Innovation in procedures for used oil sampling

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How to improve sampling procedures

BEST PRACTICES

Clean Oil Sampling How to Sample Oil Without Opening the Bottle

By Jim Fitch, Noria Corporation

The most widely used laboratory methods for initial detection of abnormal levels of wear debris in used

For instance, most people familiar with used oil analysis

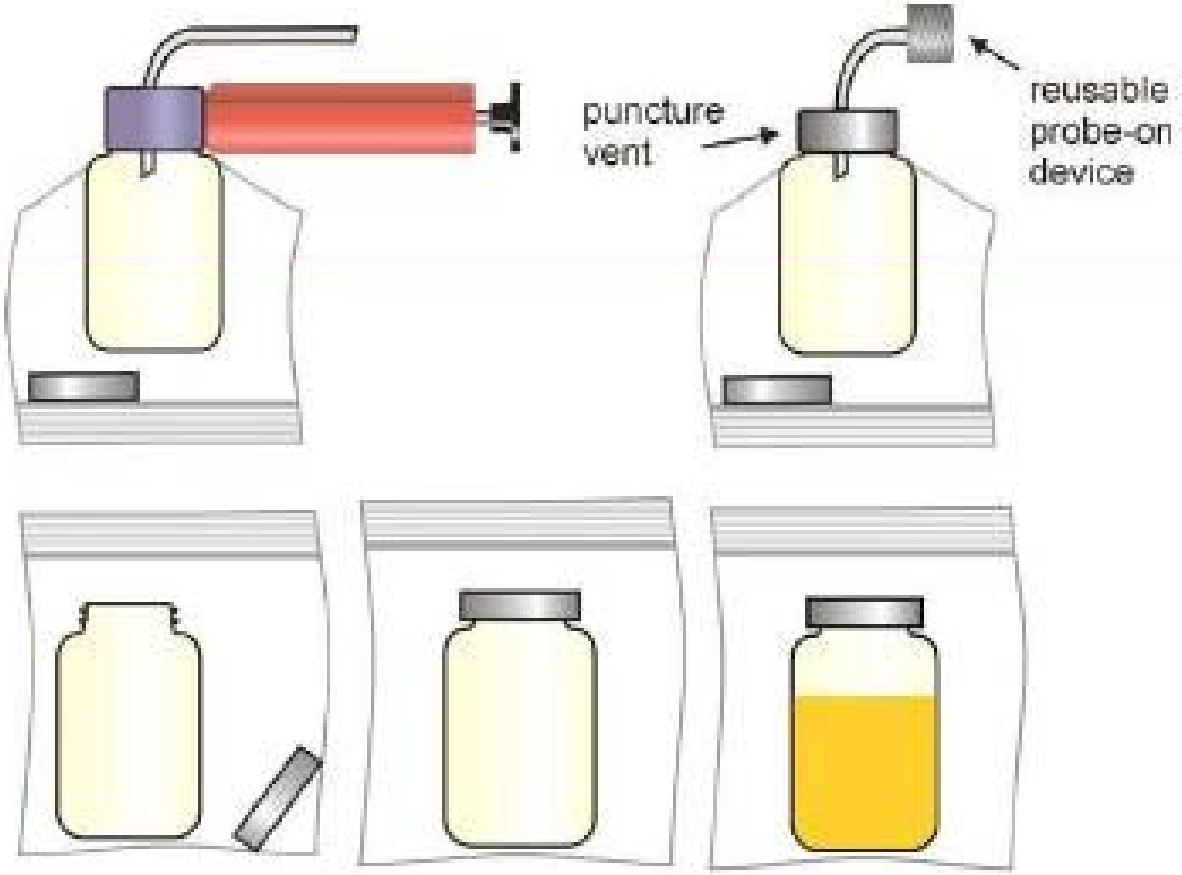
used alone, can fail to detect incipient conditions

*by **Jim Fitch** (Practicing Oil Analysis – Best Practices – July 1998)*

ANSWER:

The Ultra Clean Vacuum Device, or "U.C.V.D.", patented by Mecoil is the ideal device for easy and simple oil sampling procedures. The UCVD is hassles-free and avoids contamination, messes, or spilling. Thanks to this innovative vacuum patented technology, the procedure for obtaining a realistic sample is ready at your fingertips!

