Benchmarking- JCB Reservoir

JCB Reservoir		
1	Model	3D Max
2	Dealer	Siddhart automotives, Chakan

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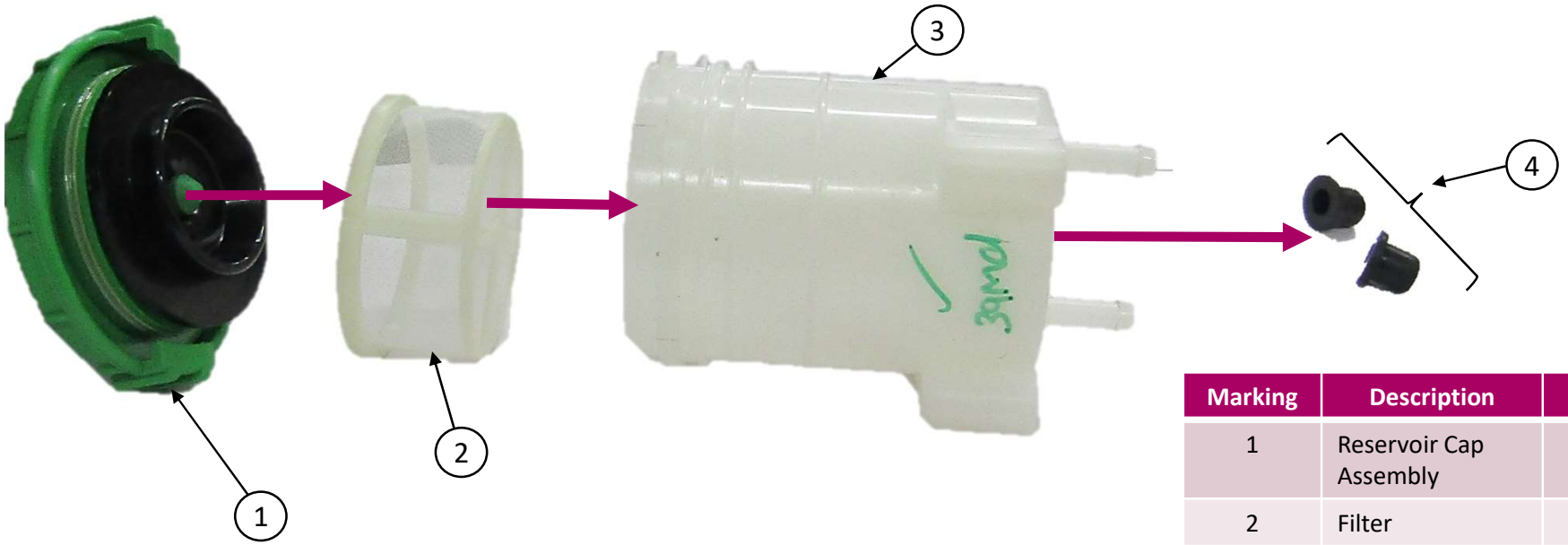
Benchmarking- JCB Reservoir

SR NO	Parameters	Description
1	**Exploded VIEW** (Reservoir and Cap Assembly)	**1.** The Exploded View of reservoir and Cap assembly is shown with the help of photos of actual JCB sample. **2.** Weights of various components of Reservoir and Cap Assembly measured and noted.
2	**Dimensional details**	Rough dimensions of various parts are measured and are noted
3	**JCB sample Volume analysis**	JCB sample tested for various volume levels and both theoretical and practical volumes were noted
4	**Laboratory test Report**	JCB sample tested for material details using FTIR analysis.
5	**Oil ageing test report**	Existing PP reservoir tested with mineral oil at defined test conditions

Benchmarking- JCB Reservoir

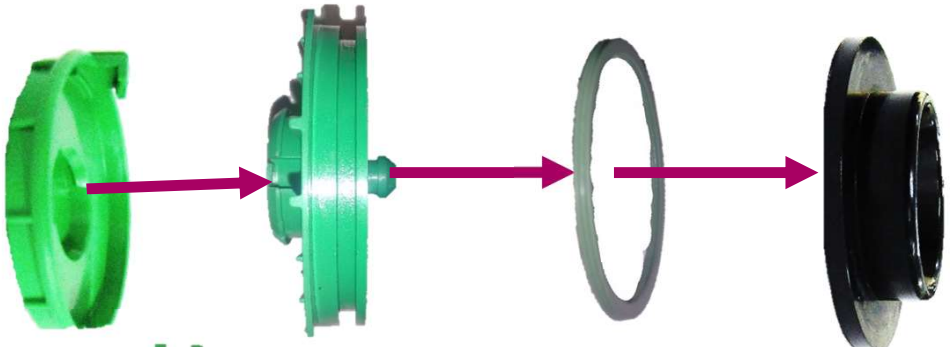
Exploded VIEW -Reservoir



Marking	Description	Weight
1	Reservoir Cap Assembly	66.71 g
2	Filter	5.81 g
3	Reservoir Body	87.95 g
4	Reservoir Plugs	0.27 g each
Reservoir assembly Weight = 160.74 g		

