

769521/2022/HEP-HTE40201

Hydro Turbine EngineeringStandard Technical PQR for Procurement of Item/ Items through Open Tender (Non GEM)

PI No.: 240214832

Date: 29.03.2022

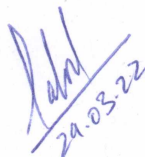
Item Description: Cup seal as per specification: HT00201 &amp; HT00203

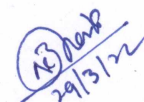
Following are the minimum eligibility requirements for considering vendors for the supply of above item/items.

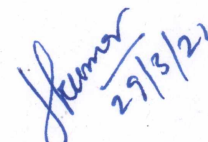
SI. NO	Description of Pre-Qualification Requirements	Vendor response	
		Complied	Bidders to submit following documents in compliance to PQR
1	Manufacturers with experience of design, manufacturing and supply of cup seal shall be eligible to take part.	Yes / No	Copy of unpriced PO with any one of the following supporting document: <ul style="list-style-type: none"> <li>• Completion Certificate</li> <li>• Invoice copy</li> <li>• Delivery challan</li> </ul>
2	Agents / Subsidiaries of manufacturers are also allowed to take part on behalf of their principals. Experience of the principal / main manufacturer which is part of vendor's offer shall be considered for evaluation.	Yes / No	1. Agents / Subsidiaries to furnish valid authorization letter from principal / OEM. 2. Copy of unpriced PO with any one of the following supporting document: <ul style="list-style-type: none"> <li>• Completion Certificate</li> <li>• Invoice copy</li> <li>• Delivery challan</li> </ul>
3	Manufacturers or subsidiaries should have a Quality Management System (QMS) of their product / process / supply / service etc. Alternatively, ISO 9001-2015 or compliance with any other norms / standard should be existing.	Yes / No	QMS of manufacturers or subsidiaries with valid a document highlighting their compliance is required at the pre-qualification stage.

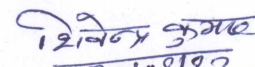
Note:

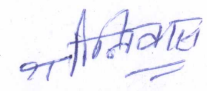
1. Compliance to above Pre-qualification requirements are mandatory. In the absence of compliance of above requirement vendor PQ application is liable to be rejected.
2. BHEL has right to verify information / confirmation furnished by asking additional documents, proofs etc.


  
24.03.22  
Shri R P Singh  
(Manager)

  
29/3/22  
Shri Alok Kumar Bharti  
(Sr. Mgr.)

  
29/3/22  
Shri Harish Kumar  
(DGM)

  
29/03/22  
Shri Shivendra Kumar  
(DGM)

  
Shri V S Rao  
(AGM-HTE, HME & HPE)

	<b>PRODUCT STANDARD</b> <b>HYDRO TURBINE ENGINEERING</b>	<b>HT 00201</b>
		<b>Rev. 02</b>
COPYRIGHT & CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.		<b>Page 1 of 8</b>
<b>PURCHASE SPECIFICATION FOR</b> <b>CUP SEALS FOR HYDRAULIC DEVICES</b> <b>(PRESSURE UPTO 320 kgf / cm<sup>2</sup> AND TEMPERATURE -35° C TO 80° C)</b>		

## 1. GENERAL

This product standard covers dimensions, tolerances, variant nos. & weights of rubber cup seals (of size d = 6 to 500 mm) to be used for sealing in hydraulic devices of reciprocating motion, operating at a pressure of up to 320 kg/cm<sup>2</sup> and temperature range of -35° C to 80° C.

## 2. MATERIAL

The material of rubber cup seals shall be Acrylonitrile rubber as per BS 2751 - 2001 compound No. BA 70 with IRHD 70  $\begin{smallmatrix} +5 \\ -4 \end{smallmatrix}$  (after vulcanization).

## 3. DIMENSIONS, TOLERANCES VARIANT NOS. AND WEIGHTS

The dimensions & tolerances, variant nos. and weights of cup seals with reference to Fig.-1 shall be as per Table -1 given in continuation sheets.

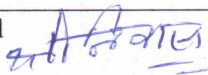
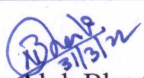

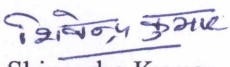
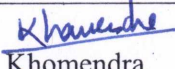
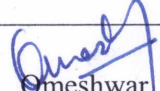
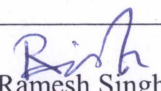
## 4. INFORMATION TO BE FURNISHED BY INDENTOR

The dimensions & tolerances, variant nos. and weights of cup seals required shall be furnished by the indenter in the product standard no. HT 00203.

