

 BEML LIMITED EM DIVISION KGF		QUALITY ASSURANCE PLAN				QAP Ref	QER / QAP / RUBR / ORING / FKM 1D
		PART NAME	O - RING		ISSUE No.	01	
		MATERIAL	FKM - 1D		DATE	07-06-2023	
Sl. No.	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	ACCEPTANCE CRITERIA	METHOD / FACILITY	FORMAT FOR RECORDING	INSPECTION SUPPLIER BEML
A	Material aspects						
I. O RING - (FKM - 1D)							
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	FKM - 1D	FTIR Spectrometer	NABL Test certificate	P V / R
3	Specific Gravity Allowance	Measure	3 samples / lot		-		P V / R
Room Temperature Tests							
4	Hardness	Measure	As per table	72 ± 5 Hs	Shore Hardness Testing methods of vulcanized Rubber	NABL Test certificate	P A
	Tensile strength	Measure	3 samples / lot	12 Mpa	Tensile testing methods of Vulcanized Rubber		P A
	% Elongation	Measure	3 samples / lot	170%			P A
Air Heating and Aging tests							
5	a) Change in Hardness	Measure	3 samples / lot	± 5	Air Heating & aging test methods of Vulcanized Rubber. Test temperature and Time is 200°C for 70 Hrs.	NABL Test certificate	P V / R
	b) Change in ratio of Tensile strength %	Measure	3 samples / lot	-10%			P V / R
	c) Change in ratio of Elongation in %	Measure	3 samples / lot	-20%			P V / R
a. Oil proof test (Test Oil JIS No. 1)							
	a) Change in Hardness	Measure	3 samples / lot	from -05 to +05.	Oil proof test methods of Vulcanized Rubber. Test temperature and Time is 200°C for 70 Hrs. Test OIL - SAE 10W.	NABL Test certificate	P V / R
	b) Change in Tensile strength %	Measure	3 samples / lot	Max -65 %			
	c) Change in Elongation %	Measure	3 samples / lot	Max -70 %			
	d) Volume change %	Measure	3 samples / lot	from -05 to +10			P V / R
b. Oil proof test (Test Oil JIS No. 2)							
6	a) Change in Hardness	Measure	3 samples / lot	from -05 to +05.	Oil proof test methods of Vulcanized Rubber. Test temperature and Time is 200°C for 70 Hrs. Test OIL - SAE 30W.	NABL Test certificate	P V / R
	b) Change in tensile strength %	Measure	3 samples / lot	Max -25 %			
	c) Change in Elongation %	Measure	3 samples / lot	Max -20 %			
	d) Volume change %	Measure	3 samples / lot	from -10 to +15			P V / R
7	Compression set in % (Maximum)	Measure	3 samples / lot	25 % (Max)	Permanent compression set strain test of vulcanized Rubber at 200°C for 70 Hrs.	NABL Test certificate	P A
8	COLD PROOF TEST	Measure	3 samples / lot	Free from cracks	Test temperature -30°C, Time : 70 Hrs.	NABL Test certificate	P A

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 (W. Channappa)

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B	Manufacturing aspects						
9	Processing stages of O-Ring - Moulding & Sintering	Visual	First / one time	Process sheet	Sequence of process	Process sheet	P A
10	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						
11	Dimensions	Measure	IS 2500 : 2000	Drawing / Std.	Physical Checking	Dimension report	P W
12	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
13	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 of MATERIAL : FKM - 1D.**

- 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 tests from Sl. No. 04 to 08 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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Approved by