Benchmarking- JCB Reservoir

Exploded VIEW- CAP Assembly



Cap Cover-

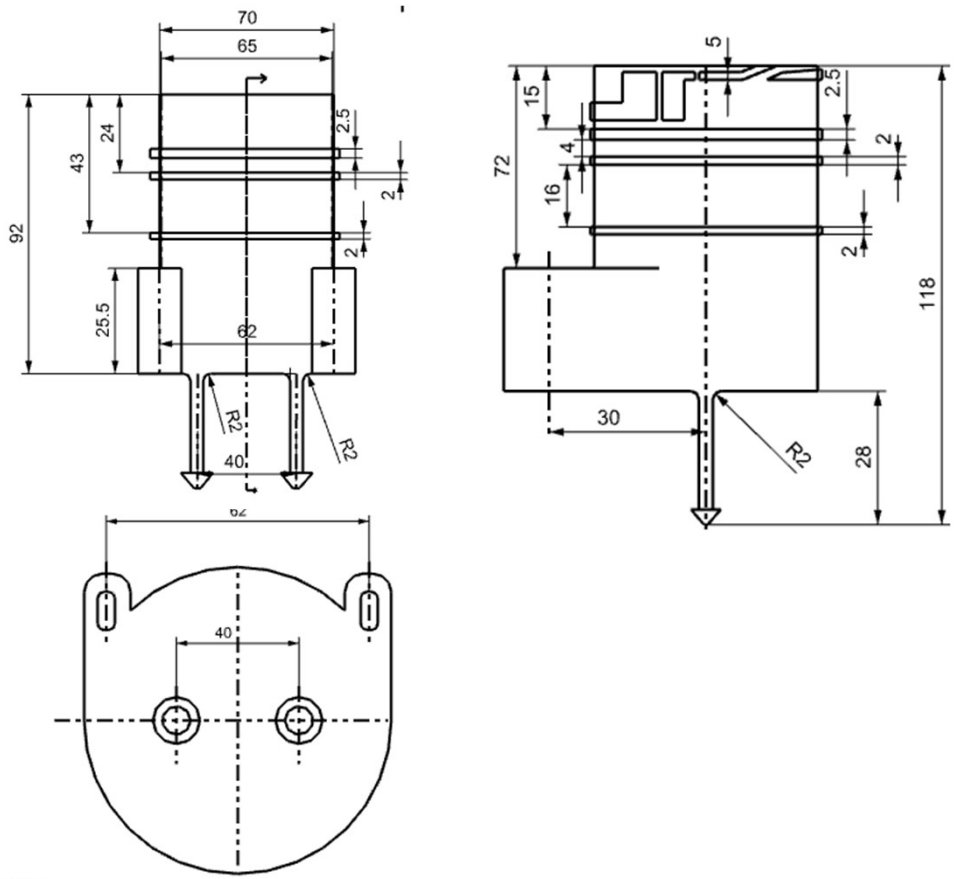
Instructions on Cap Cover-

1. **Use mineral fluid only refer to Hand book**
2. JCB lettering in Middle
3. Instruction for open and closing of left side
4. Symbol of mineral oil on right side
5. Part number

Marking	Description	Weights
1	CAP Cover	20 g
2	CAP Body	29 g
3	CAP O-Ring	1 g
4	Inverted CAP Seal	16.71 g
5	**CAP Assembly**	**66.71 g**

Benchmarking- JCB Reservoir

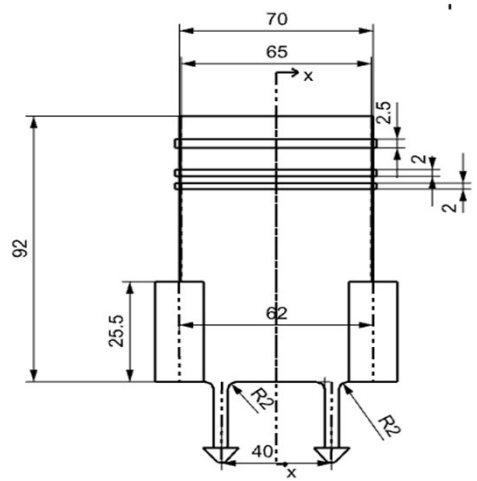
Dimensions- Reservoir Body

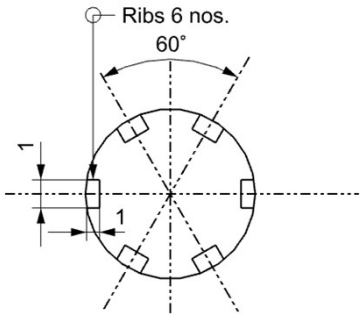


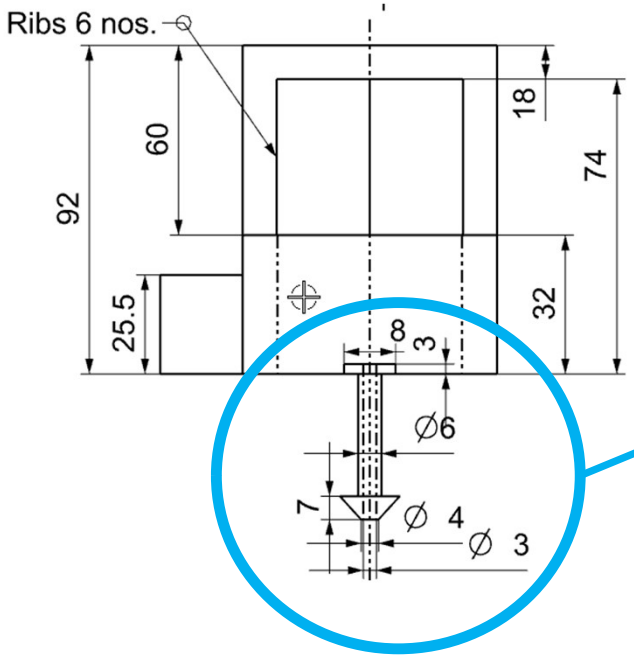
Sr. No.	Parameter	Dimension
1	Reservoir OD	70 mm
2	Reservoir ID	65 mm
3	Reservoir Height	92 mm
4	Outlet port CD	40 mm
5	Compartment Height	32 mm
6	Support holes CD	62 mm
7	Support hole height	25.5 mm
8	Support hole to outlet port distance	30 mm
9	Reservoir thickness	2.5 mm