## 5. DESIGNATION

In an assembly / sub assembly drawing as an example for cup seals having sealing diameters d = 50 mm and D = 75 mm, the following shall be written in the "Bill of material".

In the column "DESCRIPTION"	- CUP sealing 50 X 75
In the column "STD"	- 3
In the column "Drg. No."	- HT 00201
In the column "VARIANT NO."	- 42

Rev. No.	Date of Rev.	Remarks	Approved 		
00	18.07.1980	Issued.	V. S. Rao, AGM HOD - (HTE, HME & HPE)		
01	23.04.2015	Completely reviewed.	Checked		
02	31.03.2022	Completely reviewed.			
			Alok Bharti, Sr. Mgr-HTE	Harish Kumar, DGM-HTE	Shivendra Kumar, DGM-HTE
			Prepared		
					
			Khomendra Kashyap, Mgr-HTE	Omeshwar Daheekar, Mgr-HTE	Ramesh Singh, Engr-HTE
Saved in server as no. 42009900201					





# PRODUCT STANDARD

## HYDRO TURBINE ENGINEERING

HT 00201

Rev. 02

COPYRIGHT & CONFIDENTIAL  
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.  
It must not be used directly or indirectly in any way detrimental to the interest of the company.

Page 2 of 8

### PURCHASE SPECIFICATION FOR

### CUP SEALS FOR HYDRAULIC DEVICES

(PRESSURE UPTO 320 kgf / cm<sup>2</sup> AND TEMPERATURE -35<sup>0</sup> C TO 80<sup>0</sup> C)

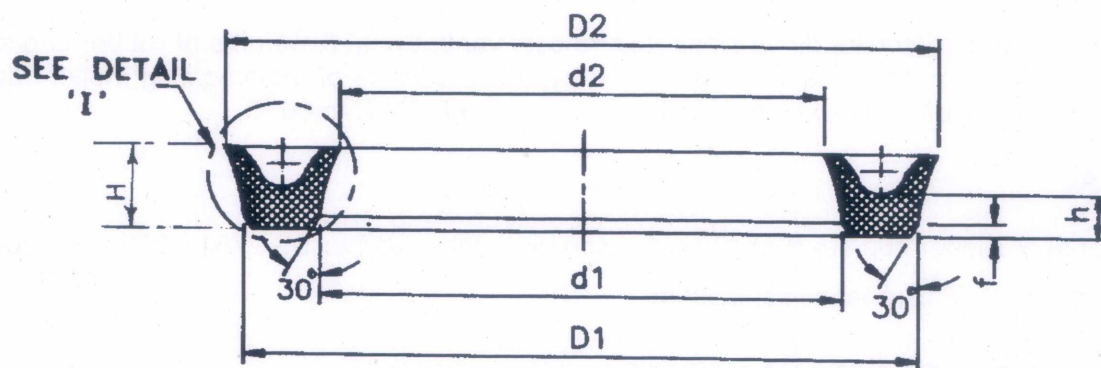
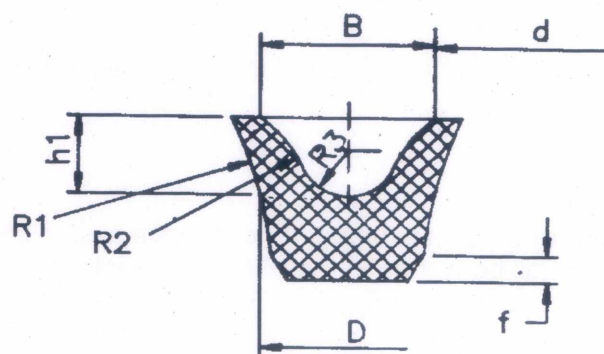



FIG-1



DETAL-I

NOTE :-

'D' AND 'd' ARE DIAMETERS ON WHICH SEALING IS REQUIRED.

