301 to IS:15220- 2002
88	1.06.2 2	10/6.5	Seal	TY:32.TsTBP .04-89	155.59.233 SB-1SB	1	
89	1.07	175.60.115	Shock Absorber		188.82SB-3	2	
90	1.08	175.82.066- 2	Bracket		188.82SB-3	1	
91	1.09	175.82.103	Clamp		188.82SB-3	1	
92	1.10	175.82.104	Clamp		188.82SB-3	1	
93	1.11	172.82.181	Spindle		188.82SB-3	2	
94	1.12	172.82.216	Bracket		188.82SB-3	1	
95	1.13	172.82.217	Bracket		188.82SB-3	1	
96	1.14	172.82.218	Bracket		188.82SB-3	1	
97	1.15	172.82.225	Bracket		188.82SB-3	1	
98	1.16	150.46.180	Washer		188.82SB-3	20	
99	1.17	54.26.071- A	Tubular Rivet		188.82SB-3	2	
100	1.18	520.10.003- 07	Gasket		188.82SB-3	1	
101	1.19	520.10.003- 09	Gasket		188.82SB-3	1	
102	1.20	3M8X1- 6gX20.46.0 16	Bolt	GOST:7796- 70	188.82SB-3	2	
103	1.21	M6- 6gX16.46.0 16	Bolt	GOST:7798- 70	188.82SB-3	4	
104	1.22	M6- 6gX20.46.0 16	Bolt	GOST:7798- 70	188.82SB-3	24	
105	1.23	3M6- 6gX20.46.0 16	Bolt	GOST:7798- 70	188.82SB-3	3	
106	1.24	3M6- 6gX20.88.3 8XC.016	Bolt	GOST:7798- 70	188.82SB-3	4	
107	1.25	3M6- 6gX25.88.3 8XC.016	Bolt	GOST:7798- 70	188.82SB-3	2	
108	1.26	M6- 6gX12.66.0 16	Bolt	GOST:7805- 70	188.82SB-3	2	

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109	1.27	3M6-6gX16.66.016	Bolt	GOST:7805-70	188.82SB-3	4	
110	1.28	M6-6H.8.016	Nut	GOST:5915-70	188.82SB-3	10	
111	1.29	6.65G.016	Washer	GOST:6402-70	188.82SB-3	20	
112	1.30	6T.65G.016	Washer	GOST:6402-70	188.82SB-3	16	
113	1.31	8.65G.016	Washer	GOST:6402-70	188.82SB-3	2	
114	1.32	C6.01.016	Washer	GOST:6958-78	188.82SB-3	2	
115	1.33	C8.01.016	Washer	GOST:6958-78	188.82SB-3	2	
116	1.34	C6.01.016	Washer	GOST:11371-78	188.82SB-3	2	
117	1.35	2.5X14.016	Cotter Pin	GOST:397-79	188.82SB-3	2	
118	1.36	1-8X10-AD1M	Seal	GOST:18677-73	188.82SB-3	4	
119	1.37	TD-1	Fire Sensitive Unit	TD-1.000TY	188.82SB-3	5	
120	1.38	KO-1.2	Wire L=(90)M m	GOST:792-67	188.82SB-3	1	
121	1.39	KO-1.2	Wire L=(600)M m	GOST:792-67	188.82SB-3	1	
122	1.40	KO-1.2	Wire L=(1250) Mm	GOST:792-67	188.82SB-3	1	
123	1.41	KO-1.2	Wire L=(300)M m	GOST:792-67	188.82SB-3	1	
124	1.42	KO-1.2	Wire L=(1500) Mm	GOST:792-67	188.82SB-3	1	
125	1.43	ARDE Drg No 1231 REV 1	Squib Ppm-3		188.82SB-3	4	
126	1.44	OD1-1C	Optical Sending Unit	OD1-1C.000TY	188.82SB-3	10	
127	1.45	15X0.2	Tape Light Blue	GOST:16214-86	188.82SB-3	2M	

128	2 IND SET	172.82.091 SB-A	Portable Khladon Fire Extinguisher		188.82SP-3	2	INDIVIDUAL SET. ALTERNATE 172.82.091S B.
129	2.01 IND SET	172.82.203	Sprayer Disc		172.82.091 SB-A	1	
130	2.02 IND SET	172.82.206	Stopper		172.82.091 SB-A	1	
131	2.03 IND SET	172.82.207	Name Plate		172.82.091 SB-A	1	
132	2.04 IND SET	155.38.254	Coupling Nut		172.82.091 SB-A	1	
133	2.05 IND SET	54.38.132	Collar		172.82.091 SB-A	1	
134	2.06 IND SET	54.38.133	Washer		172.82.091 SB-A	2	
135	2.07 IND SET	520.02.001-02	Nut		172.82.091 SB-A	1	
136	2.08 IND SET	10/6.5	Seal	TY:32.TsTBP .04-89	172.82.091 SB-A	1	
137	2.09 IND SET	K2-150L-305	Cylinder With Valve Kb-1p As Per 9g4.463.025 Ty	TY:14-3-321-74	172.82.091 SB-A	1	
138	2.10 IND SET	KO-1	Wire L=(200)M m	GOST:792-67	172.82.091 SB-A	1	
139	2.11 IND SET	KO-1.2	Wire L=(100)M m	GOST:792-67	172.82.091 SB-A	1	
140	2.12 IND SET	114B2	Khladon	GOST:15899-93	172.82.091 SB-A	0	
141	2.13 IND SET	172.82.093 SB	Body Valve		172.82.091 SB-A	1	
142	2.13.1	172.82.201	Body (Modification)		172.82.093 SB	1	

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143	2.13.2	172.82.202	Pipe		172.82.093 SB	1	Without Drawing
144	3 IND SET	172.82.091 SB	Portable Khladon Fire Extinguis her		188.82SP-3	2	INDIVIDUAL SET. ALTERNATE 172.82.091S B-A.
145	3.01 IND SET	K2-150L- 305	Cylinder With Valve Kb- 1m As Per 9g4.463. 025 Ty	TY:14-3-321- 74	172.82.091 SB	1	Alternate cylinder 765-87-81- 1/B and alternate Valve KB-1P
146	INDIV IDUA L SET	ARDE Drg No 1231 REV 1	Squib Ppm-3		188.82SP-3	0	
147	INDIV IDUA L SET	172.82.133	Diaphrag m		188.82SP-3	0	
148	INDIV IDUA L SET	155.59.585- 2	Membran e		188.82SP-3	0	
149	INDIV IDUA L SET	155.59.589- 1	Gasket		188.82SP-3	0	