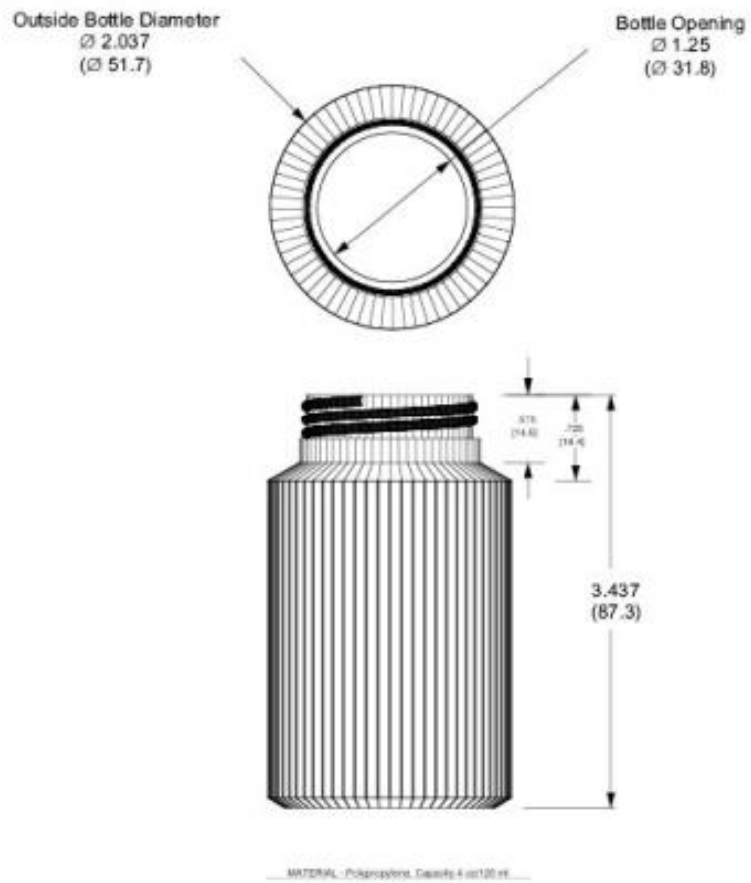
Current procedures for: "Clean Oil Sampling"



Currently, it is recommended to use a zip-lock sandwich bag and tools like a hand pump, in order to reduce the risk of cross-contamination.

Technical Requirements

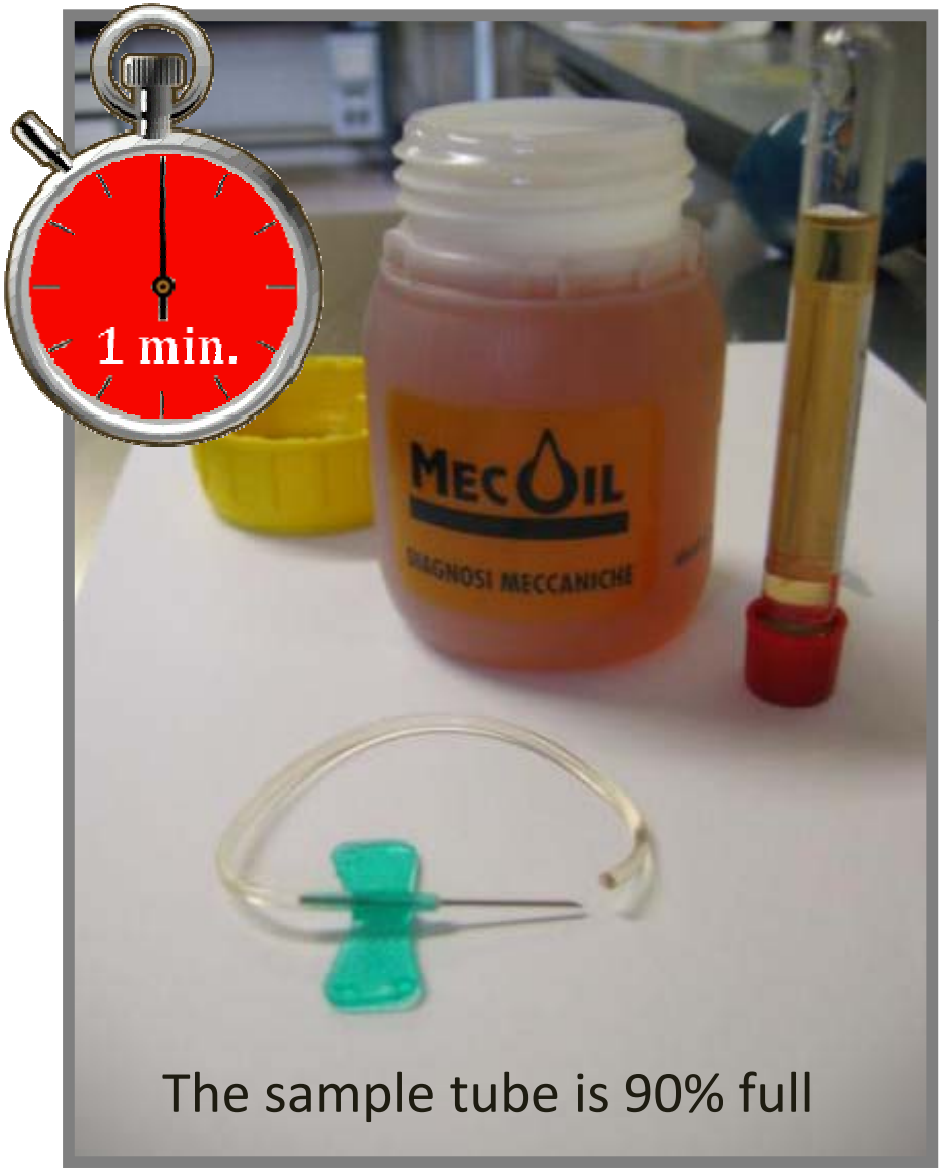
(Internationally approved standard vessel size)