21/2022/HPE-HTE40201			
	<div><b>PRODUCT STANDARD</b></div> <div><b>HYDRO TURBINE ENGINEERING</b></div>		<b>HT 00201</b>
			<b>Rev. 02</b>
<div>COPYRIGHT &amp; CONFIDENTIAL</div> <div>The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.</div>			<b>Page 3 of 8</b>
<div><b><u>PURCHASE SPECIFICATION FOR</u></b></div> <div><b><u>CUP SEALS FOR HYDRAULIC DEVICES</u></b></div> <div><b>(PRESSURE UPTO 320 kgf / cm<sup>2</sup> AND TEMPERATURE -35<sup>0</sup> C TO 80<sup>0</sup> C)</b></div>			

**Fig-1: CUP SEALS FOR HYDRAULIC DEVICES**

**TABLE-1**

d	D	B	H		d1	D1	d2	D2	Tolerance on d1,d2,D1,D2	h		R1	R2	R3	h1	f	Var. No.	Approx. wt. of 100 pieces in kg.
			Size	Tol.						Size	Tol.							
6	14	4.0	4.0	-0.2	6.4	13.6	4.8	15.2	+0.3	2.0	-0.15	10	3.0	1.0	2.5	0.6	01	0.046
7	15				7.4	14.6	5.8	16.2									02	0.051
8	16				8.4	15.6	6.8	17.2									03	0.056
9	17				9.4	16.6	7.8	18.2									04	0.061
10	18				10.4	17.6	8.8	19.2									05	0.065
12	20				12.4	19.6	10.8	21.2									06	0.075
14	22				14.4	21.6	12.8	23.2									07	0.084
16	24				16.4	23.6	14.8	25.2									08	0.093
10	22	6	6	-0.3	10.4	21.4	8.2	23.8	+0.4	3.0	-0.2	15	4.5	1.5	3.8	1.0	09	0.165
12	24				12.6	23.4	10.2	25.8									10	0.185
13	25				13.6	24.4	11.2	26.8									11	0.195
16	28				16.6	27.4	14.2	28.8									12	0.226
18	30				18.6	29.4	16.2	31.8									13	0.247
20	32				20.6	31.4	18.2	33.8									14	0.267
23	35				23.6	34.4	21.2	36.8									15	0.298
14	30				14.8	29.2	11.6	32.4									16	0.460
16	32	8	8	-0.4	16.8	31.2	13.6	34.4		4.0	-0.25	20	6.0	2.0	5.2	1.2	17	0.500







HT 00201

Rev. 02

COPYRIGHT & CONFIDENTIAL

The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.  
It must not be used directly or indirectly in any way detrimental to the interest of the company.

Page 5 of 8

**PURCHASE SPECIFICATION FOR**  
**CUP SEALS FOR HYDRAULIC DEVICES**  
**(PRESSURE UPTO 320 kgf / cm<sup>2</sup> AND TEMPERATURE -35<sup>0</sup> C TO 80<sup>0</sup> C)**

**TABLE-1 (CONTD.)**

d	D	B	H		d1	D1	d2	D2	Tolerance on d1,d2,D1,D2	h		R1	R2	R3	h1	f	Var. No.	Approx. wt. of 100 pieces in kg.
			Size	Tol.						Size	Tol.							
50	70	10	10	-0.5	51	69	47	73	±0.6	5.0	-0.3	25	7.0	2.5	6.4	1.5	34	1.78
52	72				53	71	49	75									35	1.84
55	75				56	74	52	78									36	1.93
60	80				61	79	57	83									37	2.08
65	85				66	84	62	88									38	2.21
70	90				71	89	67	93									39	2.37
75	95				76	94	72	98									40	2.52
80	100				81	99	77	103									41	2.54
50	75				12.5	12.5	-0.6	51.3									73.7	46.3
55	80	56.3	78.7	51.3				83.7	43	2.85								
60	85	61.3	83.7	56.3				88.7	44	3.06								
65	90	66.3	88.7	61.3				93.7	45	3.27								
70	95	71.3	93.7	66.3				98.7	46	3.48								
75	100	76.3	98.7	71.3				103.7	47	3.69								
80	105	81.3	103.7	76.3				108.7	48	3.90								
85	110	86.3	108.7	81.3				113.7	49	4.11								







## **PRODUCT STANDARD** **HYDRO TURBINE ENGINEERING**

**Rev. 02**

Page 7 of 8

COPYRIGHT & CONFIDENTIAL

The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.  
 It must not be used directly or indirectly in any way detrimental to the interest of the company.

