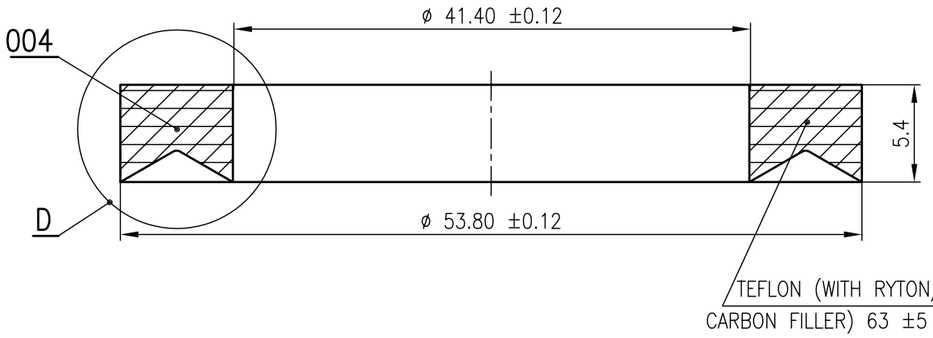
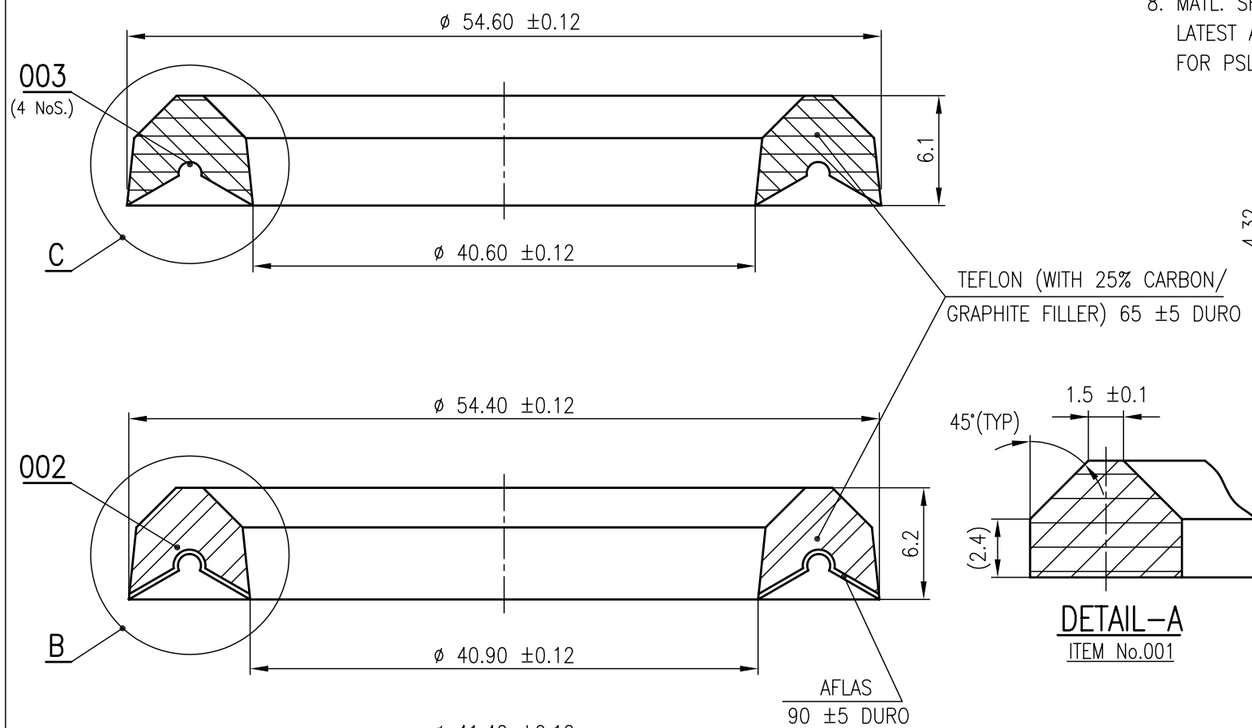
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

DRAWING NO. 3-V-4513-05881

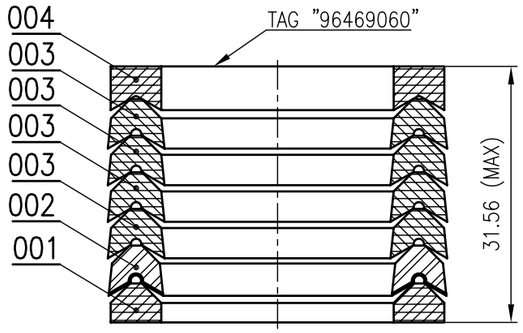
NOTES:-

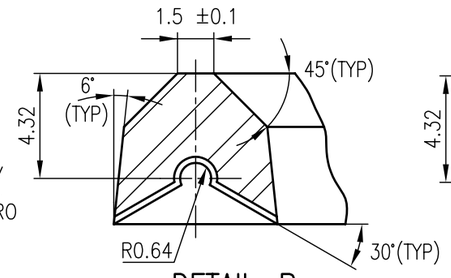
1. PACKING ID SHALL BE SUITABLE FOR A STEM DIA OF 41.22 ±0.02 AND OD FOR A BONNET BORE DIA OF 54.05 ±0.07
2. RMA A-2 F-3 TOLERANCES SHALL APPLY TO ACTUAL DIMENSIONS.
3. SURFACE FINISH SHOULD BE SMOOTH.
4. THE PACKING RINGS ARE TO BE SUPPLIED IN SETS.
5. MATL. CODE : 97 464 066 0000
6. UNSPECIFIED TOLERANCE ±0.25
7. UNSPECIFIED ANGLE TOLERANCE ± 1/2°
8. MATL. SHALL COMPLY WITH REQUIREMENTS OF LATEST APPLICABLE QUALITY PROCEDURE FOR FOR PSL-1 TO PSL-3 REQUIREMENTS.