The Bright Idea

Originated from the use of vacuum suction as a medical method for blood sampling

How does it work



U.C.V.D. – Ultra Clean Vacuum Device

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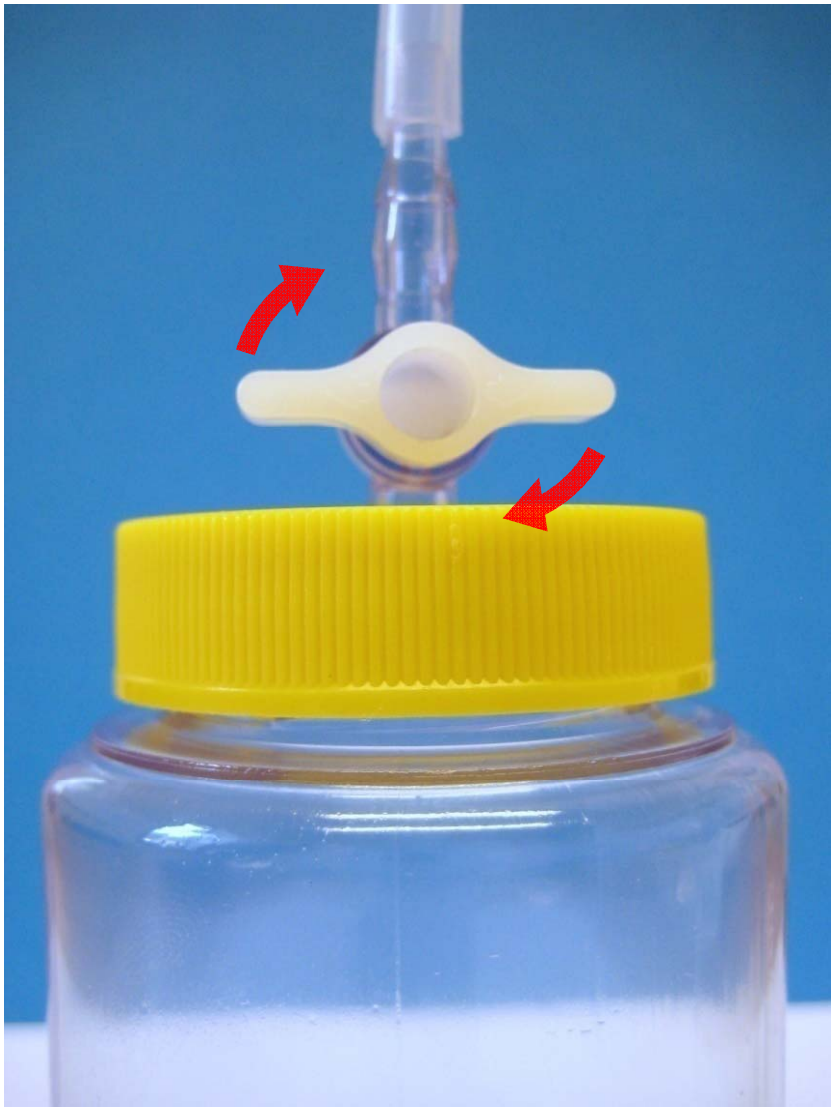
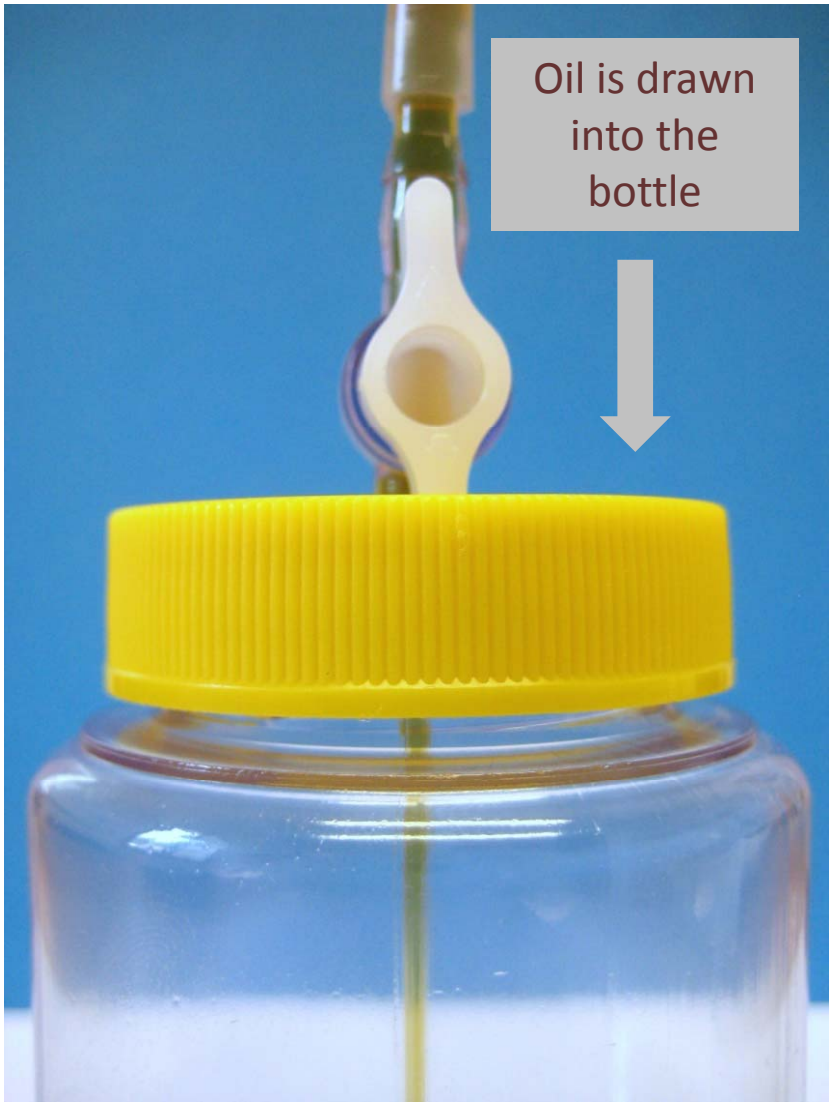




