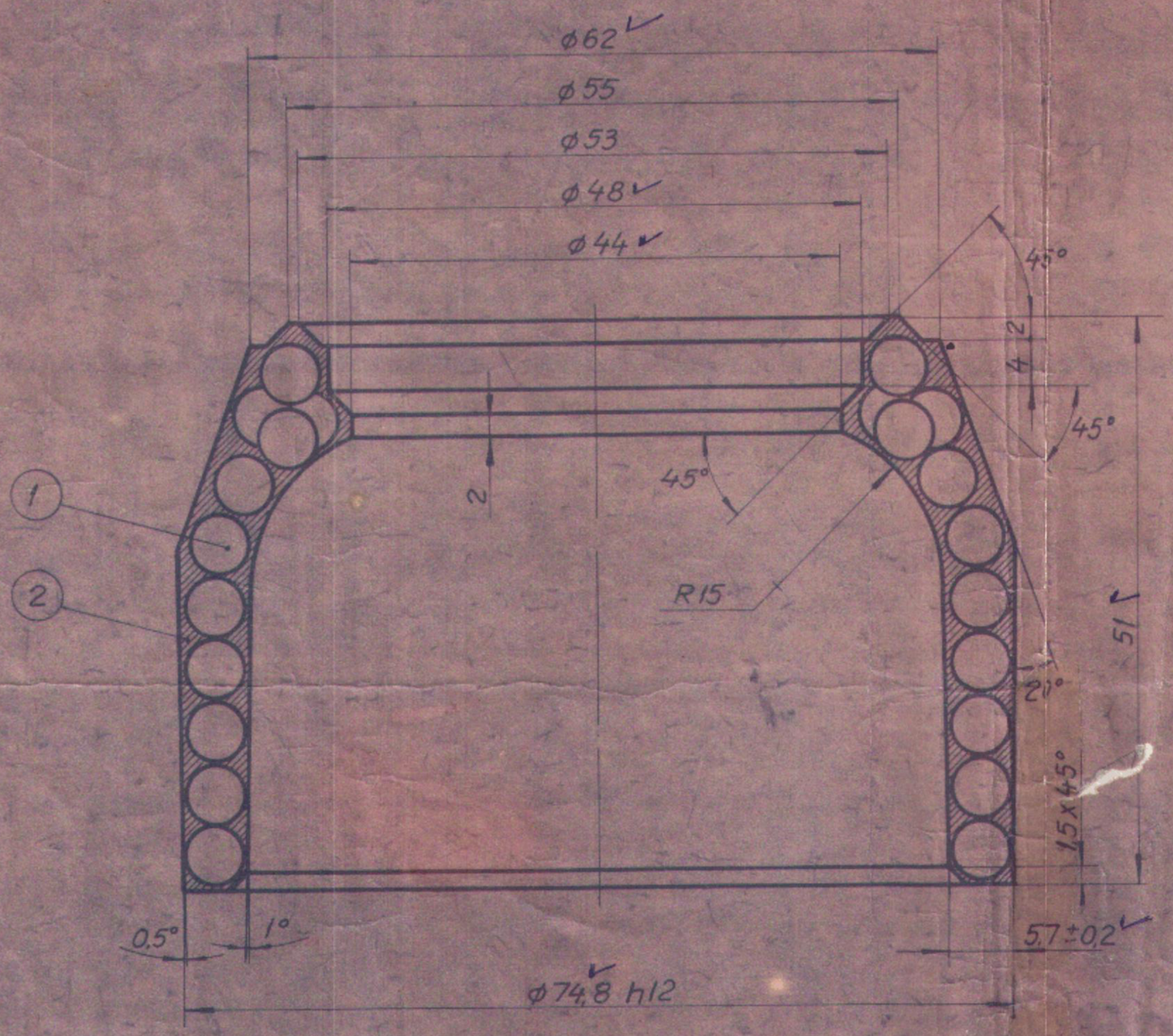
D.C.I. 33179-A
33363-A



INDIGENOUS MATERIAL:-
NEOPRENE RUBBER VULCANISED CHLOROPRENE RUBBER TO SPEC IND/ME/884 (PROV) COMPOUND C-5 WITH HARDNESS 70 TO 75 DEGREE BS.
BALL BEARING TO IS 4698 Gde 103 Cr 2 OR Gde 103 Cr1 OR BS 970 Gde 535 A 99 WITH HARDNESS 750-850 HV.

Mass: 321 g ± 4 g

Spec. F1301-910840

Det	Antal	Benämning/Beteckning	Ritning/Referens	Material/Övrigt
2	–	Binding agent		Chloroprene rubber
1	–	Ball ø5,5 ±0,025		Ball-bearing grade V

Ytbehandling					
Dim. ej angivet anges enligt Tolerans	Ytjämnhet	Gradning R / Fas	≈ eller +45°	Mått	Yta ytbeh. eller
±IT 14/2	/				

Konstr/Ritad	Kop	Granskad	Godk	Projektering	Skala
UN					2:1
Datum 77-06-21	Kontr gr SS/UN	Prod gr TH/UN			