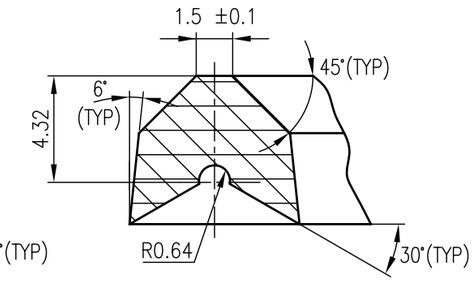


DETAIL-A
ITEM No.001

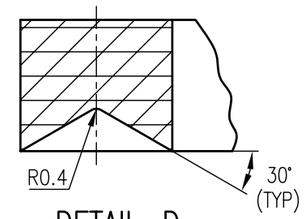




DETAIL-B
ITEM No.002



DETAIL-C
ITEM No.003



DETAIL-D
ITEM No.004

CAD REF No. o305881

No OF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
01	TOP RING		NOTE-8						004
04	MIDDLE RING (HARD)		NOTE-8						003
01	MIDDLE RING (SOFT)		NOTE-8						002
01	BOTTOM RING		NOTE-8						001

DCP No.	ALTERED	APPD
800811	CHD	DT. 21-4-08

REV.	
02	REVISED AND REDRAWN IN CAD
ZONE 02	

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 3 1/16"/4 1/16"-10M & 3 1/16"-15M

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE
DRN	T.RAJARAMAN	Rajaraman	21-4-08
CHD	T.RAJARAMAN	Rajaraman	21-4-08
APPD	R.ELAYARAJA	Elayaraja	21-4-08

NO. OF VAR.

DEPT	SCALE	WEIGHT (KG).	NO. OF ITEMS
VL	N T S	~ 0.055,-	
CODE 340			

REFERENCE INFORMATIONS: REF NL DRG No. V18468 - 3 / REV- SL No. V0063

TITLE: PACKING SET

CARD CODE: U 01

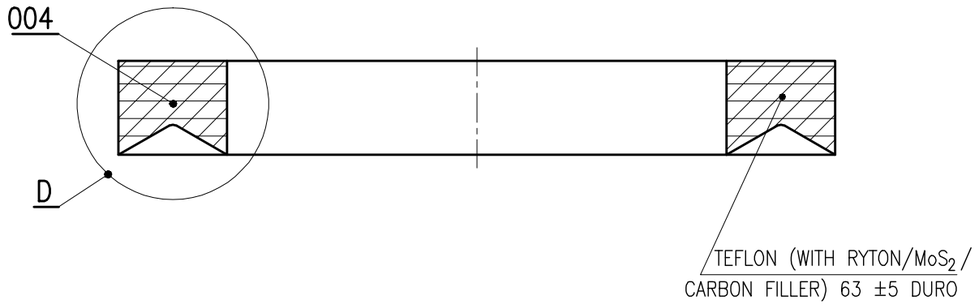
DRAWING NO.: 3-V-4513-05881

REV: 02

Size A3

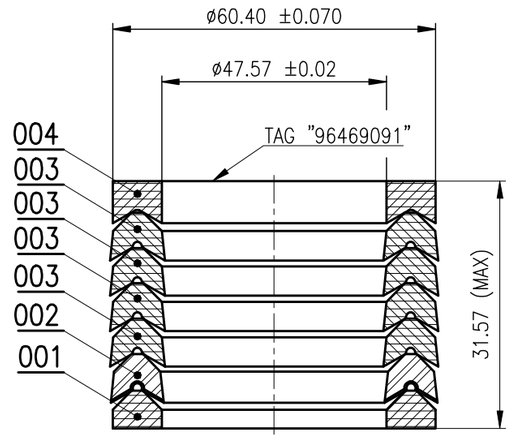
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

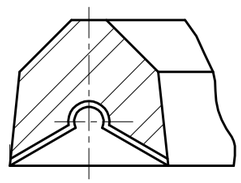
DRAWING NO. 3-V-4L57-26492



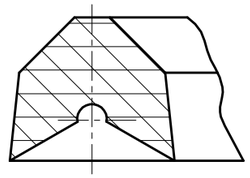
NOTES:-

1. PACKING ID SHALL BE SUITABLE FOR A STEM DIA OF 47.57 ±0.05 AND OD FOR A BONNET BORE DIA OF 60.40 ±0.07
2. RMA A-2 F-3 TOLERANCES SHALL APPLY TO ACTUAL DIMENSIONS.
3. SURFACE FINISH SHOULD BE SMOOTH.
4. THE PACKING RINGS ARE TO BE SUPPLIED IN SETS.
5. MATL. CODE : 96 469 091 0000
6. IMP. MATL. CODE : 97 464 983 0000
7. UNSPECIFIED TOLERANCE ±0.25
8. UNSPECIFIED ANGLE TOLERANCE ± 1/2°
9. MATL. SHALL COMPLY WITH REQUIREMENTS OF LATEST APPLICABLE QUALITY PROCEDURE FOR PSL-1 TO PSL-3 REQUIREMENTS.
10. SEAL RING CROSS SECTION MAY VARY PER VENDOR.