Benchmarking- JCB Reservoir

Dimensions – Outlet port

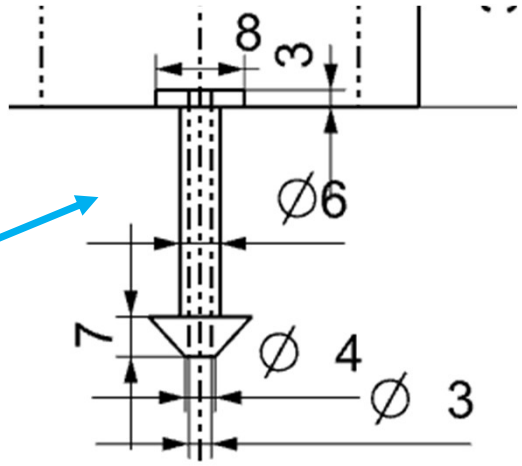






Section XX

Sr. No.	Parameter	Dimension (mm)
1	Compartment height	32
2	Outlet port OD	6
3	Outlet port ID	3



Observations-

- **Since the outlet port is raised inside Reservoir, the dead volume level is above the port openings.**

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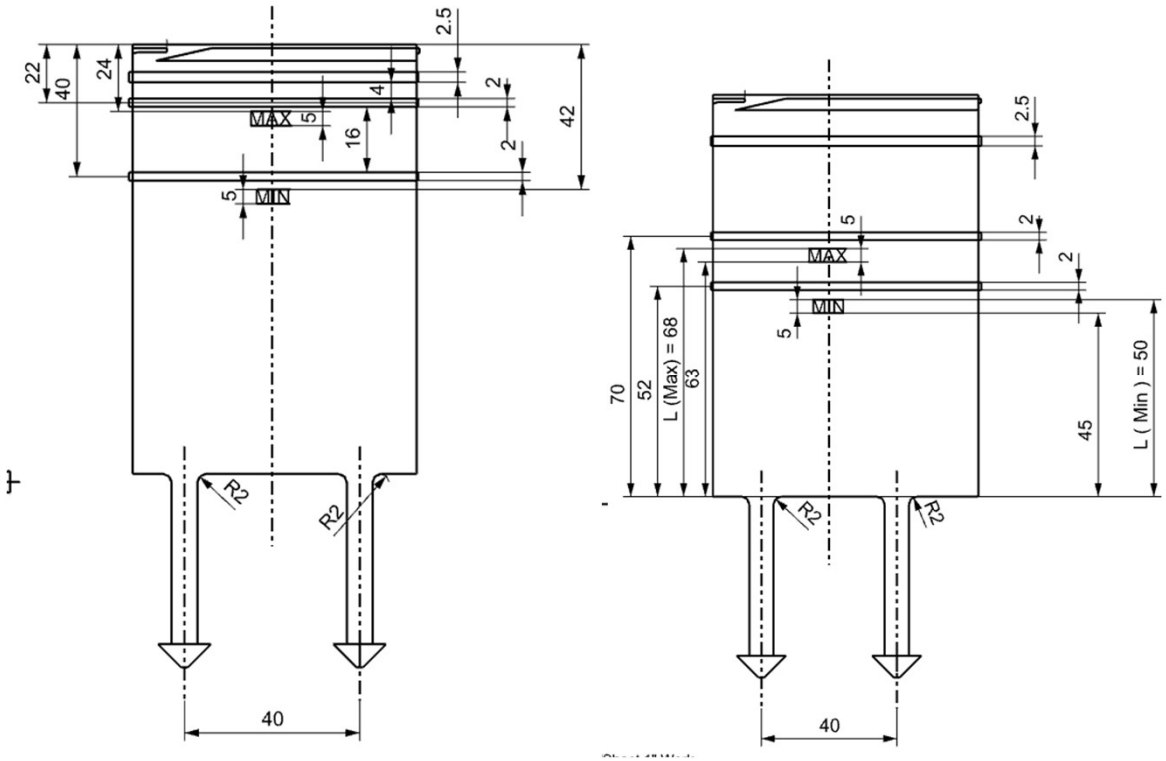
Benchmarking- JCB Reservoir

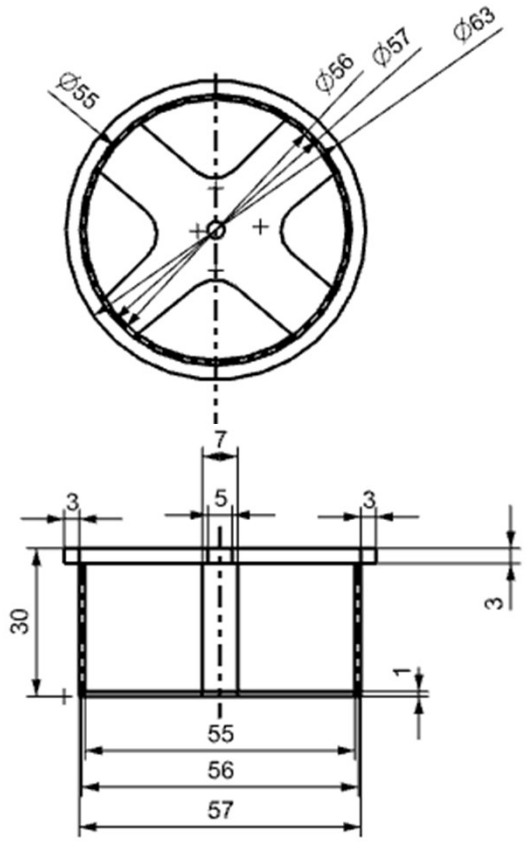
Dimensions- Max and Min markings



Sr. No.	Parameter	Dimension (mm)
1	Max Marking	70
2	Min Marking	52
3	Max Distance (L (MAX))	68
4	MIN Distance (L(MIN))	50
5	MAX and MIN Marking height	5

Benchmarking- JCB Reservoir

Dimensions- FILTER



Sr. No.	Parameter	Dimension (mm)
1	Filter OD	57
2	Filter ID	56
3	Filter height	30
4	Filter Support Rib width	7
5	Filter Rib thickness	3
6	Filter Rib radius	63