Utgåva	Ändr	Beskrivning	Datum	Utförd	Granskad/Godk
		DR. SEALED.	D.C. 33363 A	7-11-82	
		DRG. SEALED PROVISIONALLY	D.C.I. 33179-A	19.6.81	
C	1	C2	80-08-25	LH	
B	1	B5	80-04-3		
–	–	Translated from Swedish	79-10-11	IL	KT/UN
115190 Tillhör					

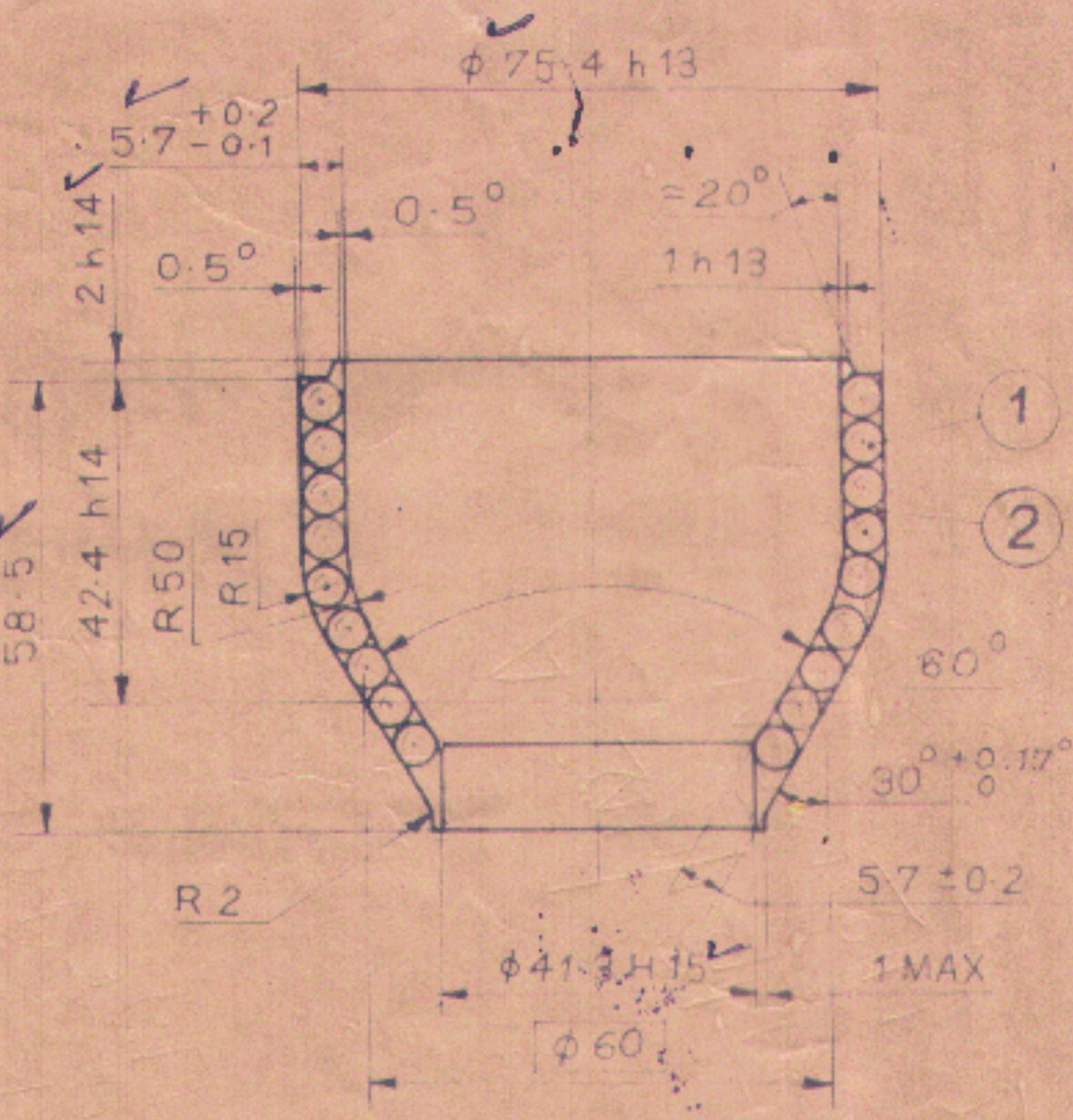
22.8.94	D.C. 35780-A	NEOPRENE RUBBER SPEC AMENDED.	
6.7.93	D.C. 35534-A	IN MATL:- RUBBER ISPEC AMENDED.	
24-10-92	D.C. 35403-A	IN MATERIAL NOTE HARDNESS Nos ADDED.	
21-10-89	D.C. 34742-A	INDIGENOUS MATERIAL ADDED.	