U.C.V.D. – Ultra Clean Vacuum Device

- PETG
- 100 ml capacity
- 85°C maximum operation temperature
- International Patent Pending
- Applicable to any viscosity range

U.C.V.D. – Customization

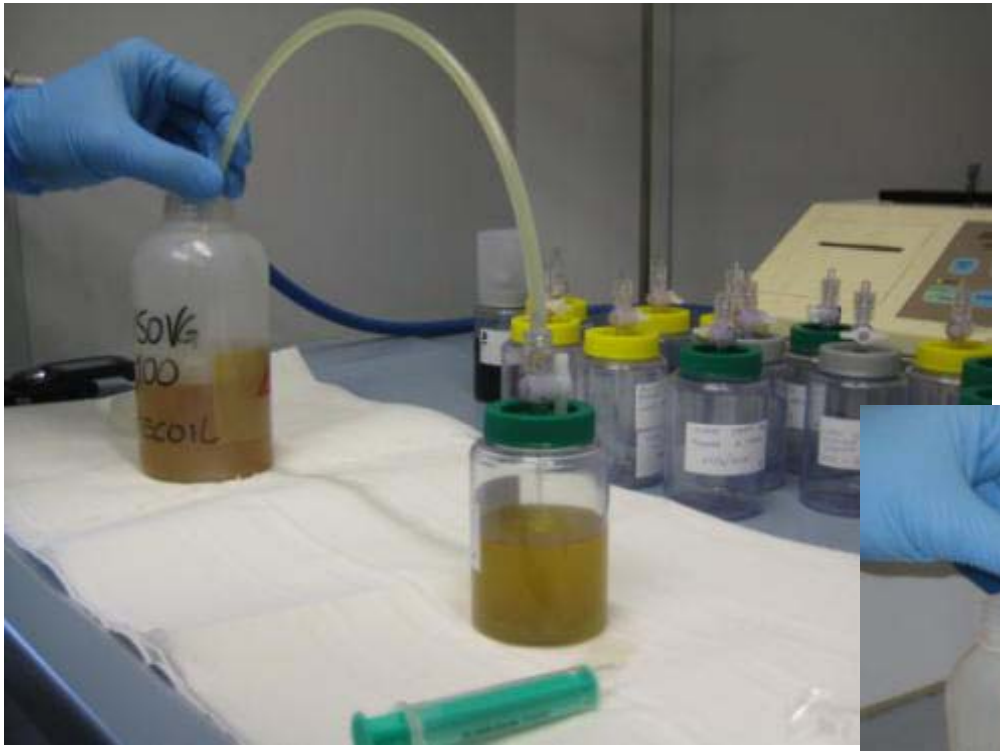
Two different bottle sizes and several cap colours to satisfy every customer's request.