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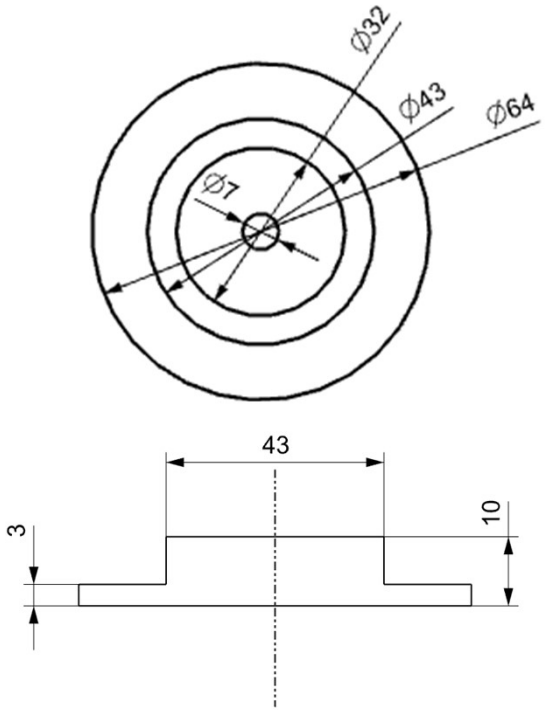
Benchmarking- JCB Reservoir

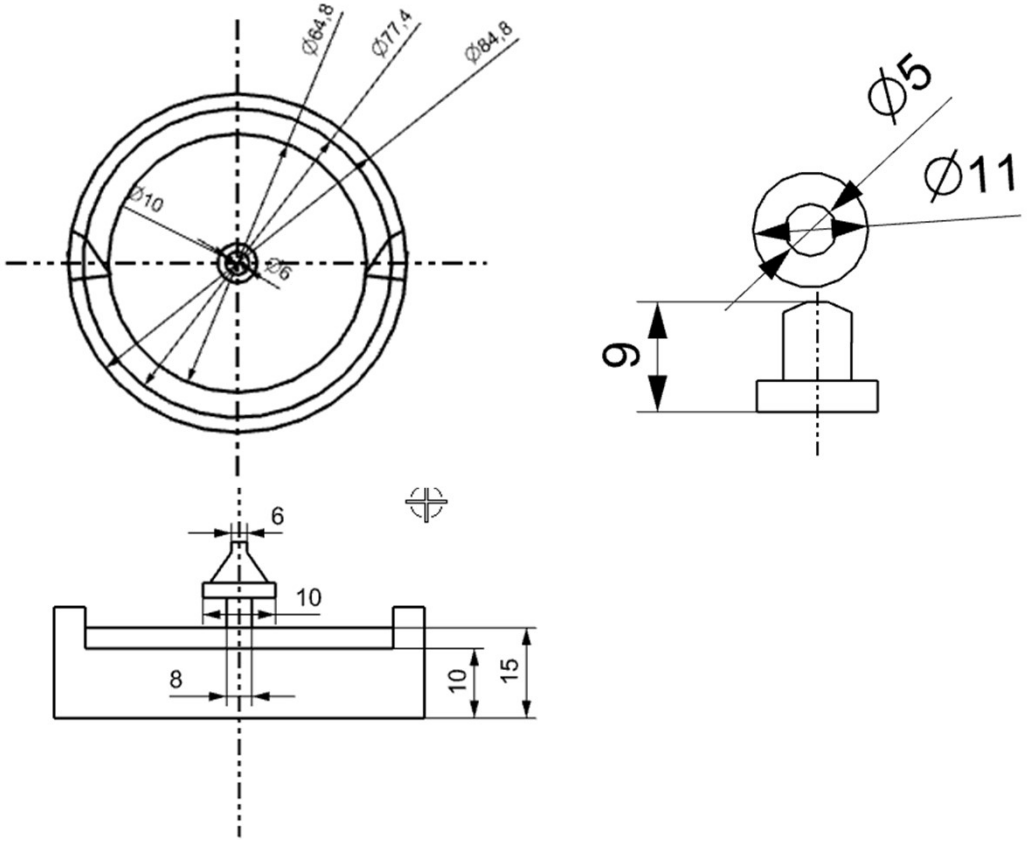
Dimensions – Inverted Cap Seal



Sr. No.	Parameter	Dimension (mm)
1	OD	64
2	ID	43
3	Bottom Height	3
4	Total Height	10

Benchmarking- JCB Reservoir

Dimensions- CAP body with Cover & Reservoir Plugs

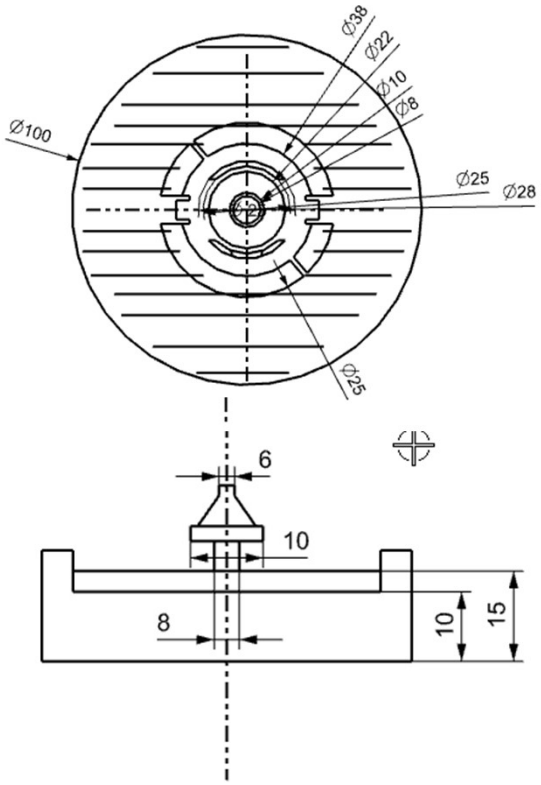


Sr. No.	Parameter	Dimension (mm)
1	CAP Cover height	10
2	CAP Body with Cover height	15
3	Seal fitter Diameter	8
4	Plug OD	11
5	Plug ID	5
6	Plug Height	9