Ball Insert, Front

FÖRENADE FABRIKSVERKEN
HUVUDKONTORET ESKILSTUNA

F1301-115180 C

Utgåva	Ändr nr	Plats på ritning/Beskrivning	Datum	Utförd	Granskt/Godkt
C	1	D 3;/Drg. amended. Redrawn	87-12-08	UL	SD/10182



INDIGENOUS MATL:-

NEOPRENE RUBBER VULCANISED CHLOROPRENE RUBBER TO SPEC NO IND/ME/884 (PROV.) COMPOUND C-5 WITH HARDNESS 70 TO 75 DEGREE B.S. BALL BEARING TO IS 4398 Gde 103 cr 2 OR Gde 103 cr 1 OR BS 970 Gde 535 A 99 WITH HARDNESS 750-850 HV

Det	Antal	Beteckning	Referens	Material
2		Binder		Chloroprene Rubber
1		Ball/ϕ5·5 ±0·025		SKF Ball Bearing Quality I

R.No	DATE	AUTHORITY	REVISION
	22.8.94	35780-A	NEOPRENE RUBBER SPEC UPDATED
	24-7-93		REDUCTION SIZE RETRACED WITHOUT CHANGE
			PREV. D.C Nos · 34511-A, 34742-A, 35403-A & 35534-A

AHSP DO SIG

Där ej annat anges gäller Tolerans IT14/2	Ytjämnhet /	Gradning max R 0.3 eller Fas 0.3 x 45°	Mått före/efter ytbeh	Form- och lägetol enl SS-ISO 1101 Matmetod: Narliggyta/Tangyta		Skala 1:1
Konstr/Ritad AC	Ritningsgranskad BP	Konstruktionsgransk AC	Godkänd th	Registrerad	Översatt	Dokumentklass
Datum	Kontrollerbarhetsgranskad	Produktionsgranskad	Datum 87-10-31	Datum 86-06-06	Datum	

Benämning

BALL INSERT REAR

FFV

Ritningsnummer F 1301 - 036770 C

Blad

14534 | DRN - | CHD - | TRD - | COMP - | D.O - | AHSP - C.Q.A.(A) KIRKEE.

DC(I) NO. 33419-A SPECIFICATION NO. F1301-902230C

GOVERNMENT OF INDIA
MINISTRY OF DEFENCE (DGQA)
CONTROLLERATE OF QUALITY ASSURANCE (AMN)

BALL INSERT, REAR F1301-036770

for

84mm HE Round FFV 441B

Specification to Govern manufacture, inspection & supply.

Approved on : 05 Apr 1982

THIS SPECIFICATION IS THE PROPERTY OFTHE MINISTRY OF DEFENCE AND MUST BE RETURNED TO THE CONTROLLER OF QUALITY ASSURANCE (AMMUNITION), KIRKEE:PUNE-411 003 IMMEDIATELY AFTER THE TENDER HAS BEEN DECIDED OR ON COMPLETION OF THE CONTRACT OR ON DEMAND.

This specification or any other information issued in connection therewith, may only be used for specific enquiries, tenders of orders placed by a competent authority, on behalf of the Ministry of Defence. It is not to be used for any other purpose whatsoever without the express written sanction of CQA(A), Kirkee:Pune-411 003.

Any question relating to the drawing, pattern or this specification should be referred to the CQA(A),KIRKEE or other INSPECTING OFFICER, duly authorised to act on behalf of him.

Obtainable from :-

The Controller
Controllerate of Quality Assurance (Amn)
Government of India
Ministry of Defence
KIRKEE:PUNE-411 003

W.I./PATTERN OFFICE.
ORDNANCE FACTORY, CHANDA
Received on 22/2/89.
CQA(A)
under letter No. TS04028/0[illegible]
dated [illegible]

VRB171187.

FFV

SPECIFICATION NO.

Ball Insert, Rear F1301-036770

F1301-90223

Sheet 1 (5)

Issue	Date	Prepared	Checked	Appd	Issue	Date	Prepared	Checked	Appd	Issue	Date	Prepared	Checked	Appd
A	67-11-27	AE		Bp										
B	68-06-06	AE		Bp										
C	82-03-24	UN												

1 RELEVANT DOCUMENTS

In addition to this specification the following documents, in the order they are given, are applicable:

Drawing, ball insert, rear	F1301-036770
Standard for rubber type 64 (chloroprene rubber)	SIS 16 26 40
Sampling procedures and tables for inspection by attributes	SS [illegible] 30 or MIL-STD-105 D

2 DESCRIPTION OF PRODUCT

The ball insert, rear, is used in the HE shell to increase the fragmentation effect of the shell.

3 PRODUCT REQUIREMENTS

3.1 MATERIAL

3.1.1 The material shall meet the requirements for grade 801 of the standard specified in para. 1.

3.1.2 When extracting 5 grammes of finely ground material in methyl alcohol for 16 hours, the loss in weight must not exceed 1 %. A Soxhlet extractor or equal shall be used for the extraction.

3.1.3 Furthermore, before approval of the material the following type tests shall be performed.

3.3 DIMENSIONS AND WEIGHT

The following AQL's are applicable:

Dimension	AQL %	
Ø 75.4 h13	1.0	
42.4 h14 max	1.0	
min	2.5	
1 h13	2.5	
2 h14	2.5	
Other dimensions	4.0	
Mass Weight	4.0	however no value more than 3 g outside tolerance zone.

4 MANUFACTURE

4.1 METHODS AND EQUIPMENT

4.1.1 To check the requirement of para. 3.2.2, the number of lots shall be inspected for each part by weighing or counting.

4.1.2 For each batch curing test, determination of hardness and determination of specific gravity shall be made.

4.2 PLANNING AND FOLLOW-UP

4.2.1 Manufacturing Journal

A manufacturing journal shall be kept and be shown on request. The journal shall give information on the material used for the lot. Further, the journal shall state essential alterations, if any, in the manufacturing process as well as other details that may be valuable when judging the quality of the product. The manufacturing journals shall be preserved for 20 years.