**PURCHASE SPECIFICATION FOR**  
**CUP SEALS FOR HYDRAULIC DEVICES**  
**2. AMBIENT TEMPERATURE -35°**


**CUP SEALS FOR HYDRAULIC DEVICES**  
**(PRESSURE UPTO 320 kgf / cm<sup>2</sup> AND TEMPERATURE -35° C TO 80° C)**

**TABLE-1 (CONTD.)**

d	D	B	H		d1	D1	d2	D2	Tolerance on d1,d2,D1,D2	h		R1	R2	R3	h1	f	Var. No.	Approx. wt. of 100 pieces in kg.
			Size	Tol.						Size	Tol.							
130	160	15	15	-0.7	131.5	158.5	125.5	164.5	±1.0	7.5	-0.5	37.5	11	3.5	9.4	2.3	67	10.3
140	170				141.5	168.5	135.5	174.5									68	11.07
150	180				151.5	178.5	145.5	184.5									69	11.8
160	190				161.5	188.5	155.5	194.5									70	12.5
170	200				171.5	198.5	165.5	204.5									71	13.2
180	210				181.5	208.5	175.5	214.5									72	13.9
190	220				191.5	218.5	185.5	224.5									73	14.6
200	230				201.5	228.5	195.5	234.5									74	15.3
210	240				211.5	238.5	205.5	244.5									75	16.0
180	220				20	20	-1.0	182									218	174
190	230	192	228	184				236	77	25.8								
200	240	202	238	194				246	78	26.0								
210	250	212	248	204				256	79	27.2								
220	260	222	258	214				266	80	28.4								
230	270	232	268	224				276	81	29.0								
240	280	242	278	234				286	82	29.6								
250	290	252	288	244				296	83	32.0								





	<b>PRODUCT STANDARD</b> <b>HYDRO TURBINE ENGINEERING</b>	<b>HT 00203</b>
		<b>Rev. 03</b>
COPYRIGHT & CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.		<b>Page 1 of 3</b>
<b>PURCHASE SPECIFICATION FOR</b> <b>CUP SEALS FOR HYDRAULIC DEVICES</b> <b>(PRESSURE UPTO 320 kgf / cm<sup>2</sup> AND TEMPERATURE -35 °C TO 80 °C)</b>		

### 1. GENERAL

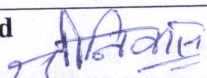
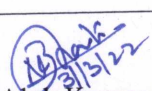
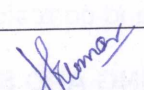
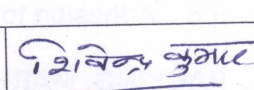
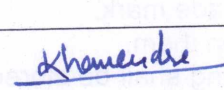
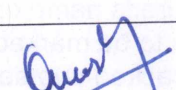
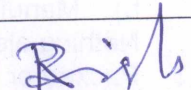
This product standard covers rubber cup seals for sealing in hydraulic devices of reciprocating motion, operating at a pressure of up to 320 kg/cm<sup>2</sup> and temperature range -35° C to 80° C.

### 2. MATERIAL


The material of rubber cup seals shall be Acrylonitrile rubber as per BS 2751 - 2001 compound No. BA 70 with IRHD 70 <sup>+5</sup>/<sub>-4</sub> (after vulcanization).

### 3. TECHNICAL REQUIREMENTS

- 3.1 Cup sealing surfaces shall be smooth, without any burrs, cracks, inclusions and bubbles.
- 3.2 Non-working surfaces may have notches and projections not exceeding 0.5 mm in height (not more than 3) over a 100 mm length of the perimeter. Incomplete pressing area should not be more than 0.25 cm<sup>2</sup> per 100 mm length.
- 3.3 It is allowed to discard minor traces left after cutting of the buffing not exceeding the specific tolerances.
- 3.4 Radial notches are not permissible.
- 3.5 Wall thickness variation shall be within tolerance on thickness.
- 3.6 The specific weight for cup seals has been taken as 1.4.

