

 BEML LIMITED EM DIVISION KGF		QUALITY ASSURANCE PLAN				QAP Ref	QER / QAP / RUBR / ORING / NBR - 1D
		PART NAME	O - RING		ISSUE No.	02	
		MATERIAL	NBR - 1D				
Sl. No.	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	ACCEPTANCE CRITERIA	METHOD / FACILITY	FORMAT FOR RECORDING	INSPECTION SUPPLIER BEML
A	Material aspects						
1	Physical condition	Visual	As per table	Free from corrosion & sticking	Corrosion & Sticking test. Test temperature is 70° C for 24 Hrs.	Inspection report	P V
2	Material	Composition	Batch wise	NBR - 1D	FTIR Spectrometer	NABL Test certificate	P V
3	Specific Gravity	Measure	3 samples / lot	1.220 - 1.277	Weight loss in water		P V / R
Room Temperature Tests							
4	Hardness	Measure	As per table	70 ± 5 Hs	Shore Hardness Testing methods of vulcanized Rubber		P A
	Tensile strength	Measure	3 samples / lot	120 Kg/cm ²	Tensile testing methods of Vulcanized Rubber	NABL Test certificate	P A
	% Elongation	Measure	3 samples / lot	150%			P A
	100 % Tensile stress	Measure	1 sample / lot	28 Kg/cm ²			P A
Air Heating and Aging tests							
5	a) Change in Hardness	Measure	3 samples / lot	Max +10%	Air Heating & aging test methods of Vulcanized Rubber. Test temperature and Time is 120°C for 70 Hrs.	NABL Test certificate	P V / R
	b) Change in ratio of Tensile strength %	Measure	3 samples / lot	-20%			P V / R
	c) Change in ratio of Elongation in %	Measure	3 samples / lot	-50%			P V / R
a. Oil proof test (Test Oil JIS No. 1)							
6	a) Change in Hardness	Measure	3 samples / lot	from -5 to +10	Oil proof test methods of Vulcanized Rubber. Test temperature and Time is 120 °C for 70 Hrs.	NABL Test certificate	P V / R
	b) Change in Tensile strength %	Measure	3 samples / lot	Max -20%			
	c) Change in Elongation %	Measure	3 samples / lot	Max -40%			
	d) Volume change %	Measure	3 samples / lot	from -10 to +10			P V / R
b. Oil proof test (Test Oil JIS No. 2)							
	a) Change in Hardness	Measure	3 samples / lot	from -15 to 0	Oil proof test methods of Vulcanized Rubber. Test temperature and Time is 120 °C for 70 Hrs.	NABL Test certificate	P V / R
	b) Change in tensile strength %	Measure	3 samples / lot	Max -35 %			
	c) Change in Elongation %	Measure	3 samples / lot	Max -35 %			
	d) Volume change %	Measure	3 samples / lot	from 0 to +20%			P V / R
Cold proof test							
7	a) Low temperature bending (Outward appearance)	Measure	3 samples / lot	No cracks	Low temperature bend test of vulcanized Rubber at -50°C for 5 Hrs.		P V / R
	b) T-R Value at -35° C for NBR - 1D (% Minimum)	Measure	3 samples / lot	Min 10 %	TR Value test of vulcanized rubber	NABL Test certificate	P V / R
	c) Cold proof co-efficient at -40° C (Minimum)	Measure	3 samples / lot	0.050	Cold proof coefficient measurement methods of vulcanized rubber.		P V / R

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Oil aging test Temperature at 120°C for 1000 Hrs.								
8	a) Hardness change (Maximum)	Measure	3 samples / lot	Max +15%	Shore Hardness Testing methods of vulcanized Rubber.	NABL Test certificate	P	V / R
	b) 25% Compression rate permanent strain (Maximum)	Measure	3 samples / lot	Max 50	Compression test of vulcanized Rubber.		P	V / R
9	Compression permanent strain in % (Maximum)	Measure	3 samples / lot	30 % (Max)	Permanent compression strain test of vulcanized Rubber at 120°C for 70 Hrs.	NABL Test certificate	P	A
B	Manufacturing aspects							
10	Processing stages of O-Ring - Moulding & Sintering	Visual	First / one time	Process sheet	Sequence of process	Process sheet	P	A
11	Ensuring dimensions - CNC Machining / Die pressing	Measure	First / one time	Die calibration	CNC Machine / Dies	Inspection / Calibration report	P	A
C	Final inspection, Identification & Packing							
12	Dimensions	Measure	IS 2500 : 2000	Drawing / Std.	Physical Checking	Dimension report	P	W / R
13	Identification	Visual	100%	Drawing / Std.	Physical Checking of V.C. No., Part No., Part name, Qty, Batch No., -Manufacturing date & Expiry date.	Check list	P	W
14	Packing	Visual	100%	Drawing / Std.	Physical Checking	Packing list	P	W

LEGEND : P - Perform the activity, V - Verification of documents, W - Witness the activity, A - Audit carried out for the activity, R - Review of QA Reports.

NOTE : 1. This QAP is applicable for **O - RING to P/N : 07000 4XXXX & 07002 4XXXX** series only.

- Sample approval by supplying pilot batch along with test samples (4 nos of each - Test Button & Test slab) for testing at R & D, BEML, KGF. Prior to bulk supply.
- Above test from Sl. No. 04 to 09 are to be carried out at NABL Lab for first two batches at supplier end and forward the NABL test report, however same test shall be verified / carried out at R & D, BEML, KGF.
- TEST BUTTON (Size : \varnothing 30 x 6mm thk) - 2 Nos & TEST SLAB (Size : 200 x 200 x 6mm thk) - 2 Nos are to be supplied along with each supply for testing at R & D.
- NABL Test certificate for above mentioned test Sl. No. 04 is to be checked for each lot and NABL test report shall be forwarded along with each supply / lot.
- Sample size is as per Sampling Plan: As per IS: 2500-2000, Part 1, Level - II. Details mentioned below.

Lot Size in Nos	Sample Size in	AQL
2 ~ 50	8	1.50%
51 ~ 90	13	1.00%
91 ~ 150	20	0.65%
151 ~ 280	32	0.40%
281 ~ 500	50	0.25%
501 ~ 1200	80	0.15%
1201 ~ 3200	125	0.10%
3201 ~ 10000	200	0.07%

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