3.1.3.1 Test of compatibility with RDX/TNT in accordance with FOA's (the Research Institute of the Swedish National Defence) method with ~~weight~~ mass loss flasks.

3.1.3.2 Test of the chemical resistance of the material to RDX/TNT.

3.1.3.3 Test of crack resistance during casting of RDX/TNT (85 to 90 °C)

3.1.3.4 Temperature test with 15 cycles between +60 °C and -40 °C. Each cycle shall comprise 2 hours in a heating chamber with direct removal to a refrigerating chamber, where the ball inserts shall be kept for 2 hours.
During the test the ball inserts shall be kept in a closed plastic bag.
Cracks must not araise.

3.1.4 Approved grades are specified in para. 7.1.

3.2 SURFACE QUALITY

3.2.1 The ball insert shall be free from cracks. Check particularly that the lip is intact.
(The lines round the balls must not be mistaken for cracks).
The balls shall be free from corrosion.
Remove defective ball inserts.

3.2.2 The number of balls shall be adjusted to give the minimum area free from balls. Inspection to be performed by weighing finished parts.

3.2.2.1 The area free from balls around the sprue must not exceed 100 mm^2.
AQL: 2.5 %.

3.2.2.2 For other surfaces, areas free from balls must not exceed 40 mm^2.
AQL: 2.5 %.
Note: - An area free from balls is an area below which the material is completely free from balls.

5 DELIVERY

5.1 PACKING

5.1.1 The ball inserts shall be supplied in lots of 2 500. Each lot shall be given a lot number, e.g. 82001.

5.1.2 The ball inserts shall be packed in a suitable package giving protection against damages and corrosion during storing and transport.

5.2 TRANSPORTATION MARKING

Each package shall be clearly marked with contents, FFV article number, lot number and number of ball inserts.

6 INSPECTION

6.1 VENDOR'S INSPECTION

The vendor shall perform inspection to the extent necessary to verify that the requirements of para. 3 are met (as regards para. 3.1 the properties are normally inspected only in type tests).

6.2 PURCHASER'S INSPECTION

The purchaser shall be informed of the result of the vendor's inspection and performs counterinspection to the extent he will find necessary. The inspection may take place at the vendor's works.

The sampling scheme specified in para. 1 is applicable to statistical inspection.

6.3 CERTIFICATES

The vendor shall for each lot of ball inserts deliver test certificates stating grade of material used and the results of the inspection of the properties specified in paras. 3.2 and 3.3.

7 OTHER CONDITIONS

7.1 INSPECTION OF ~~WEIGHT~~ MASS

To determine the ~~weight~~ mass of the parts with the full number of balls, see para. 3.2.2, at least 200 parts per mould shall be weighed when starting manufacture. From the obtained values, the minimum ~~weight~~ mass shall be calculated.

7.2 APPROVED GRADES

Ulsvunda gummifabrik 9808
SIGMA AB 1050
Forsheda gummifabrik kval 453 (9484336).

CORRECT COPY OF THE SEALED SPECIFICATION AT THIS DATE.

Dated : for CONTROLLER OF INSPECTION (AP.)

NOTES: (i) This specification is to be ... Controller of Quality Assurance (Amn), Kirkee immediately on submission of tender or completion of order.

(ii) The specification only holds good for the particulars order for which it was issued.

CORRECT COPY OF THE SEALED SPECIFICATION AT THIS TIME.

KIRKEE: PUNE-411003.
DATE: 01-2-1989

(AH PANTKER)
DSS
ACQA(A)
for CONTROLLER OF QUALITY ASSURANCE(AMN)

MASTER COPY

IND/ME/884(PROV)

Based on B.S. 2752 - ~~1956~~ 1982.

VULCANISED CHLOROPRENE RUBBER COMPOUNDS (NEOPRENE)

CONTROLLERATE OF QUALITY ASSURANCE
(MILITARY EXPLOSIVES)
AUNDH ROAD, KIRKEE, PUNE - 411 003.

DEPARTMENT OF DEFENCE PRODUCTION

MINISTRY OF DEFENCE

AMENDMENT RECORD

Amendment	Dc(1) No. & Date	Clauses affected	Remarks & Initials
Specification is Sealed Provisionally	8394-ME 11:7-81	—	
	3309-ME 26.5.82	Appendix 'B' Line 4 & 6	
	3495-ME 6/2/98	P-1 Right Hand Corner below Specification clause 1.4 under table I ② clause 9.2 physical	

IND/ME/884(PROV)

AMENDMENT RECORD

Amendment	DC(I)- No. & Date	Clauses affected	Remarks & initials
~~3495-ME~~ 6/2/98			
3751-ME 12.12.2002		Clause 1.2 Page 3 For comp C2 to C6 Read comp C4c to C80	FMJoshi.
3754-ME 12.12.2002		Page-3 Top para last line & clause 6(i) last line.	

VULCANISED CHLOROPRENE RUBBER COMPOUNDS (NEOPRENE)

CONTENTS

0. FOREWORD

0.1 This specification has been prepared by the Controllerate of ~~Inspection~~ QUALITY ASSURANCE (MILITARY EXPLOSIVES), KIRKEE, PUNE - 411 003.