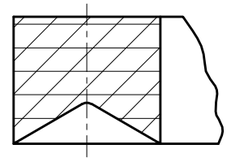




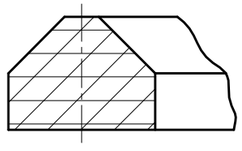
DETAIL-B
ITEM No.002



DETAIL-C
ITEM No.003



DETAIL-D
ITEM No.004



DETAIL-A
ITEM No.001

No OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
01	TOP RING		NOTE-9						004
04	MIDDLE RING (HARD)		NOTE-9						003
01	MIDDLE RING (SOFT)		NOTE-9						002
01	BOTTOM RING		NOTE-9						001

DCP No.	ALTERED	APPD
	CHD	DT.
REV.		
ZONE		

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: F/ 5- 1/8"-10M

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	R.NATARAJAN		06-12-2010	
CHD	R.NATARAJAN		06-12-2010	
APPD	R.ELAYARAJA		06-12-2010	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	~ 0.07	REF NL DRG No. V26468 REV-	
CODE 340				

TITLE	CARD CODE	DRAWING NO.	REV
PACKING SET	U 01	3-V-4L57-26492	

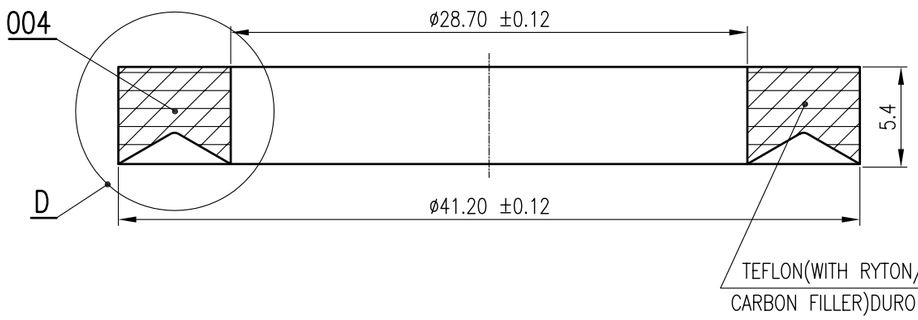
Size A3

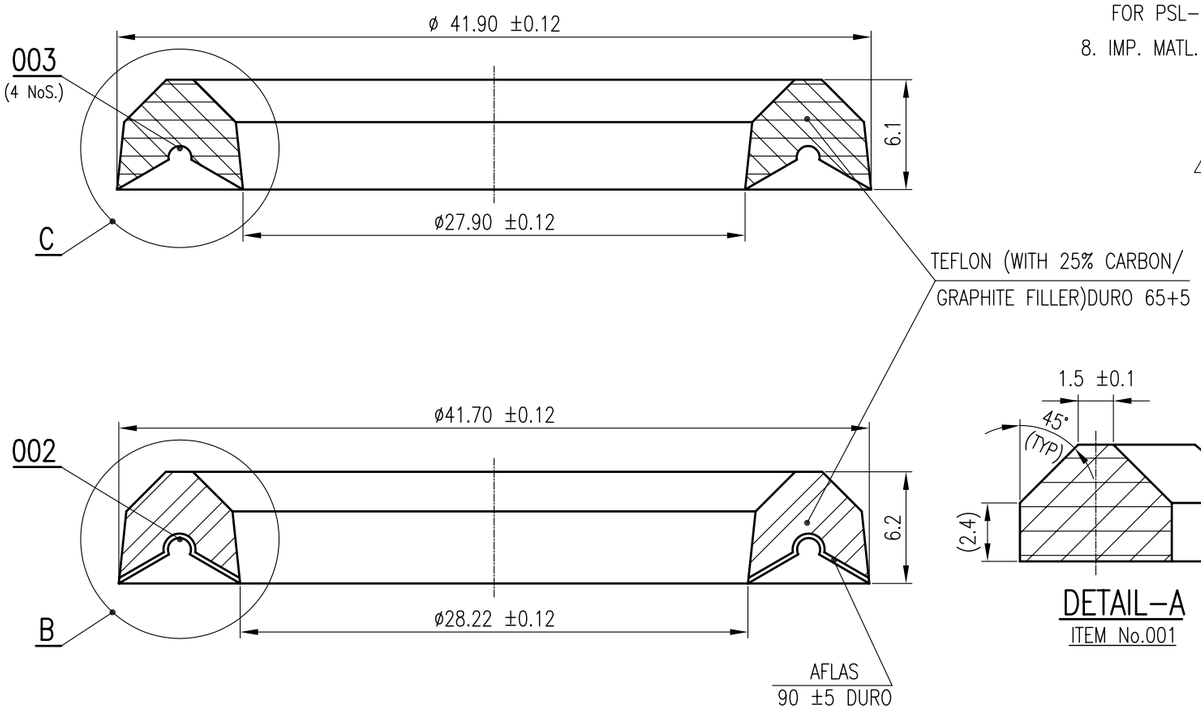
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

DRAWING NO. 3-V-4498-05880

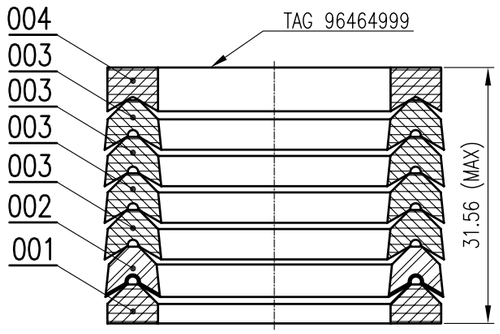
NOTES:-

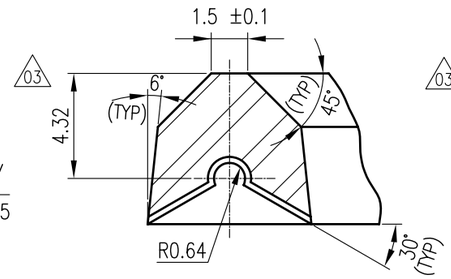
1. PACKING ID SHALL BE SUITABLE FOR A STEM DIA OF 28.52 ±0.02 AND OD FOR A GLAND BORE DIA OF 41.35 ±0.07.
2. RMA A-2 F-3 TOLERANCES SHALL APPLY TO ACTUAL DIMENSIONS.
3. SURFACE FINISH SHOULD BE SMOOTH.
4. THE PACKING RINGS ARE TO BE SUPPLIED IN SETS.
5. UNSPECIFIED TOLERANCES ±0.25mm.
6. UNSPECIFIED ANGLE TOLERANCES ± 1/2°.
7. MATL. SHALL COMPLY WITH REQUIREMENTS OF LATEST APPLICABLE QUALITY PROCEDURE FOR PSL-1 TO PSL-3 REQUIREMENTS.
8. IMP. MATL. CODE. 97 464 048.