Testing on U.C.V.D.

Several vessels are under extended testing with vacuum applied and monitored weekly

Sampling procedure; Suction test

Sampling procedure; Suction test



Test with 10%
vacuum (-0.9 bar)

U.C.V.D. is
(90%) almost full

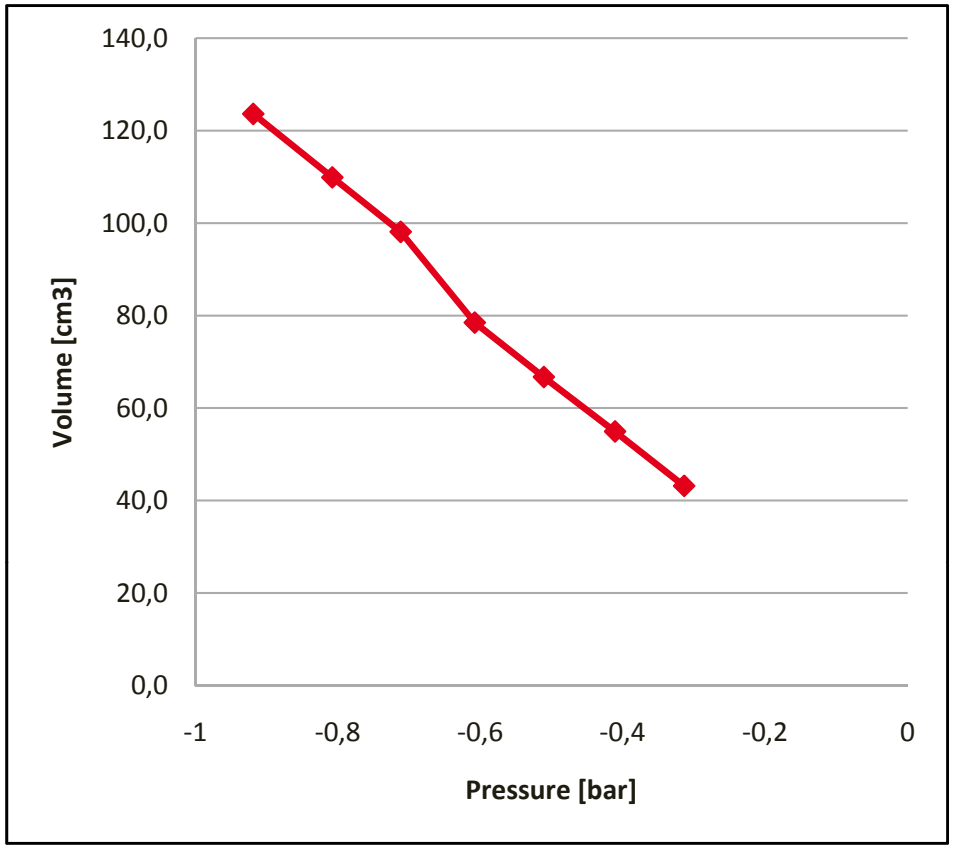
Suction Test: Results

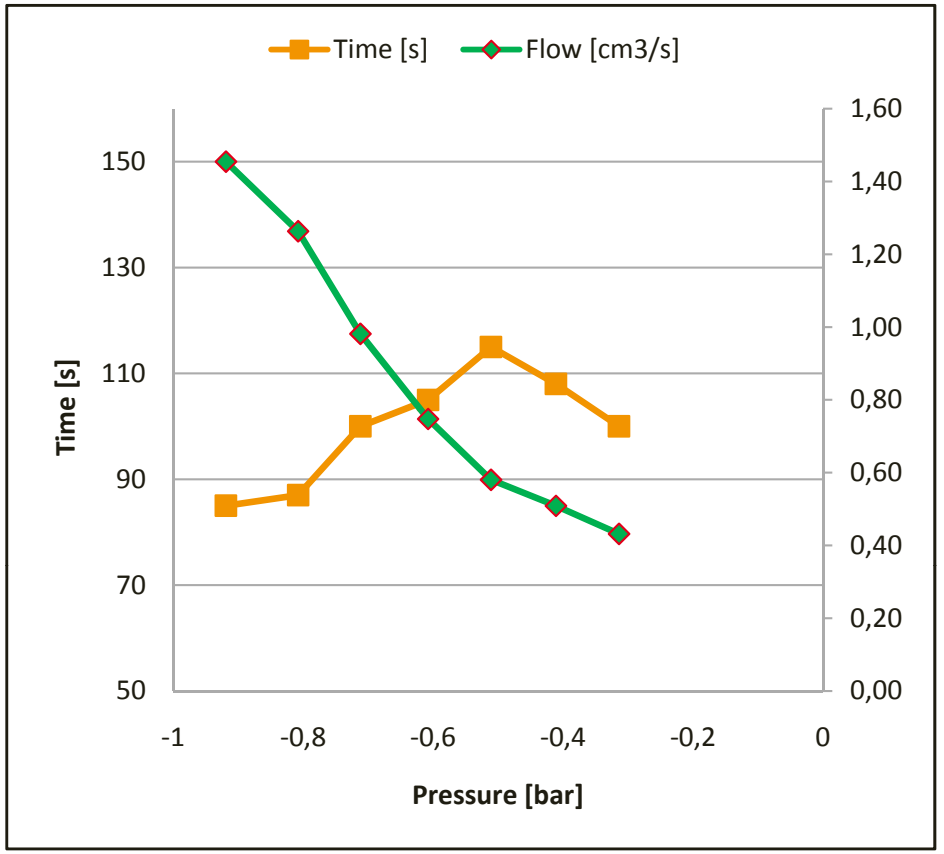
Viscosity grade: ISO VG 100
Room Temp.: 19°C
r.h.: 36%
Tubing length: 50 cm

Testing how the vacuum level can influence the amount (cm^3) and flow rate (cm^3/s) of the oil drawn.

n°	Pressure [bar]	Volume [cm^3]	Time [s]	Flow [cm^3/s]
1	-0,919	123,6	85	1,45
2	-0,808	109,9	87	1,26
3	-0,712	98,1	100	0,98
4	-0,608	78,5	105	0,75
5	-0,511	66,7	115	0,58
6	-0,411	55,0	108	0,51
7	-0,314	43,2	100	0,43

Suction Test: Summary





A linear trend is observed for the amount of fluid and time (flow rate) depending on the applied vacuum.