0.2 For additional copies or any other enquiry regarding this specification reference should be made to the Inspection Authority named in the tender of contract (i.e. CQA (ME) KIRKEE).

1. SCOPE

1.1 This specification is meant to govern manufacture, supply and inspection of Vulcanised Chloroprene Rubber Compounds (Neoprene).

1.2 This specification covers five synthetic rubber C40 to C80 (Chloroprene) Vulcanisates designated as compounds ~~C2 to C6~~. The compounds are classified according to their hardness (as shown in Table I below)

1.3 The vulcanisates are primarily intended to meet the requirements of items in which resistance to weather and certain organic liquids is a necessary property.

1.4 The material is suitable for use in the manufacture of items such as sheets, washers, strips, gaskets, moulded articles and wrapped tubing etc.

TABLE I

Class	Compound No	Hardness (B.S. Rubber Hardness degrees)
~~C2~~	C 40	~~41-50~~ $40 \pm \frac{5}{4}$
~~C3~~	C 50	~~51-60~~ $50 \pm \frac{5}{4}$
~~C4~~	C 60	~~61-70~~ $60 \pm \frac{5}{4}$
~~C5~~	C 70	~~71-80~~ $70 \pm \frac{5}{4}$
~~C6~~	C 80	~~81-90~~ $80 \pm \frac{5}{4}$

2. RELATED DOCUMENTS

2.1 The related documents mentioned at clause 2.2 are those applicable at the date of publication of this specification. It is contractor's responsibility to confirm their current applicability and to obtain from the Authority Holding Seated Particulars (i.e. CQA (ME), KIRKEE) information concerning any change that may be necessary due to cancellation, replacement or supersession of any of these documents.

..4/-

2.2 Copies of the related specifications in clauses 3.5 and 9 are obtainable as follows :

BS 903	Indian Standards Institution Manak Bhavan, 9, Bahadur Shah Zafar Marg NEW DELHI - 110 002.
BS 903 A-26 - 1969	
BS 903 A-2 - 1971	
BS 903 A-19 - 1956	
BS 903 A-6 - 1960	
BS 903 A-16 - 1971	
BS-007 - 1965	
BS-805 - 1953 (Toluene)	
BS-1995-1962	
BS 2536-1954	
BS 2637/8-1956 (I Sooctane)	

3. COMPOSITION

3.1 Rubber Mix : The manufacture should prepare a suitable mix which on vulcanisation will give material conforming to the physical properties given in clause 9.2. The basic polymer may be Chloroprene Rubber No reclaimed synthetic rubber, ground vulcanised scrap or waste rubber shall be used. The mix should also contain suitable plasticisers, softeners, fillers, accelerators, anti-oxidance, vulcanising agents etc.in requisite proportion.

3.2 All ingredients used in the mix shall be of good commercial quality and free from grit and extraneous materials.

3.2.1 Di-2-ethylhexyl phthalate and Di-2-ethylhexyl sebacate used in the mix shall be in accordance with specification BS:1995-1962 and BS:2530-1956 amended todate respectively.

3.3 The manufacturer shall give a declaration of the mix he proposes to use for manufacturing articles against a particular contract and this mix shall not be altered in any way during the period of contract without the written permission of the Inspecting Officer/Inspection Authority.

3.4 The compounding and processing must be such that the material may be calendered, extruded, moulded or otherwise fabricated and give after suitable vulcanization, a product free from grit, foreign matter and sulphur bloom and from defects such as blisters, porosity and surface imperfections and complying with all the requirements of clause 9. The material shall have a smooth surface.

3.5 Mix which as been found to give satisfactory material is appended at Appendix 'E' for guidance.

..5/-

3.6 The type of the mixes appended at Appendix 'E' shall be regarded as indicating the class of compositions which is considered suitable but depending on the brand of synthetic rubber used. It may be necessary for the contractor to adjust the proportions of carbon black or any of the vulcanising ingredients in order that the vulcanizate will comply with the requirements of the relevant class to this specification.

4. DESCRIPTION

4.1 The synthetic rubber must consist of suitable chloroprene polymer compounded with approved ingredients so that the composition is in accordance with requirements of this specification.

5. TENDER SAMPLE

5.1 Details of the composition of the mix which the contractor proposes to use together with test samples as given below shall be submitted to the Inspecting Officer for approval prior to the commencement of bulk manufacture.

5.1.1 The contractor shall submit, free of charge, one each of the following samples.

i) Test slab size - 300 mm x 300 mm x (2.5 mm ± 0.25 mm thick)

ii) Test slab size - 150 mm x 150 mm x (6.35 mm ±0.125 mm thick)

iii) Sample of finished stores -

A minimum of 100 grams which should contain atleast 3 Nos of actual size is normally required.

In case the finished component are of small dimensions and low weights, the quantum of samples required for tests, shall be decided by the Inspecting Officer on the merit of the case. However, these samples shall trully represent the bulk and their total mass shall not be less than 30 grams in such cases.

5.2 The samples will be manufactured from the mix proposed to be used by the contractor and for which declaration of the mix shall be given as per clause 3 above.