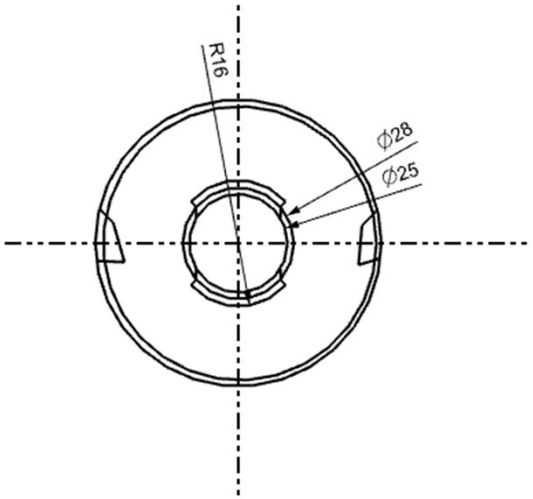
Benchmarking- JCB Reservoir

Dimensions- CAP body & CAP Cover

Sr. No.	Parameter	Dimension (mm)
1	CAP Body OD	100
2	CAP Body – CAP Cover Fitter OD	45



CAP Body



CAP Cover

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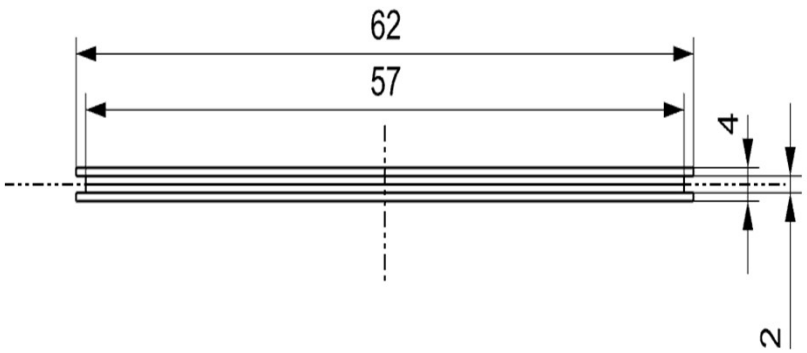
Benchmarking- JCB Reservoir

Dimensions- Cap O Ring



Sr. No.	Parameter	Dimension (mm)
1	O Ring OD	62
2	O Ring ID	57
3	Height	4

Benchmarking- JCB Reservoir

Volume Calculations

1. Maximum Volume - ∑/ 4 (d^2) L = ∑/ 4 (65^2) 65.5 = 217 cc
2. MinimumVolume - ∑/ 4 (d^2) L = ∑/ 4 (65^2) 47.5 = 158 cc
3. Compartment Volume = ∑/ 4 (d^2) L = ∑/ 4 (65^2) 32 * 0.5 = 53.24 cc
4. Brim Volume = ∑/ 4 (d^2) L = ∑/ 4 (65^2) 92 = 306 cc

Sr no.	Volumes	Quality Requirement	Practical (Water)	Practical (Mineral Oil)
1	Maximum	217 cc	205 cc	199 cc
2	Minimum	158 cc	141 cc	140 cc
3	Brim	306 cc	280 cc	288 cc
4	Compartment	54 cc	42 cc	40 cc
5	Dead Volume	-	-	17.5 cc

****Difference in practical and theoretical values is due to the dead volume observed (17.5 cc)****

Benchmarking- JCB Reservoir

Volume Readings

Brim Volume- 306 cc

Max Volume- 199 cc

Min Volume- 140 cc

Compartment Volume- 40 cc

Dead Volume- 17.5 cc

Observations-

- **Since the outlet port is raised inside Reservoir, the dead volume level is observed**.

Benchmarking- JCB Reservoir

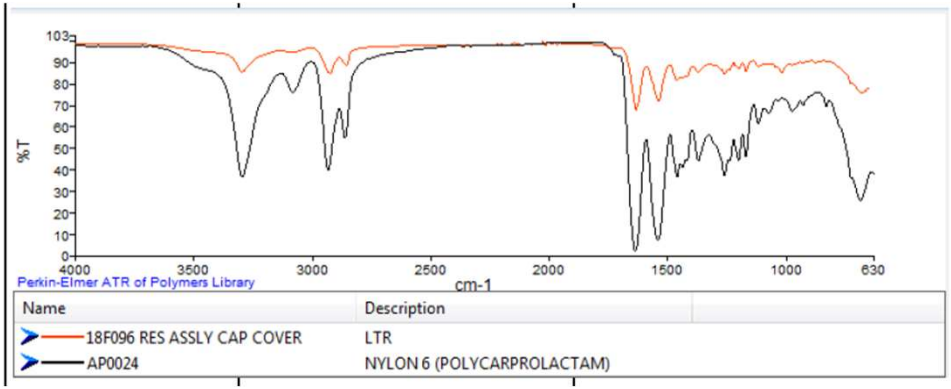
LTR 18F/ 096- Laboratory Test Report for Material identification using FTIR test

Sr no.	PART NAME	MATERIAL IDENTIFIED
1	CAP COVER	NYLON 6
2	CAP BODY	NYLON 6
3	INVERTED CAP SEAL	NBR
4	CAP BODY SEAL	NBR
5	RESERVOIR BODY	NYLON 6
6	FILTER	NYLON 6
7	FILTER MESH	NYLON 6
8	PLUGS	SBR