Rev. No.	Date of Rev.	Remarks	Approved 		
00	19.01.2006	Issued.	V. S. Rao, AGM HOD- (HTE,HME & HPE)		
01	23.04.2015	Completely reviewed.	Checked		
02	16.12.2015	Clause- 4.3 & 7revised & Annexure-A added.	 Alok Kumar Bharti, Sr. Mgr-HTE	 Harish Kumar, DGM-HTE	 Shivendra Kumar, DGM-HTE
03	31.03.2022	QAP added. Checklist pt 5 & 6 added.			
			Prepared		
			 Khomendra Kashyap, Mgr-HTE	 Omeshwar Dahekar, Mgr-HTE	 Ramesh Singh, Engr-HTE
Saved in server as no. 42009900203					



21/2022/HEP-HTE40201			<b>PRODUCT STANDARD</b>	HT 00203
			<b><u>HYDRO TURBINE ENGINEERING</u></b>	Rev. 03
<p>COPYRIGHT &amp; CONFIDENTIAL</p> <p>The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.</p>				Page 2 of 3
<p><b><u>PURCHASE SPECIFICATION FOR</u></b></p> <p><b><u>CUP SEALS FOR HYDRAULIC DEVICES</u></b></p> <p><b>(PRESSURE UPTO 320 kgf / cm<sup>2</sup> AND TEMPERATURE -35 °C TO 80 °C)</b></p>				

#### 4. RULES ON ACCEPTANCE

- 4.1 The supply of cup seals shall be made only when the rubber sheet samples have been accepted as per BS 2751 - 2001 compound BA-70.
- 4.2 The manufacturer shall guarantee the conformity of all manufactured cup seals with the requirements of this standard and provide each lot of cup seals with duly approved documents certifying their quality.
- 4.3 When tested, the lot of cup seals shall be subjected to visual inspection. 10% of seals (minimum 3 numbers) are to be randomly selected & checked for dimensions. If the test result reveals that cup seals fail to meet the requirements of this standard, the cup seals shall be subjected to a repeat test. The second test shall be carried out on double the number of specimens.
- 4.4 In the second test, if even one specimen yields unsatisfactory results, the whole lot of cup seals shall be rejected.

#### 5. TEST CERTIFICATES

Vendor to submit the TCs for the following properties as mentioned in Table - 2 of BS 2751.

- 5.1 Hardness after vulcanization (IRHD)
- 5.2 Minimum tensile strength (MPa)
- 5.3 Minimum elongation at break (%)
- 5.4 Maximum compression set (%)
- 5.5 Resistance to liquids – Volume change (%) after immersion in liquid B
- 5.6 Resistance to low temperature – temperature in °C at which the stiffness shall not exceed 70 MPa
- 5.7 Resistance to accelerated aging
  - a) Change in hardness degrees (IRHD)
  - b) Maximum change in tensile strength (% of original values)
  - c) Maximum change in elongation at break (% of original values)
- 5.8 Adhesion to and corrosion of metals.


#### 6. PACKING, MARKING AND STORAGE

- 6.1 Cup seals shall be packed in plywood, card board or wooden boxes lined with paper.
- 6.2 Non-working surfaces of each cup seals shall be marked with
  - a) Size d and D
  - b) Manufacturer's name or trade mark.
 Nothing else is to be marked on them.
- 6.3 Packed or unpacked cup sealing shall be stored at a temperature between 0° C and 20° C and protected from direct sunrays.
- 6.4 It shall not be allowed to store cup seals near stoves or other heating devices at a distance of less than one metre, as well as in the premises with organic solvents, acid, alkali, lubricating materials and other materials that may cause rubber destruction.

#### 7. DIMENSIONS, TOLERANCES & VARIANT NOS.

Refer Annexure-A which is specific to a particular purchase indent.

769521/2022/HEP-HTE40201

	<b>PRODUCT STANDARD</b> <b>HYDRO TURBINE ENGINEERING</b>	<b>HT 00203</b>
		<b>Rev. 03</b>
COPYRIGHT & CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.		<b>Page 3 of 3</b>
<b><u>PURCHASE SPECIFICATION FOR</u></b> <b><u>CUP SEALS FOR HYDRAULIC DEVICES</u></b> <b>(PRESSURE UPTO 320 kgf / cm<sup>2</sup> AND TEMPERATURE -35 °C TO 80 °C)</b>		

### CHECK LIST

(To be filled in by the vendor and submitted along with the offer.  
Offers with incomplete checklist will not be considered)

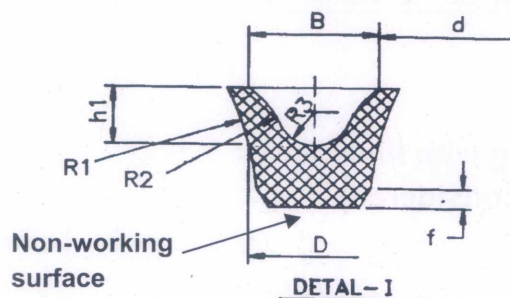
Sl. No.	Description	Vendor's comments
1	Material of cup seal as per clause no. 2	Yes / No
2	Dimensions of seal are strictly as per Table-1	Yes / No
3	Technical requirements as per clause – 3 shall be complied	Yes / No
4	TCs for physical properties as per clause – 5 shall be furnished	Yes / No
5	Enclosed QAP shall be followed	Yes / No
6	Any deviation	Yes / No