6. PRE-INSPECTION

6.1 Before tending the store to the Inspector, the supplier shall carry out a thorough inspection of each delivery to satisfy himself that the store fully conforms to this specification and shall render a certificate to that effect to the Inspecting Officer

..6/-

7. INSPECTION

7.1 The vulcanised chloroprene rubber compound(Neoprene) and the packages in which it is contained, shall be subject to inspection by, and to the final approval of the Inspecting Officer/Inspection Authority.

7.2 Samples of the material and of the packages in which it is contained may be taken from any portion of the consignment.

7.3 If, on examination, any sample be found not to conform to this specification, the whole consignment is liable for rejection.

7.4 The foregoing provisions shall apply equally to prime contractors and to sub-contractors, if any.

8. SAMPLING

8.1 The number of samples to be drawn from each lot/consignment will be at the discretion of the Inspecting Officer.

9. TEST REQUIREMENTS

9.1 Samples drawn from any portion of the supply shall comply with clause 3 and 4 above and shall also conform to the following requirements.

9.2. PHYSICAL

Sl No. 1	Characteristics 2	Passing Standard 3					Test Method 4
		Compound No.					
		C40	C50	C60	C70	C80	
1)	Hardness degree BS	40^{+5}_{-4}	50^{+5}_{-4}	60^{+5}_{-4}	70^{+5}_{-4}	80^{+5}_{-4}	BS 903-A-26
2)	Tensile Strength in kPa min.	9000	12000	13000	13000	13000	BS 903-A-2
3)	Elongation at break percent min.	450	400	250	200	100	BS 903-A-2
4)	Compression set percent max.	30	30	25	25	25	Appendix 'A' Refer BS 903-A-6
	a) For 24 hrs at 70°C						
	b) 25 % Compression applied wrt original thickness						
5)	Swelling percent max.	100	80	70	70	60	Appendix 'B' Refer BS 903 A-16
	a) For 22 hrs at 40°C						
	b) Use liquid B i.e. ISO - Oc-tane 70 Toluene 30						
6)	Adhesion to and Corrosion of metals i.e Copper & Mild Steel	There shall be no corrosion or pitting of metals & the vulcanizate shall not adhere to the metal surface. Discolouration of metal surfaces shall not be considered objectionable.					Appendix 'C'
7)	Resistance to heat ageing at 70°C ± 1 deg C for 168 hrs	a) The hardness shall not increase by more than 7 degree B.S b) The tensile strength shall not decrease by more than 12 percent c) The elongation at break shall not decrease by more than 20 percent.					
8)	Resistance to Crystallisation	The test piece shall show no appreciable increase in stiffness					Appendix 'D'

9.3 CHEMICAL

9.3.1 Carry out chemical analysis on any portion of the consignment or on sheet supplied for physical testing. Results of chemical tests shall be in accordance with the requirements specified and if necessary with the manufacturer's declaration of the composition.

9.3.2 Carry out the chemical tests by the appropriate methods described in IS 903 (Methods of testing vulcanised rubber).

10. PACKING AND MARKING

10.1 PACKING

a) Components : Rubber component shall be packed loose in a wooden box/card-board box/card-board box and shall be adequately dusted with french chalk, where wooden boxes are used, they shall be lined internally with brown paper.

b) Sheets : Sheets in running length shall be rolled the rolls shall be covered with brown paper and then packed in hessian cloth. Sheets shall be dusted with french chalk during rolling.

10.2 MARKING

10.2.1 The packages constituting a consignment shall each be legibly and durably marked with the following details as applicable :

i) Nomenclature and specification number of the material.

ii) Name and address of the consignee,

../-

iii) AT/SO No. and date.

iv) Consignment Number.

v) Lot No./Batch No. and date of manufacture.

vi) Gross and net mass.

vii) Consecutive number of package and total No. of packages.

viii) Date of supply.

ix) Contractor's initials or recognised trade mark.

10.2.2 The componets will be appropriately marked with initials/trade mark of the manufacture, date of manufacture, if specified, on the relevant component drawing.

10.2.3 In addition to above, the Inspecting Officer may suggest some more marking/identification, suitable at the time of inspection.

10.2.4 The inclusion of any foreign matter or impurities in any of the packages shall render the whole consignment liable to rejection.

Sd/- X X X
(Dr.S.B.RAY)
DCSO/CIME
for DI(Armts).

* * *

.10/-

11. APPENDICES

APPENDIX 'A'

DETERMINATION OF COMPRESSION - SET

APPARATUS

1) Dies and knives - for cutting test pieces

2) Thickness gauge - micrometer dial gauge type A as per BS 907.

3) Compression apparatus - Two or more highly polished or chromeplated parallel plates of stainless steel sufficiently rigid which will withstand stress and which can be held together with bolts.

4) Specers - 4.73 ± 0.01 mm.

5) Oven - which will work as per requirement of temperature within limits.

6) Test Pieces - A cylindrical disc 13.0 ± 0.5 mm and thickness 6.3 ± 0.3 mm.