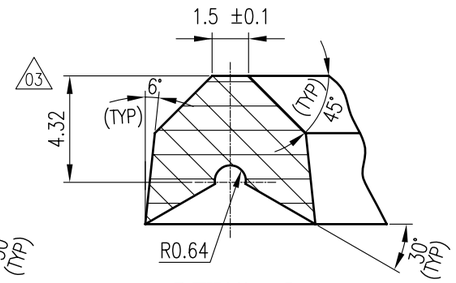


DETAIL-A
ITEM No.001

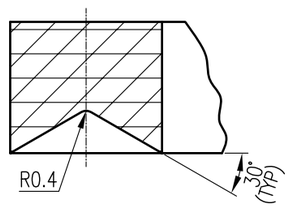




DETAIL-B
ITEM No.002



DETAIL-C
ITEM No.003



DETAIL-D
ITEM No.004

CAD REF No. o305880

No OFF	DESCRIPTION	MATL CODE	MATL SPECN HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
04	TOP RING		NOTE-7					004
03	MIDDLE RING (HARD)		NOTE-7					003
02	MIDDLE RING (SOFT)		NOTE-7					002
01	BOTTOM RING		NOTE-7					001

DCP No.	ALTERED	APPD	DCP No.	ALTERED	APPD
800546	CHD DT. 30-12-2005		800432	CHD DT. 06-4-05	

REV.		ZONE
03	DIMENSION LOCATION MODIFIED IN PLACES MARKED AS 03 IN DETAIL-B & DETAIL-C	03
02	REVICED AND REDRAWN IN CAD MATL. CODE 96 464 999 WAS 96 464 098	02

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

MATL. CODE : 96 464 999

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

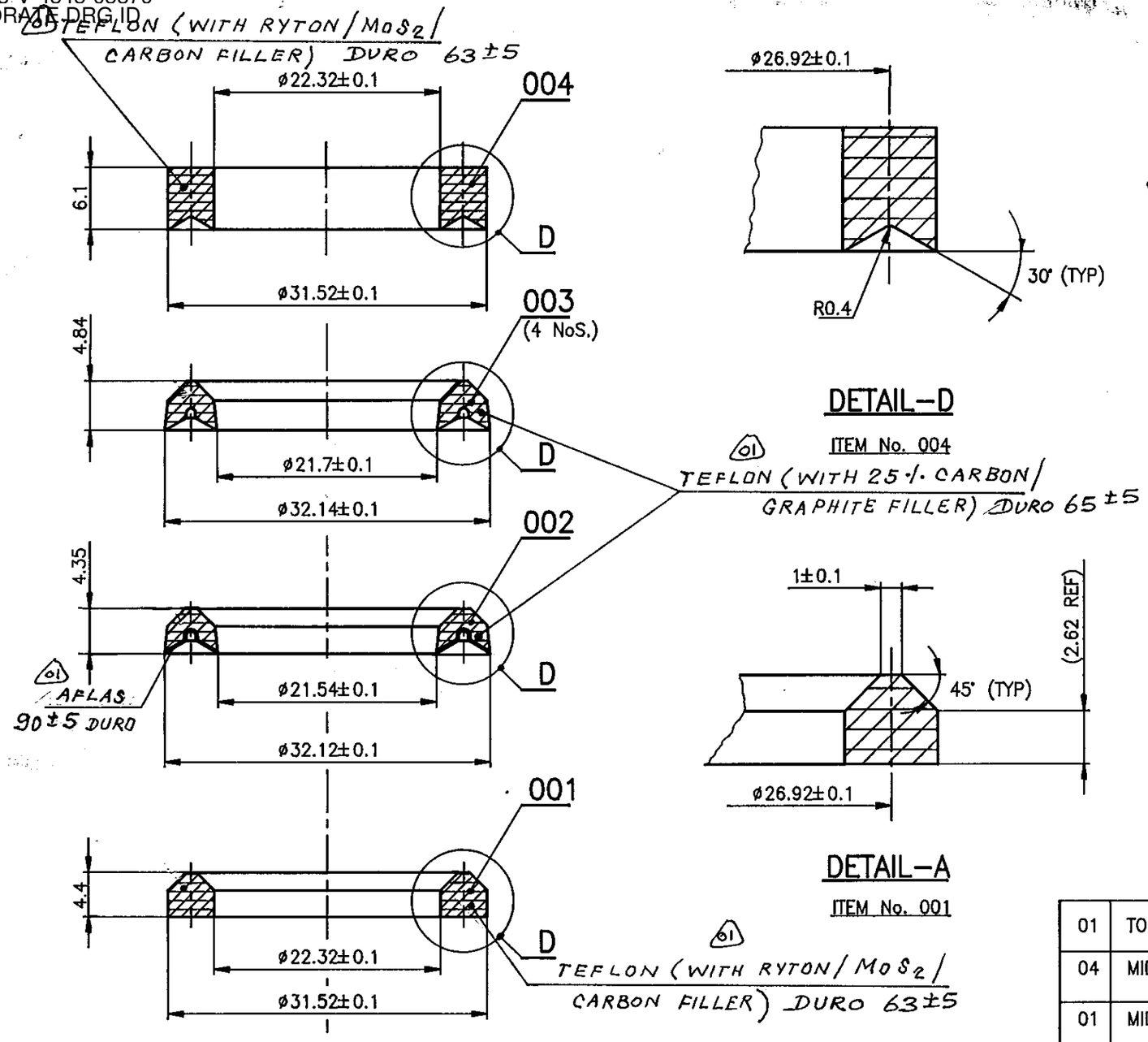
	NAME	SIGN	DATE	NO.OF VAR.
DRN	R.NATARAJAN		06-4-05	
CHD	R.NATARAJAN		06-4-05	
APPD	V.ALAGARSWAMI		06-4-05	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	N T S	~0.05	REF.NL.DRG.No. V04468 REV. -	
CODE 340			REF.NL.PART No. - REV. -	
			SL.No. V0064	