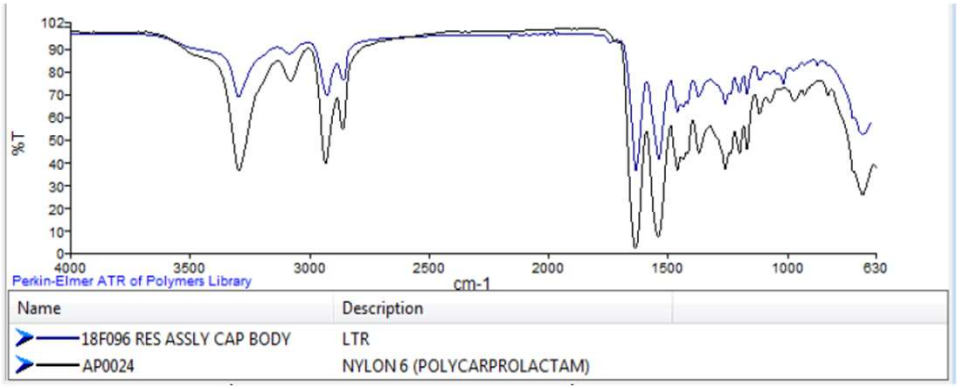
Benchmarking- JCB Reservoir

FTIR Test Reports

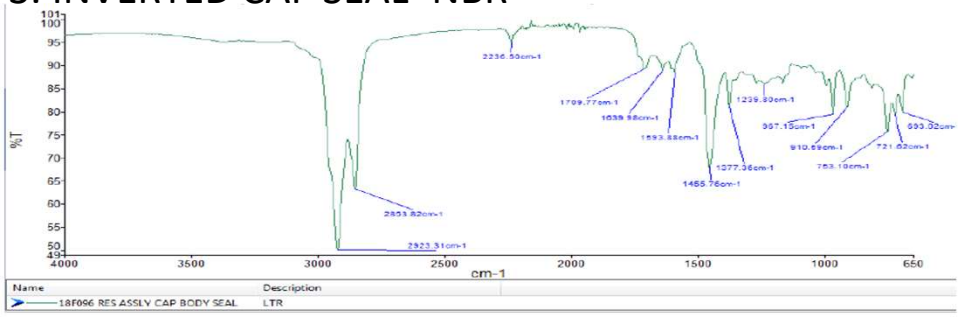
1. CAP COVER - NYLON 6



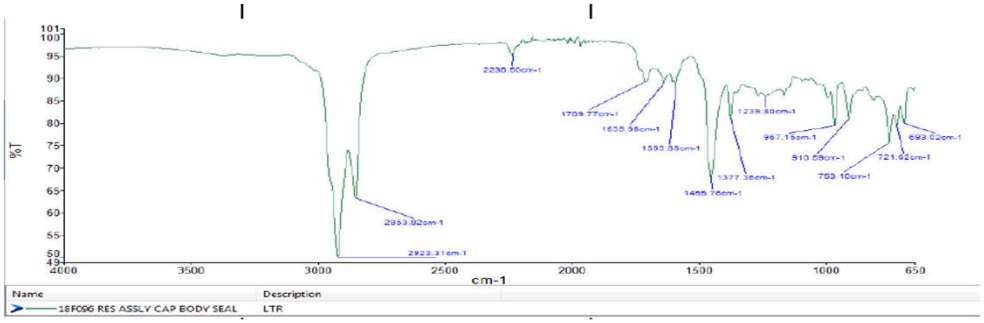
2. CAP BODY- NYLON 6



3. INVERTED CAP SEAL- NBR



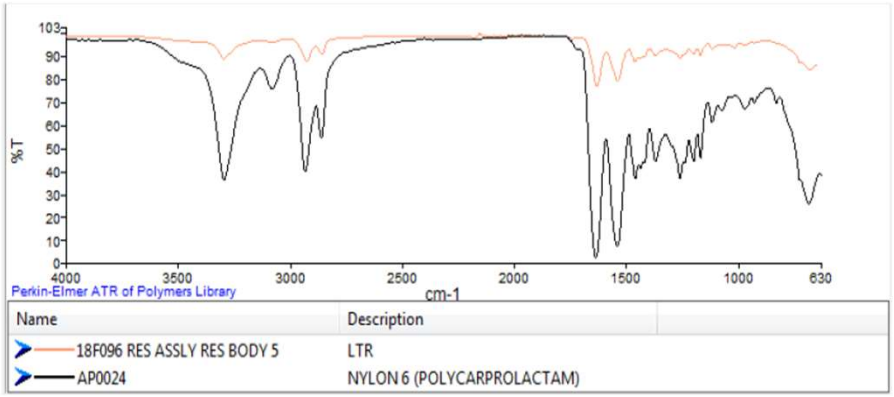
4. CAP BODY SEAL - NBR



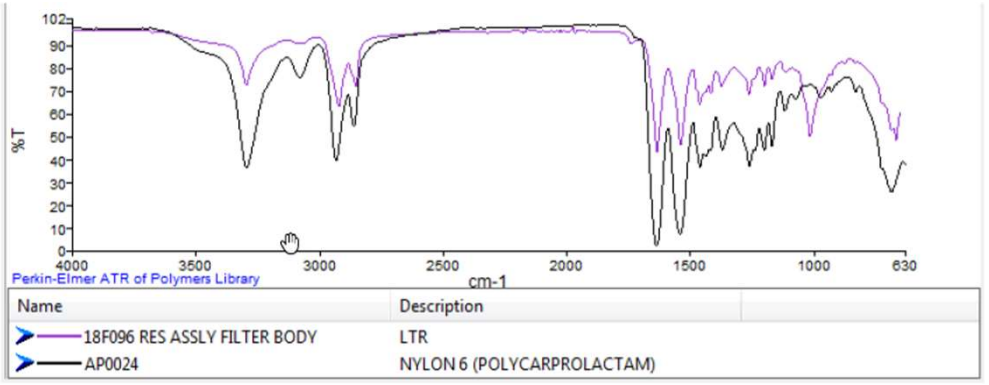
Benchmarking- JCB Reservoir

FTIR Test Reports

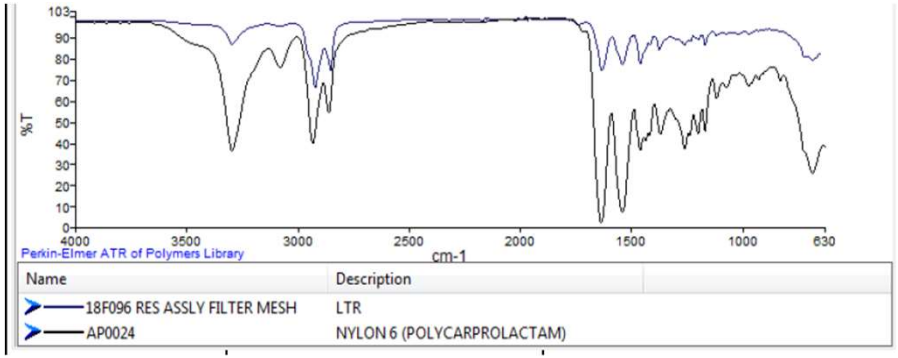
5. RESERVOIR BODY- NYLON 6



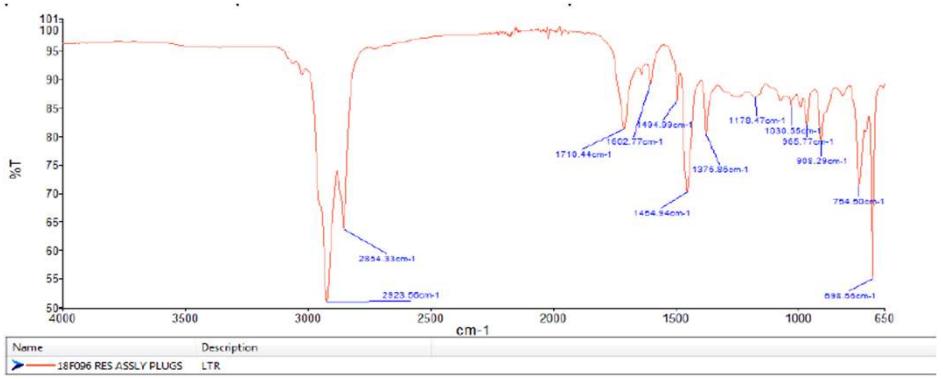
6. FILTER - NYLON 6



7. FILTER MESH - NYLON 6



8. PLUGS - SBR



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Benchmarking- JCB Reservoir

TESTS-

IOC was prepared for testing the PP reservoir

Test Purpose-

- To check reservoir compatibility with mineral base oil (JCB HVI Hydraulic Hindustan Oil)
- Test Conditions with Specifications :-
  - Oil Ageing test : - Brake fluid reservoir with brake fluid shall be kept in environmental chamber for 140 h at 120^0 C