Procedure : Cut 3 test pieces as per requirement above and measure thickness of each piece. Compress the test pieces in between compression set plates by keeping required spacers so that the thickness of test pieces is pressed by 25%. Ensure full tightening and keep this assembly in the oven at 70°C ± 1 deg C for a period of 24 hours. Take out the assembly from oven. Remove the rubber pieces. Keep the rubber pieces on wooden base and allow to cool and recover for 30 ± 3 minutes at 20°C ± 2 deg C. Measure the thickness of the each test pieces. Calculate compression set percentage as follows :

$$\text{Compression Set at constant strain} = \frac{t_o - t_1}{t_o - t_s} \times 100$$

Where t_o = original thickness of test piece.

t_r = thickness of test piece after recovery.

t_s = thickness of spacer.

****

APPENDIX 'B'

DETERMINATION OF SWELLING IN ISOOCTANE AND TOLUENE MIXTURE

Weigh the test piece accurately in air(W_1) and then in distilled water at 20 C ± 2 deg C(W_2). See that no air bubble exists while weighing in distilled water. Dry the test piece in air and keep in 100 ml of swelling liquid(mixture of isooctane) and toluene in the proportion of 70:30) in a well stoppered container. Keep the container alongwith test piece in an oven at 40°C ± 1 deg C for 22 hours. Remove the container and quickly transfer the test piece to a fresh cool swelling liquid at 20°C ± 2 deg C and allow to stand for 5 minutes. It is then dried and weighed in air (W_3) and then in distilled water at 20°C ± 2 deg C(W_4). Swelling is calculated as follows :

$$Sv = \frac{(W_3 - W_4)}{(W_1 - W_2)} \frac{(W_1 - W_2)}{} \times 100$$

Confirmation to specn DS 2637/8-1956
" to specn DS 805-1953

APPENDIX 'C'

ADHESION TO AND CORROSION OF METALS

Place a test piece approximately 25 mm square on a clean, smooth, finely ground surface of Mild steel plate of 50 mm square and 3 mm whick approximately. Place a copper plate, similar in dimension to that of steel plate, over the test piece in line with the steel plate and with the prepared surface against the test piece. Place the assembly in a vice. Apply sufficient pressure to bring the rubber and metal surface in intimate contact. Secure the assembly by means of wire or clamp and place it is an oven at 70°C ± 1 deg C for 168 hours. Remove the assembly from the oven and cool to room temperature. Dismantle the assembly and observe the surfaces of the metal plates in contact with the test piece for corrosion or pitting and for adhesion of the compound. Adhesion of the compound shall be considered to have occured, if on separation from the metal, particles of the compound remain affixed to either plate.

APPENDIX 'D'

RESISTANCE TO CRYSTALLISATION

Maintain a suitable test piece, at 0°C for 14 days and then allow to stand at room temperature for one hour. Test the piece by hand for any increase in stiffness. Do not flex the test piece at any time during the test.

****

QA 06666

APPENDIX 'E'

The following mixes have been found to give vulcanizates complying with the requirements of this specification :

Constituents	Compound Number				
	~~C.2~~ C40	~~C.3~~ C50	~~C.4~~ C60	~~C.5~~ C70	~~C.6~~ C80
Chloroprene polymer*	100	100	100	100	100
Di-2-ethylhexyl sebacate	6	6	6	6	6
Di-2-ethylhexyl phthalate	6	6	6	-	-
Brown factice	10	10	10	10	10
Magnesia (light calcined)	4	4	4	4	4
Zinc Oxide	5	5	5	5	5
Stearic acid	1.5	1.5	1.5	1.0	1.0
Paraffin Wax	1.0	1.0	1.0	0.5	0.5
2-Mercaptoimidazoline	0.5	0.5	0.5	0.5	0.5
Phynyl-B-Naphthylamine	2.0	2.0	2.0	2.0	2.0
P.E.F. Carbon Black	1	25	45	55	80
Equivalent press cure: Min (approx.) at 163°C for 0.1 in (2.5 mm) thick sheets	45	45	45	45	45

* In these compounds, Neoprene WRT has been used.

****

DC(I) NO. 33/17-A

SPECIFICATION NO. F1301-910840C (Old: 47141)

GOVERNMENT OF INDIA
MINISTRY OF DEFENCE (DGQA)
CONTROLLERATE OF QUALITY ASSURANCE (AMN)

BALL INSERT, FRONT F1301-115180
for
84-mm HE Round FRY 441E

Specification to Govern manufacture, inspection and supply.

Approved on : 05 Apr 1983

THIS SPECIFICATION IS THE PROPERTY OF THE MINISTRY OF DEFENCE AND MUST BE RETURNED TO THE CONTROLLER OF QUALITY ASSURANCE (AMMUNITION), KIRKEE:PUNE-411 003 IMMEDIATELY AFTER THE TENDER HAS BEEN DECLINED OR ON COMPLETION OF THE CONTRACT OR ON DEMAND.

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Any question relating to the drawing, pattern or this specification should be referred to the CQA(A), KIRKEE or other INSPECTING OFFICER, duly authorised to act on behalf of him.

Obtainable from :-

The Controller
Controllerate of Quality Assurance (Amn)
Government of India
Ministry of Defence
KIRKEE:PUNE-411 003

VRB171187.