TITLE	CARD CODE	DRAWING NO.	REV
PACKING SET (2 1/16"-5000 PSI)	U 01	3-V-4498-05880	03

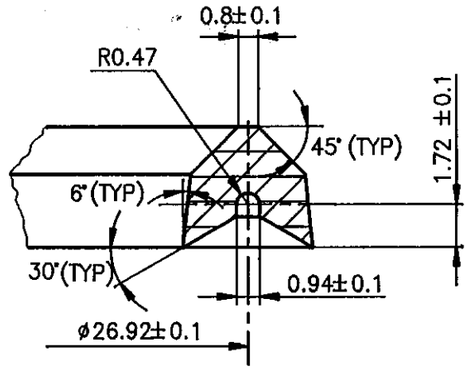
Size A3

First Angle Projection | FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP/QP | All Dimensions are in mm



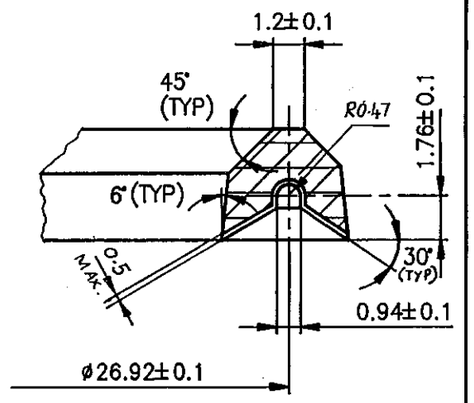
DETAIL–D

ITEM No. 004



DETAIL–C

ITEM No. 003



DETAIL–B

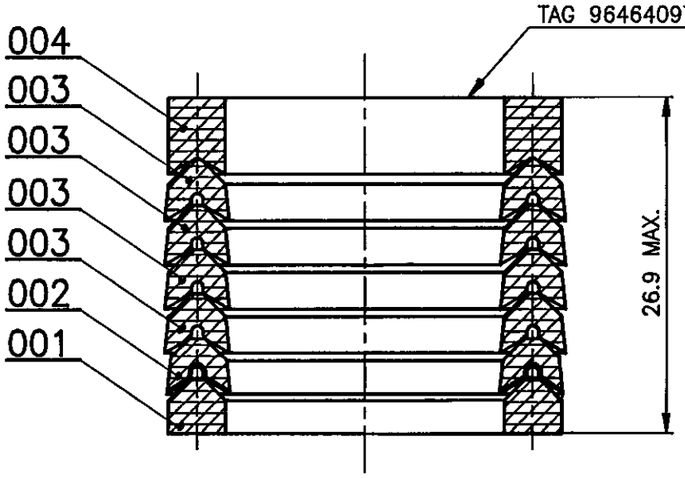
ITEM No. 002

DETAIL–A

ITEM No. 001

(01) TEFLON (WITH RYTON/MoS2/ CARBON FILLER) DURO 63±5

TAG 96464097 -REV-01



NOTES:–

1. PACKING ID SHALL BE SUITABLE FOR A STEM DIA 22.17±0.04 & OD FOR A GLAND BORE DIA OF 31.83±0.07
2. RMA A–2 F–3 TOLERANCES SHALL APPLY TO ACTUAL DIMENSIONS.
3. SURFACE FINISH SHOULD BE SMOOTH.
4. THE PACKING RINGS ARE TO BE SUPPLIED IN SETS.
5. MATERIAL CODE 96 464 097 0000
6. (01) MATL. SHALL COMPLY WITH REQUIREMENTS OF LATEST APPLICABLE QUALITY PROCEDURE FOR PSL-1 TO PSL-3 REQUIREMENTS

No.OFF	DESCRIPTION	MATERIAL CODE	MATERIAL SPECN. & HEAT TREATMENT	SCRAP SORT	NET WT.	GROSS WT.	DRAWING No.	ITEM No.
01	TOP RING		NOTE-6		0.02			004
04	MIDDLE RING (HARD)		NOTE-6					003
01	MIDDLE RING (SOFT)		NOTE-6					002
01	BOTTOM RING		NOTE-6					001

UNLESS OTHERWISE SPECIFIED

~~BREAK SHARP CORNERS~~	~~:0.25~~
~~FILLET RADII~~	~~: 0.76±0.12~~
CONCENTRICITY	: 0.25 FIM
SQUARNESS	: 0.25 IN 254
PARALLELISM	: 0.25 IN 254

RFS EXCEPT WHEN (M) MODIFIED.

DCN. No. OF D491	ALTRD	APRD
	CHD	DT. 31/7/99

REV 01 — MATL. AFLAS WAS TDC 5.157
MATL. TEFLON WAS MS-447 & MS-452
NOTE-6 INCLUDED.