Acceptance Criteria :-

1. No Harmful deformation, defect, No abnormality found on basic functionality.
2. No failure of deterioration, visual defect of changes in transparency of the reservoir.

Benchmarking- JCB Reservoir

Test Results

Part	Part No.	Material
Reservoir Body	0204715345	PPCP MI 3530
Filter	0204715346	NYLON 6 (Actual part PP)
Float	0204749 574	Foamed 6 Nylon (Actual part PP)
Cap Body	0204714945	Nylon 6 (Actual part PP)

Summary of test Results-

- Crack observed on Reservoir Cap after test
- Float assembly, filter and reservoir body dimensions are changed after test.

After test vent port cap cover crack observed & also bubbles observed on cap assembly.

After test cap crack observed at threaded portion.

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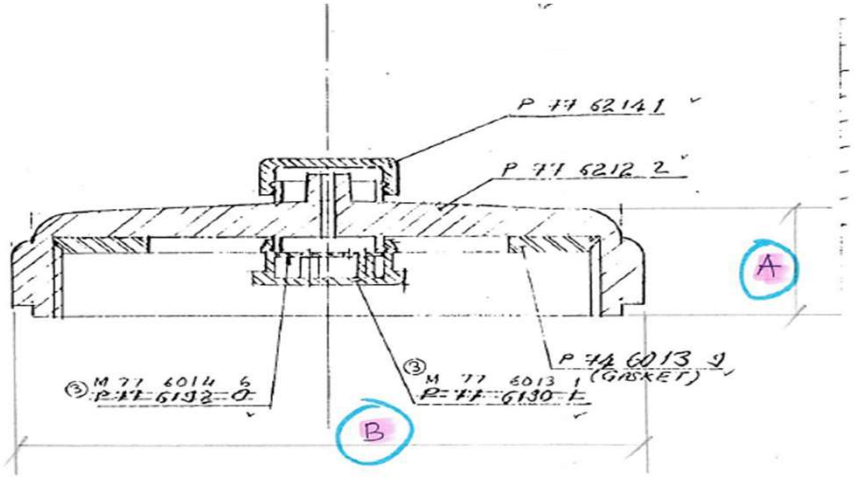
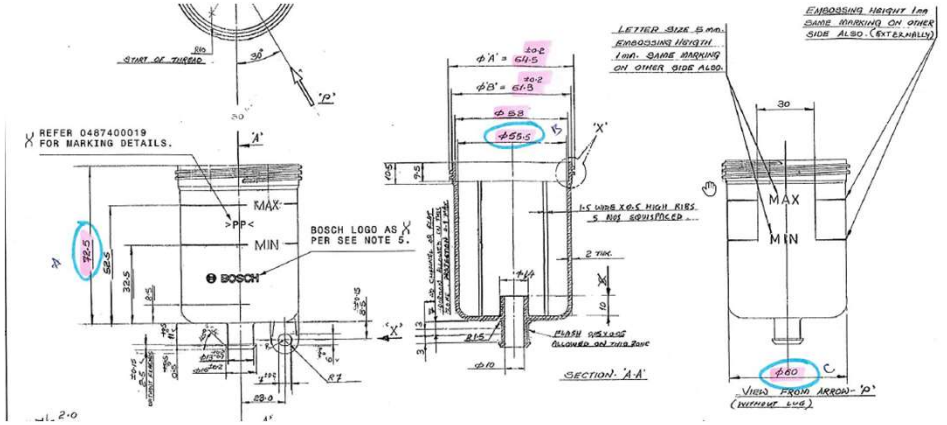
Benchmarking- JCB Reservoir