[illegible] 27/2/87
CQA(A) letter No. 75/4096/OFK dt 6/2/87

SPECIFICATION (SFS)

FFV

Ball insert, front F1301-115180

No. F1301-910840

Sheet 1 (5)

Issue	Date	Prepared	Checked	Appd	Issue	Date	Prepared	Checked	Appd	Issue	Date	Prepared	Checked	Appd
A	78-02-24	AE		At										
B	80-04-15	LN												
C	82-05-10	LN												

Translated from Swedish KT

1 RELEVANT DOCUMENTS

In addition to this specification in the order stated below:

Drawing, ball insert, front	F1301-115180
Standard for rubber type 64 (chloroprene rubber)	SIS 16 26 40
Sampling procedures and tables for inspection by attributes	SS 02 01 30 or ISO 2859

2 DESCRIPTION OF PRODUCT

The ball insert, front, is used in the HE shell to increase the fragmentation effect of the shell.

3 PRODUCT REQUIREMENTS

3.1 MATERIAL

3.1.1 The material shall meet the requirements for grade 801 in the standard stated in para. 1.

3.1.2 When extracting 5 g of finely ground material in methyl alcohol for 16 h, the weight loss must not exceed 10 %. A Soxhlet extractor or equal shall be used for the extraction.

3.1.3 Furthermore, before approval of the material, the following type tests shall be performed.

3.1.3.1 Test of compatibility with RDX/TNT in accordance with FOA's (Swedish National Defence Research Institute) method with weight loss flasks.

3.1.3.2 Test of the chemical resistance of the material to RDX/TNT.

3.1.3.3 Test of resistance to crack formation during casting of RDX/TNT (85-90°C).

3.1.3.4 Temperature test with 15 cycles between +60°C and -40°C. Each cycle to comprise 2 h in heating cabinet with direct removal to a refrigerating cabinet, where the ball insert shall be kept for 2 h.

During the test, the ball insert shall be kept in a closed plastic bag.

Cracks must not form.

3.1.4 Approved grades according to para. 7.1.

3.2 SURFACE QUALITY

3.2.1 The ball inserts shall be free from cracks. (Knitting lines around the balls are not to be mistaken for cracks).

The balls shall be free from corrosion.

Defective ball inserts to be sorted out.

3.2.2 The number of balls shall be adjusted to give the minimum area free from balls. Inspection to be performed by weigning finished parts.

3.2.2.1 The area free from balls around the sprue must not exceed 100 mm^2.

AQL: 2.5 %.

3.2.2.2 For other surfaces, areas free from balls must not exceed 40 mm^2.

AQL: 2.5 %.

Note: An area free from balls is an area below which the material is completely free from balls.

3.3 DIMENSIONS

The following AQLs apply:

Dimension	AQL %
ø 74.8 h12	1.0
ø 62	1.0
ø 48	2.5
ø 44	2.5
51	2.5
2	2.5
Other dimensions	4.0
Weight	4.0 , however no value more than 3 g outside the tolerance zone.

4 MANUFACTURE

4.1 METHODS AND EQUIPMENT

4.1.1 To check the requirement of para. 3.2.2, the number of balls shall be inspected for each part by weighing or counting.

4.1.2 For each batch, curing test, determination of hardness and determination of specific gravity shall be carried out.

4.2 PLANNING OCH FOLLOW-UP

4.2.1 Journal

A journal shall be kept during manufacture and shall be shown on request. The journal shall give information on the materials used for the respective lot, essential alterations of the manufacturing process, if any, and other information that may be of value when judging the quality of the product. The journal shall be kept for 20 years.

5 DELIVERY

5.1 PACKING

5.1.1 The ball inserts shall be delivered in lots of 2 500. Each lot to be given a lot number, e.g. 78001.

5.1.2 The ball inserts shall be packed in a suitable packing giving protection against damages and corrosion in storage and transport.

5,2 TRANSPORTATION MARKING

Each packing to be distinctly marked with contents, FFV article number, lot number and quantity.

6 INSPECTION

6.1 VENDOR'S INSPECTION

The vendor shall perform inspection to the extent necessary in order to verify that the requirements stated in para. 3 are met (as for para. 3.1, the properties, as a rule, are only inspected in type test).

6.2 PURCHASER'S INSPECTION

The purchaser shall be informed of the result of the vendor's inspection and performs counterinspection to the extent he will find necessary. The inspection may take place at the vendor's premises. For sampling inspection, the sampling scheme stated in para. 1 applies).

6.3 CERTIFICATE

For each lot of ball inserts, the vendor shall submit test certificates stating the grade of material used and the results from inspection of the properties in paras. 3.2 and 3.3.

7 OTHER CONDITIONS

7.1 APPROVED GRADES

Ulvsunda gummifabrik 9808
Sigma AB 1050
Forsheda gummifabrik kval 453 (9484336)

CORRECT COPY OF THE SEALED SPECIFICATION AT THIS DATE.

Dated :

for CONTROLLER OF INSPECTION (CC)

NOTES: (i) This specification is to be returned to the Controller of Quality Assurance (Amn),Kirkee immediately on submission of tender or completion of order.--

(ii) The specification only holds good for the particulars order for which it was issued.

CORRECT COPY OF THE SEALED SPECIFICATION AT THIS DATE.

KIRKEE:PUNE-411003
DATE:01-2-1989

(AH PANICKER)
DSS
ACQA(A)
forCONTROLLER OF QUALITY ASSURANCE(AMN)