CAD No. 0305879

Bharat Heavy Electricals Ltd.,
Boiler Plant Unit Valves Division
Tiruchirapalli – 620 014

	Name	Signature	Date
Drawn	R.NATARAJAN		31-03-92
Checked	V.ALAGARSWAMY		31-03-92
Approved	K.RAMALINGAM		31-3-92

Department	Grade of	Scale	REF. NL. TELEX.
EDC/V&SB		NTS	BHE:NL:
Code 340			

REF.NL.DRG.No. V25468 REV.
REF.NL.PART No. V25468-3 REV.
SL.No. V0065

Title: PACKING SET (2 1/16" – 2,000 PSI)

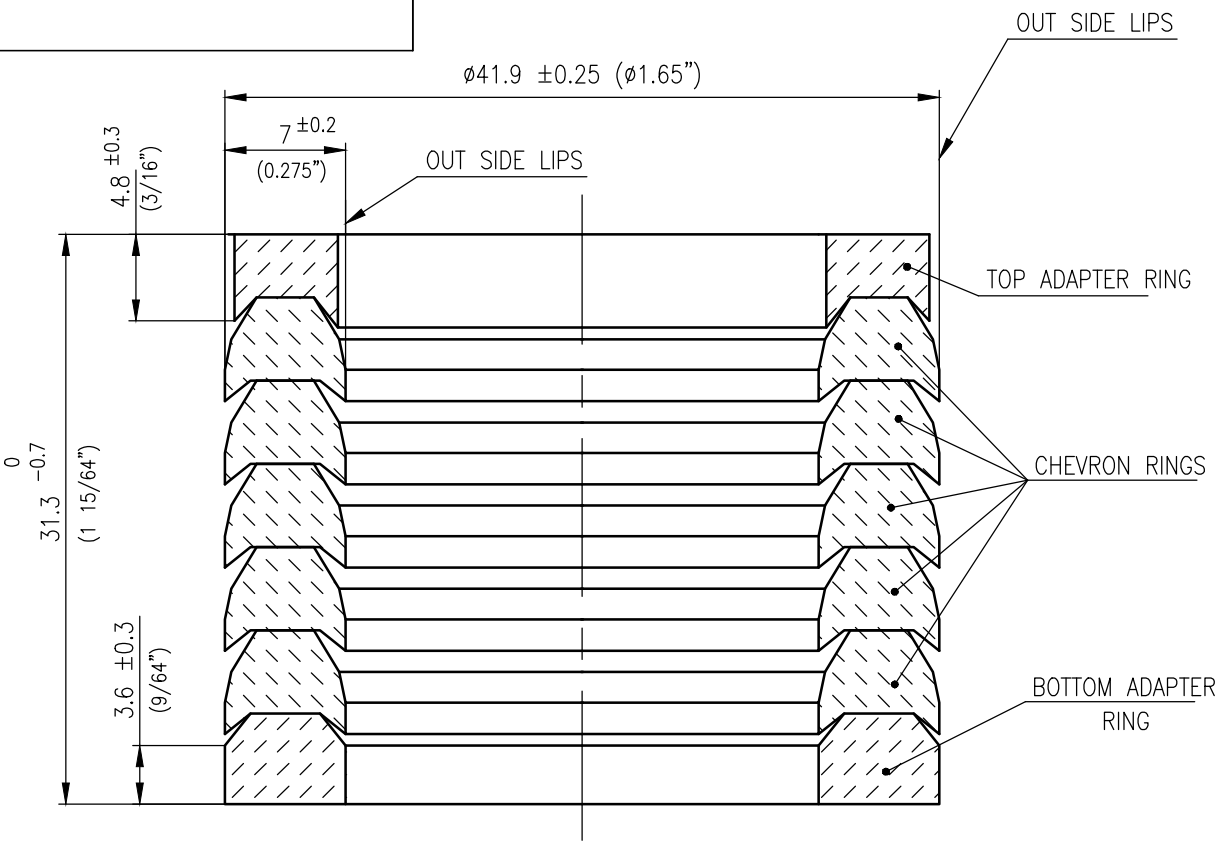
Drawing No.: 3–V–4545–05879 Rev. 01

ALL DIMENSIONS ARE IN MILLIMETRES.

FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP/QP

DCP No.	ALTD: A.K.P.	APPD: R.E.
802322	CHD: R.E.	DT: 08.02.18

REV	
01	REVISED AND REDRAWN IN CAD.
ZONE 01	



NOTES:–

1. MATERIAL :– UNIVERSAL GLASS FILLED TEFLON (V–PATTERN GROUP).
2. UNSPECIFIED DETAIL WITH RESPECT TO DIMENSIONS, TOLERANCES AND CONTOUR SHALL BE OPTIONAL WITH MANUFACTURER, PROVIDED SERVICEABILITY OF THE PACKING IS NOT IMPAIRED.
3. IMPORTED MATERIAL CODE :– 974525740000

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
–	–	964527930000	NOTE–1	–	–	0.04	–	–	–

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI 620014.
365–122

	NAME	SIGN	DATE	NO.OF VAR
DRN	K.SIVASANKAR		13–02–88	
CHD	V.ALAGARSWAMI		15–02–88	___
APPD	D.KRISHNAMURTHY	DK	17–02–88	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	–	NL.REF: 522117–BTX	___
CODE 340			SL.NO: 4226	

TITLE	CARD CODE	DRAWING NO.	REV
PACKING SET (ADJ.CHOKE)	U 01	4–V–4343–07656	01

Size A4

Revision Record: Rev:00/16.04.90: First issue
Rev:01: 04.12.93: Editorial corrections
Rev:02: 15.11.96: Elastomer TDCs 5:131, 135,154,155,156,157,161,162,163,179,183 & 184 merged and rewritten
Rev.03: 12.08.21: Latest version of the referred Standards/Specifications indicated in TDC; Cl.4.0 & 8.0 modified

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1.0 Material Specifications

Elastomer materials of grade specified in P.O.or drg. The property requirements are as given in Table-1.