Test Results

Cap Assembly Dimensions (mm)			
Sr. No.	Before Test	After Test	Difference
A	14.66	16.47	-1.82
B	74.11	79.12	-5.00
After Test Cap assembly dimensions increased observed than before test, Also crack observed at threaded portion of cap assembly & vent port cover cap. There are bubbles observed in cap assembly.			

Reservoir body Dimensions (mm)			
Sr. No.	Before Test	After Test	Difference
A (72.5)	72.53	77.63	**-5.10**
B (Ø55.5)	55.50	57.35	**-1.85**
C (Ø60)	59.91	61.72	**-1.80**
After Test there is major change observed in dimension of Reservoir body assembly. Reservoir body swell observed at the bottom side.			



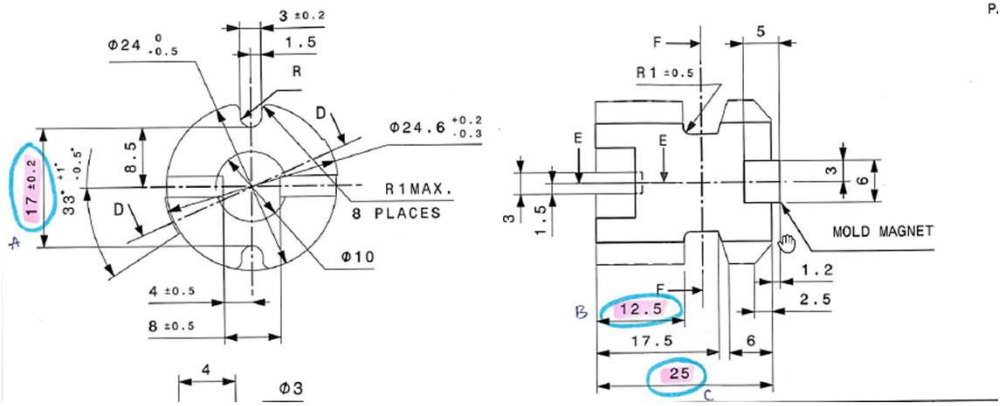


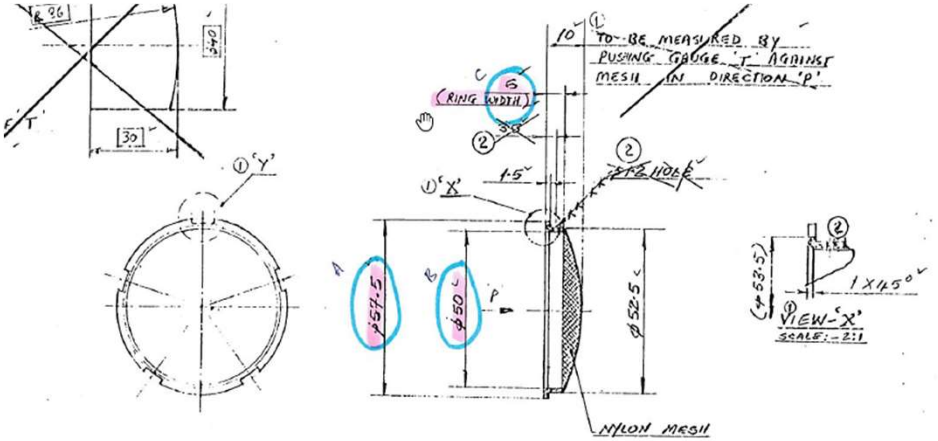
Benchmarking- JCB Reservoir

Test Results

Float assembly Dimensions (mm)			
Sr. No.	Before Test	After Test	Difference
A (17±0.2)	16.94	16.92	0.02
B (12.5)	12.50	12.45	0.05
C (25)	24.95	24.89	0.06
After Test there is no major change observed in dimension of float assembly.			

Reservoir filter Dimensions (mm)			
Sr. No.	Before Test	After Test	Difference
A (Ø57.5)	56.87	56.52	0.35
B (Ø50)	50.03	49.48	0.55
C (Ring Width 6)	6.23	6.24	-0.01
After Test there is change observed in dimension of Reservoir body assembly.			





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Benchmarking- JCB Reservoir

Observations and Conclusions-

OBSERVATIONS-

- Since the outlet port is raised inside Reservoir, the dead volume level is observed.
- All plastic parts are found to be of material – NYLON 6
- All rubber parts **except plugs** are found to be of material- NBR
- Plugs are made of material- SBR
- After the oil ageing test of PP sample the dimensions are distorted and dimensional accuracy is disturbed
- After the oil ageing test of PP sample crack is observed on Reservoir Cap.

COCLUSIONS-

- Since the existing reservoir failed in the oil ageing test it is not compatible with mineral oil.
- Benchmarking sample of JCB has following material as per FTIR test conducted in material lab-
  1. CAP COVER- NYLON 6
  2. CAP BODY-NYLON 6
  3. INVERTED CAP SEAL- NBR
  4. CAP BODY SEAL - NBR
  5. RESERVOIR BODY - NYLON 6
  6. FILTER - NYLON 6
  7. FILTER MESH - NYLON 6
  8. PLUGS - SBR