Time vs. Viscosity

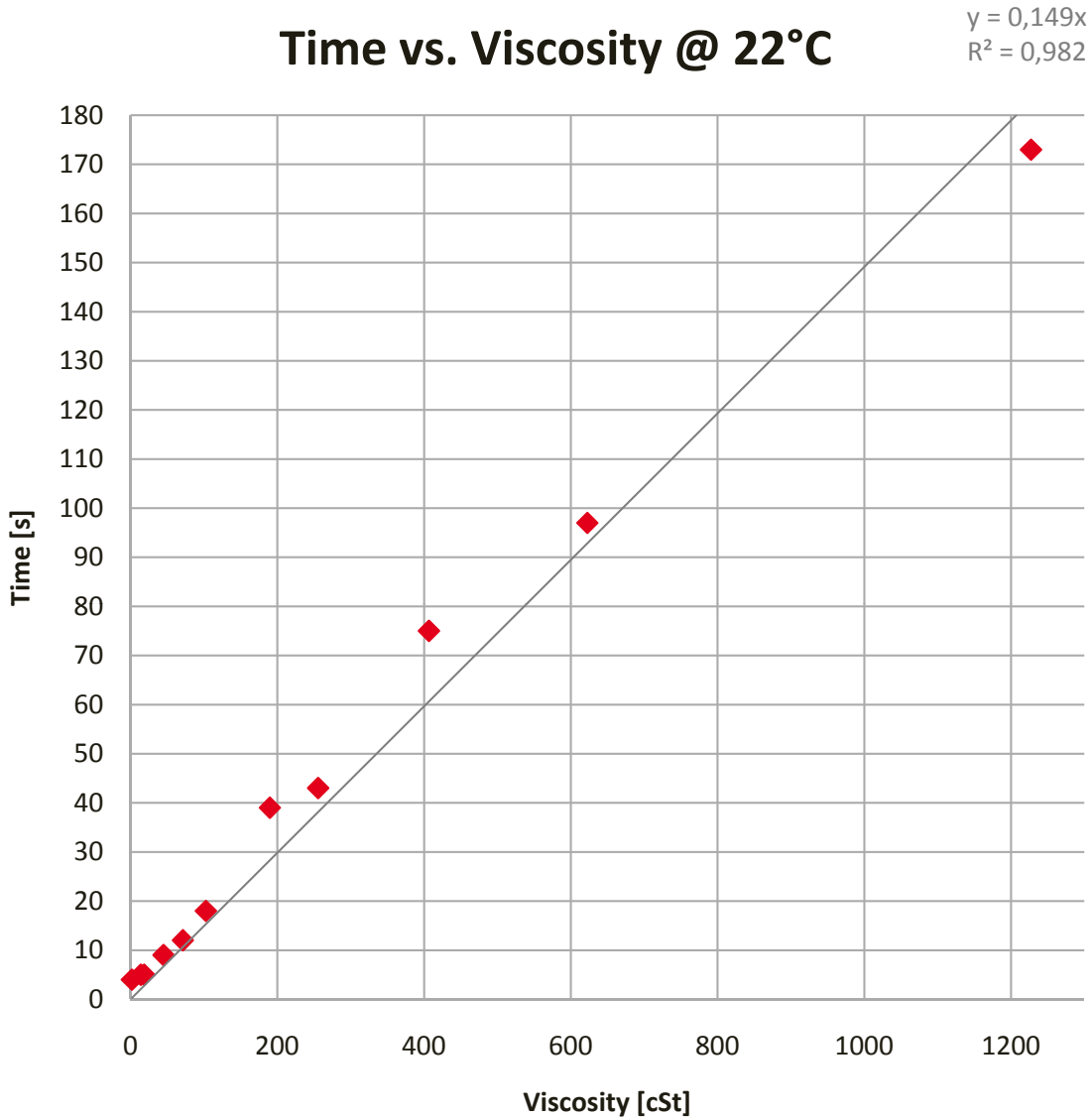
Measuring time requested to draw 100 ml of oil at a given temperature for different ISO VG.

Time vs. Viscosity

Room Temp.: 21°C
R.h.: 46%
Tubing length: 50 cm
Quantity: 100 ml

n°	Oil	V@15°C	V@40°C	V@100°C	Bottle Weight	Bottle Vacuum	Vacuum Weight	Oil Temperature	V@ Oil Temp.	Time
		cSt	cSt	cSt	g	g	-g	°C	cSt	s
1	Light Fuel	18,22	7,88	#	29,749	29,551	0,198	22	14,0	5
2	Gasoline	2,1	1,39	#	29,826	29,623	0,203	22	1,8	4
3	ISO VG 10	#	9,72	2,56	29,835	29,643	0,192	22	18,5	5
4	ISO VG 22	#	20,51	4,13	29,866	29,660	0,206	22	44,9	9
5	ISO VG 32	#	30,71	5,48	29,836	29,621	0,215	22	71,2	12
6	ISO VG 46	#	42,59	6,96	29,722	29,517	0,205	22	102,7	18
7	ISO VG 68	#	67,97	8,6	29,848	29,626	0,222	22	189,8	39
8	ISO VG 100	#	88,46	10,35	29,672	29,461	0,211	22	255,6	43
9	ISO VG 150	#	131,37	13,33	29,724	29,519	0,205	22	406,7	75
10	ISO VG 220	#	191,91	17,42	29,751	29,536	0,215	22	622,5	97
11	ISO VG 320	#	333,55	23,71	29,883	29,629	0,254	22	1227,4	173

Time vs. Viscosity



ISO VG cSt	Time @40°C s
10	<2
22	3
32	5
46	7
68	10
100	15
150	22
220	33
320	48
460	69