2.0 General

These Elastomeric compounds are for use as O-rings/ packing in water and oil based drilling fluids, seawater, petroleum based lubricants and ethylene glycol anti-freeze mixtures.Shall be manufactured to the relevant size in the drawing.

The grade nos. specified correspond to the Standards of M/s National; USA.

3.0 Engineering Requirements

Material Properties: The property requirements for the elastomers are given in table-1.

The hardness tests shall be carried out as per ASTM D2240-*15(Reapproved 2021)* or ASTM D1415-*18* and tensile tests as per ASTM D412-*16(Reapproved 2021)* or ASTM D1414-*15* (as per ASTM *D4894-19* for PTFE materials).

Additional property requirements for grades MS-447 & MS 452 (tested as per ASTM D621-*88*) are as follows.

	MS 447	MS 452
Coefficient of thermal expansion (in/in/ Fx10-5) at 75 to 300˚F	6.0+ 0.5	7.6+0.5
% deformation under load (max.)(24 Hours at 2000 psi at 70˚F Min).	5.0	3.5
% permanent deformation (max.) after load release	2.0	2.2

4.0 Inspection & Testing

Sampling inspection shall be carried out for visual, dimensions & hardness test as per Cl.8.0

Each piece of the sample shall be dimensionally inspected for compliance to specified tolerances in the relevant drawing.

Each piece of the sample shall be visually inspected for compliance to this specification.

The following type tests shall be carried out for conformance to this specification:

a) **Air Aging Test**:

This test shall be carried out in an Air oven *as per* ASTM D573-*04(Reapproved 2019)* or by heating in air in a test tube enclosure as per ASTM D865-*11(Reapproved 2018)*.The purpose of this test is to determine the influence of elevated temperatures on the physical properties of vulcanized rubber.

The test shall be carried out at Minimum test temperature shown in table-2 for each grade for 70 hrs. in accordance with ASTM D412-*16(Reapproved 2021)* and properties after air aging test shall conform to table-2.

b) **Compression Set Test** :

This test shall be carried out in accordance with ASTM D395-*18* B i.e., Compression set under constant deflection in air with exceptions listed out in ASTM D1414-*15* Cl.10.0.

The test shall be performed at a minimum test temperature indicated in table-2 for 70 hours, except for Grade MS 225. For grade MS:225, the test duration shall be 22 hours.

The maximum permanent compression set shall comply to table-2.

c) **Low Temperature Brittleness Test** :

This test ensures that rubber will not exhibit fracture when subjected to specified impact conditions. The Test shall be carried out in accordance with ASTM D2137-*11(Reapproved 2018)* or ASTM D746-*20* and shall PASS at the test temperature indicated in table-2.

d) **Immersion Test** :

This test ensures the ability to withstand the effect of liquids and shall be carried out in accordance with ASTM D471-*16a (Reapproved 2021)* or ASTM D1414-*15*.

The liquids used for the test shall be ASTM Oil 1&3 at a minimum temperature indicated in Table-3 for various grades and Distilled water at a minimum temperature of 212˚F for a period of 70 hrs. Permissible variation in properties after immersion in liquids are given in Table- 3.

Immersion test is not applicable for grades MS 447 & MS 452.

Validity of Type Test:

The validity of these Type test results is for two years from the date of test,in the case of PSL 1,2 & 3. However, in case of PSL 4,this test shall be carried out for each batch of purchase order. The type test shall be conducted at approved laboratory or witnessed by BHEL.

5.0 Special Requirements

Insert ring shall be positioned as shown in BHEL drawing or the drawing approved by BHEL.

After Moulding, all parts must be inspected by the vendor/manufacturer to ensure proper positioning of the insert ring. The NDE to be followed can be RT/MT and meet the requirement indicated in the drawing.

The ring must be generally located in the web of the seal, but in no case,in flexible lip of the seal. No part of the ring shall be visible to the naked eye unless it is specified in the drawings.

6.0 Documentation

For PSL 1,2 & 3: Certificate of compliance which indicates P.O.No, Drg No,Material grade & type tested compound no, Batchwise Cure/mould date & Shelf life(expiry date) shall be submitted.

For PSL 4 : Test certificates for the physical properties ,in addition to certificates mentioned above shall be submitted for each P.O.

7.0 Marking and Packing

Each item shall be packed in polythene cover individually with suitable preservants like French chalk powder with label having following details.

(a) Drg. Number & size
(b) Purchase Order No.
(c) Batch Number
(d) Compound No.
(e) Date of Cure/Mould
(f) Shelf life (expiry date)
(g) Any other relevant details specified in the Purchase Order/drawing.

Each item shall be supplied in sturdy carton boxes to protect against permanent distortion during shipment and storage and from sunlight, dust etc. during shipment and storage.

Each box shall contain only one size and lot of the product as given below.

(1) Size more than 6" -- each separate box
(2) Size 2" to 6" -- 5 nos.in one box
(3) Size below 2" -- 10 nos.in one box.

Each box shall also be labeled with details specified above viz (a) to (g) above.