Signature and stamp of vendor \_\_\_\_\_

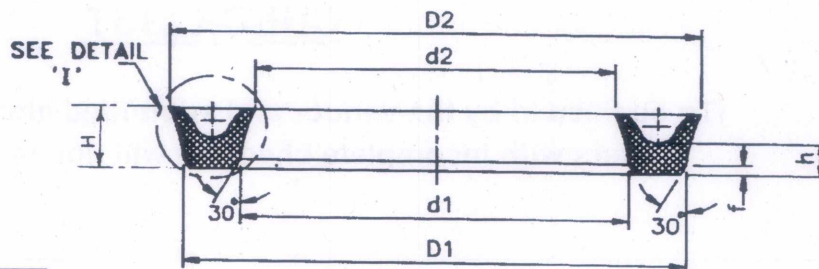


## Annexure - A

(The information furnished is specific to indent no. given below)



**Note:** 'D' and 'd' are diameters on which sealing is required.



**Figure - 1**

**Table-1**

(For indenter: Refer HT 00201 or HT00202 for dimensions of cup seals)

S. No.	d	D	B	H		d1	D1	d2	D2	Tolerance on d1,d2,D1,D2	h		R1	R2	R3	h1	f	* Var No.	Approx. wt. of 100 pieces in kg
				Size	Tol.						Size	Tol.							
1																			
2																			
3																			
4																			

Name of project: \_\_\_\_\_

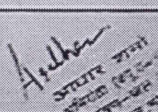
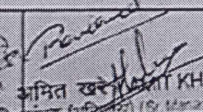
Sign and seal of BHEL's designer

Purchase Indent No. \_\_\_\_\_

Date \_\_\_\_\_

\* VAR No. is to be written from HT00201 & HT00202 & is only for BHEL's reference.



SL. NO		CHARACTERISTICS & CHECKS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REF. DOC.	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY		REMARKS
					M	N					M	N	
1	2	3	4	5	6	7	8	9	10	11			
1	Material Compliance	Major	Review	100%	100%	Drawing / relevant catalogue	Compliance certificate covering drawing TR	COC / TC	V	P	V		
2	Dimensions Check	Major	Measurement	100%	*	Drawing / relevant catalogue	Drawing / relevant catalogue	IR	V	P	W		
3	Visual Check	Critical	Visual	100%	100%	Drawing / relevant catalogue	Cracks, deformations, joints (if not called in drawing) & any deviation from drawing not acceptable.	IR	V	P	W		
 Anil Kumar Sr. Engineer (QA/QC) Bharat Heavy Electricals Limited, Bhopal		 Anil Kumar Khare Sr. Engineer (QA/QC) Bharat Heavy Electricals Limited, Bhopal		<b>LEGEND:</b> RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: MANUFACTURER/SUB-SUPPLIER B:BHEL/ BHEL APPOINTED INSPECTION AGENCY P: PERFORM W: WITNESS AND V: VERIFICATION (DOCUMENT SUBMISSION) IR-INSPECTION REPORT QCR-QC REPORT TC-TEST CERTIFICATE RR- REVIEW OF RECORD COC: CERTIFICATE OF COMPLIANCE									
PREPARED & REVIEWED BY: BHEL QA & ENGINEERING												ACCEPTED BY (VENDOR'S QC REPRESENTATIVE)	

- Note: This QAP is commonly applicable for standard / catalogue rubber items procured by H.T.E. like- 1. Chevron Packing, 2. U Packing seal, 3. Moulded O Ring, 4. Piston Seal/ Piston Guide, 5. Two-Piece Seal, 6. J Seal, D Seal or other Special Seals as per drawing
- \*Quantum of witness of dimension checks for BHEL appointed third party- ( $N \leq 10$  nos--100%,  $10 < N \leq 30$ --25%,  $30 < N \leq 200$ --10%,  $N > 200$ - BHEL QC will fix the quantum on case-to-case basis) N- Number of pieces of each type offered per lot.