Draw time is due only to viscosity

Time = 0.15 x Viscosity

Accelerated leakage test

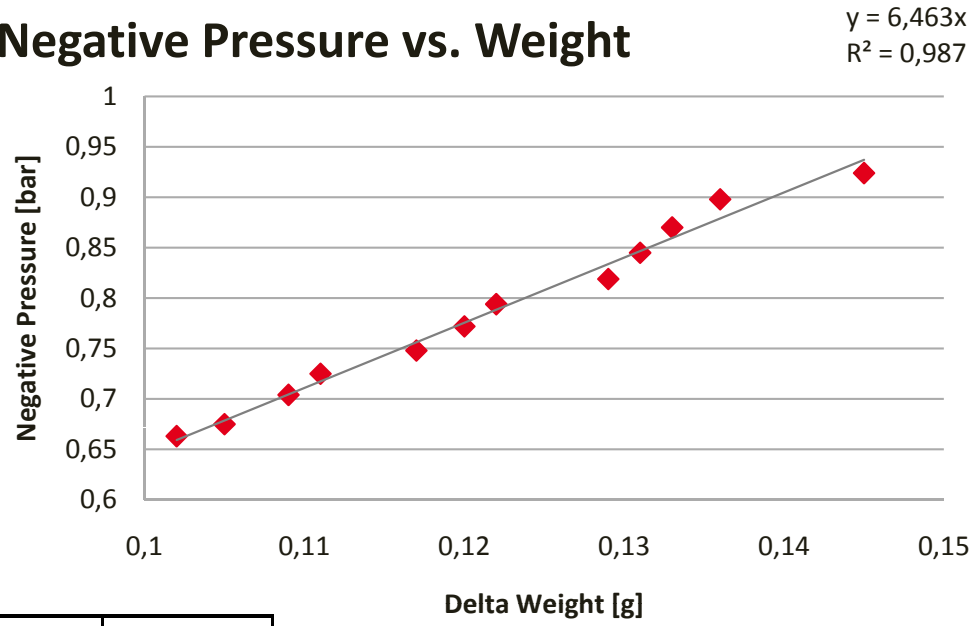
Under stress, pressure >1,5 bar, to check the leakage point

n°	Ext. Press. bar	Initial Press. bar	Time day	Finish Press. bar
1	1,5	-0,94	2	-0,93
2	1,5	-0,94	10	-0.93

Weight & Pressure Correlation

Bottle average weight: 29.599 g

Bottle & Vacuum [g]	Pressure [-bar]	Delta Weight [g]
29,454	0,924	0,145
29,463	0,898	0,136
29,466	0,87	0,133
29,468	0,845	0,131
29,47	0,819	0,129
29,477	0,794	0,122
29,479	0,772	0,12
29,482	0,748	0,117
29,488	0,725	0,111
29,49	0,704	0,109
29,494	0,675	0,105
29,497	0,663	0,102



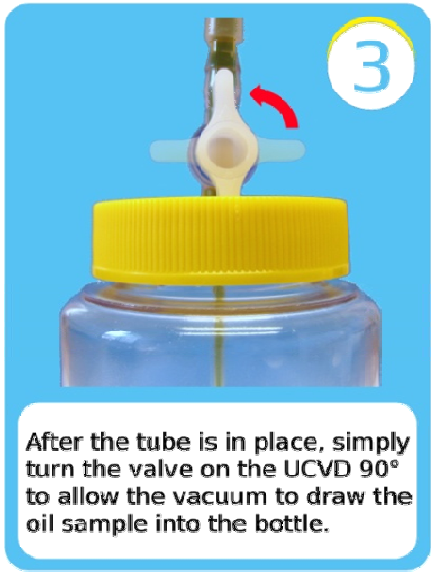
Peso [g]	Press. [bar]
0,001	0,006
0,002	0,013
0,003	0,019
0,004	0,026
0,005	0,032
0,006	0,039
0,007	0,045
0,008	0,052
0,009	0,058
0,01	0,065

Negative Pressure Level = 6.463*ΔWeight

How use the Ultra Clean Vacuum Device

Insert the plastic tubing into the sampling port so that the end of the tube reaches a midpoint within the oil.

Remove the safety cap and connect the other end of the plastic tubing to the nozzle at the top of the UCVD.



After the tube is in place, simply turn the valve on the UCVD 90° to allow the vacuum to draw the oil sample into the bottle.

With high viscosities, oil sampling could take a couple minutes to draw. You can leave the bottle sitting in any position, even upside down.

As the oil reaches 80% capacity, pull the tubing from the oil in the sampling port and allow the remaining oil in the tube to be drawn into the bottle.

Once the UCVD has cleared the remaining oil in the tubing, close the valve by turning it 90°, then remove the tube and reattach the safety cap.

Why this the Right Choice

- QUICK drawn any practical viscosity in seconds.
- EASY hands-free sampling, no other device is required.
- CLEAN pre-charged vacuum allows a high cleanliness level.
- SURE no possible cross-contamination.
- SAFE no oil spills, leaks, keeps oil away from the user and the environment.