8.0 Sampling Plan:

Lot Size (Nos)	*Sample size (Nos)*	*Acceptance Criteria for O-rings (as per ISO 2859-1:1999, Level II, 2.5 AQL)*
26 to 50	*8*	*If one sample fails, entire lot shall be dimensionally inspected*
51 to 90	*13*	*If two samples fail, entire lot shall be dimensionally inspected*
91 to 150	*20*	
151 to 280	*32*	*If three samples fail, entire lot shall be dimensionally inspected*
281 to 500	*50*	*If four samples fail, entire lot shall be dimensionally inspected*

Lot Size (Nos)	Sample size (Nos)	Acceptance Criteria for other seals (as per ISO 2859-1:1999, Level II, 1.5 AQL)
26 to 50	8	If one sample fails, entire lot shall be dimensionally inspected
51 to 90	13	
91 to 150	20	If two samples fail, entire lot shall be dimensionally inspected
151 to 280	32	
281 to 500	50	If three samples fail, entire lot shall be dimensionally inspected

For lot size 25 Nos. & below, 100% inspection shall be done

12/08/2021	12/8/2021	12/8/21	12/8/21	12/8/2021
N Nagamuthu Pandian	P Arun kumar	S Lakshmi	Ajay Kumar Gupta	J V V Aruna Kumar
Manager/QA	Dy.Manager / Valves Engg	SDGM/QA	AGM / Valves Purchase	AGM / QA
Prepared By	**Reviewed By**			**Approved By**

TABLE-1 PROPERTY REQUIREMENT OF ELASTOMERS

Elastomer Grade		MS 219	MS 220	MS 221	MS 225	MS 231	MS 233	MS 426	MS 427	MS 428	MS 430	MS 431	MS 447	MS 452
Material		NBR	NBR	NBR	NBR	FKM	FKM	TFEP	TFEP	FVMQ	HSN	XNBR	PTFE	PTFE
Hardness	Value	60±5	70±5	90±5	70±5	90±5	70±5	90+10 -5	80±5	85±5	80±5	70±5	65±5	63±5
	Type	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(D)	(D)
Applicable Temperature Range ˚F	Min.	0	-20	-20	32	0	-20	-20	-20	-50	-20	-20	-50	-50
	Max.	180	180	180	200	250	250	250	250	250	250	180	250	250
Tensile strength in psi (min)		2000	2000	2500	2000	1600	1500	2200	2000	1000	2500	2000	1500	1000
Ultimate elongation % (min)		500	300	200	350	100	100	100	100	150	150	300	75	75
Tensile modulus (psi)at 100% elongation (min)		200	400	800	600	500	500	-	1000	500	500	400	-	-
Tensile modulus (psi)at 50% elongation (min)		-	-	-	-	-	-	1500	-	-	-	-	-	-
Shelf life in years		2	2	2	2	4	4	4	4	4	2	2	10	10

NBR - Nitrile FVMQ - Fluoro Silicone (Silastic LS) FKM - Fluoro carbon(VITON,FLUOREL) HSN - Hydrogenated Nitrile
TFEP - Tetra fluoro ethylene & Propylene(AFLAS) XNBR - Carboxylated Nitrile PTFE - Teflon (W/25% carbon/graphite filler)-MS447
PTFE - Teflon (W/RYTON/MoS2/Carbon filler)-MS452

TABLE-2 : AIR AGING, COMPRESSION AND LOW TEMPERATURE BRITTLENESS TEST REQUIREMENTS

Grade	Minimum Temperature ˚F(*)	Air Aging Test Acceptable variation in				Compression test result (Compression set) in (%)max	Test Temperature for Low Temperature Brittleness Test
		Hardness points	Tensile Strength(%)	Ultimate Elongation(%)	Volume(%)		
MS 219	180	±05	±10	±20	±10	40	0˚F
MS 220	180	±10	±15	±20	±05	30	0˚F&-20˚F
MS 221	180	±05	±10	±30	±10	25	0˚F&-20˚F
MS 225	212	±10	±10	±20	±10	40	32˚F
MS 231	250	±10	-40max	-20max	±10	40	0˚F
MS 233	250	±10	-40max	-20max	±10	40	0˚F&-20˚F
MS 426	250	±10	±10	±15	±10	30	0˚F&-20˚F
MS 427	250	±10	-25	-25	-	40	0˚F&-20˚F
MS 428	250	±05	±10	±10	±10	30	0˚F,-20˚F, -50˚F&-75˚F
MS 430	250	±10	±10	±20	±10	30	0˚F&-20˚F
MS 431	180	±05	±15	±20	±10	35	0˚F&-20˚F
MS 447	-	-	-	-	-	-	0˚F,-20˚F & -50˚F
MS 452	-	-	-	-	-	-	0˚F,-20˚F & -50˚F

(*) Min. test temperature is same for both air aging test & compression test

TABLE-3 : IMMERSION TEST REQUIREMENT

Grade	Minimum Temperature ˚F(*)	Permissible variation in properties (±) with											
		ASTM Oil # 1				ASTM Oil # 3				Distilled Water			
		Hardness	Tensile strength	Ultimate Elongation	Volume	Hardness	Tensile strength	Ultimate Elongation	Volume	Hardness	Tensile strength	Ultimate Elongation	Volume
MS219	180	05	10	20	10	10	20	15	20	05	15	20	10
MS220	180	10	20	20	10	10	20	20	10	10	20	20	10
MS221	180	05	15	30	10	05	15	30	10	05	15	10	05
MS225	212	05	05	10	05	05	05	10	10	-	-	-	-
MS231	250	05	15	10	05	05	10	10	05	05	20	10	10
MS233	250	05	15	10	05	05	10	10	05	05	20	10	10
MS426	250	10	15	20	10	10	15	20	20	10	15	20	10
MS427	250	05	15	25	10	10	20	25	10	05	15	20	10
MS428	250	05	15	10	10	10	20	10	30	05	10	10	10
MS430	250	10	10	20	10	10	10	20	10	05	10	10	10
MS431	180	10	20	20	10	10	20	20	10	-	-	-	-

*Minimum test temperature specified is only for immersion test with ASTM Oil #1 & 3. For distilled water,the test temp. is 212˚F.

NOTE: Values indicated in Table are % values, except for Hardness. For hardness, it is variation in absolute value.