Laboratory Analysis Service

Par-Test™

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Changes to ISO Standards

The impact on filter performance reporting and the contamination code.

The recent changes to ISO contamination and filtration standards were brought about to solve accuracy, tracability, and availability issues. It is important to remember that both real world hydraulic system cleanliness levels and actual system filter performance remain unchanged.

However, the reporting of cleanliness levels and filter performance has changed due to the new particle counter calibration and multi-pass test procedures.

The new calibration method.

ISO 11171 is the new particle counter calibration method and utilises calibration fluid made from ISO Medium Test Dust (ISO MTD) suspended in MIL-H-5606. The calibration fluid is traceable to the National Institute of Standards and Technology (NIST) and is designated by NIST as Standard Reference Material (SRM) 2806. ISO 11171 is replacing ISO 4402 which is based on obsolete AC Fine Test Dust (ACFTD)

It is important to note that the ISO 11171 calibration method is based on a distribution of particles measured by their equivalent area diameter, whereas ISO 4402 is based on distribution of particles measured by their longest chord. Also, the NIST work utilised scanning electron microscopy for particles below 10µm in size, whereas sizing distribution on ACFTD utilised optical microscopy.

The charts to the right show the approximate particle size relationship between the calibration methods.

Chart 1 - ISO Comparison

Former two-digit ISO 4406:1987 5µm / 15µm 14 / 11
Former three-digit ISO 4406:1987 2µm / 5µm / 15µm 17 / 14 / 11
New three-digit ISO 4406:1999 4µm (c) / 6µm (c) / 14µm (c) 18 / 14 / 11

Chart 2 - Particle Size Comparison

ACTFD size (per ISO 4402:1991) µm	NIST size (per ISO 11171:1999) µm (c)
1	4.2
2	4.6
3	5.1
5	6.4
7	7.7
10	9.8
15	13.6
20	17.5
25	21.2
30	24.9
40	31.7

Laboratory Analysis Service

The Par-Test service is a complete laboratory analysis performed on a small quantity of fluid supplied by the customer.

Provision of a sampling bottle of known cleanliness and a pre-addressed bottle container, both of which are designed to be suitable for mailing, is part of the service.

Most contaminant in hydraulic or lube oil systems are invisible

Damage causing particles range from 5 to 40 micrometers in size, but the limit of human visibility is only 40 micrometers. Harmful particulate matter is often invisible, even in very high concentration. Also, acids, water and other fluid oxidation by-products cannot be easily detected by human senses. Some other means must be used to monitor fluid conditions.

Fluid analysis is the only method to check fluid conditions

Fluid analysis services may be as simple as a sample batch comparison. Or, a full laboratory treatment may be used to indicate the sources and quantity of contamination. In either case, important test results are achieved. Parker offers both types of services to fit your specific needs.

Par-Test: complete laboratory analysis

Par-Test is a complete laboratory analysis, performed on a small quantity of fluid. The test results are very comprehensive, and can include the following critical analysis:

- Spectrochemical analysis of over 20 wear metals and additives.
- Particle count reported over five size ranges. The particle count is expressed as an ISO cleanliness code. It is also plotted on a graph for better comparisons.
- Viscosity at 40°C is reported in centistokes.
- Water content is expressed as a % of volume. Many hydraulic systems may tolerate up to 300 ppm (.03%) of water contamination. Some bearing or lube oil systems must strictly limit water content.
- Analysis recommendations summarises Par-Test results and indicates what action should be taken to prevent any potential problems.
- Fast turnaround—test results are mailed back to you within 24-48 hours after receiving your fluid sample.

Par-Test: concise and complete

The Par-Test report you receive is neatly organised. You may quickly analyse the test results — or compare them to a previous sample. Using the same “unit number” on your sample information form will allow up to four test results listed on a single Par-Test report form. Par-Test belongs in your regular maintenance program. Comprehensive and accurate fluid analysis will help you prevent major hydraulic or lube oil system problems. Order Par-Test today (see below details) and see how easy and complete—fluid analysis can be.

Ordering Information

Par-Test: laboratory fluid analysis

The purchase price for the Par-Test sample kit includes the pre-cleaned and sealed sample bottle, mailing tube with a pre-addressed label, sample information data sheet to be completely filled out by the end user and the complete laboratory analysis.

IMPORTANT
Parker Filtration has three European laboratory locations able to receive and process fluid samples. One location in the UK, one location in The Netherlands taking care of Central European analysis and a location in Finland to provide Scandinavian analysis. Decide on the Option required and contact the relevant Parker location.

Par-Test laboratory analysis service
- UK (Email: filtrationinfo@parker.com) (option 2 only)
- Holland (Email: filtration.netherlands@parker.com) (all options)
- Finland (Email: filtration.finland@parker.com) (all options)

Option	Description
Option 1	Sample bottle plus particle/membrane/water/microscopic photo analysis
Option 2	Sample bottle plus particle/water/spectro-chemical analysis
Option 3	Sample bottle plus membrane/water/microscopic photo analysis
Option 4	Sample bottle plus particle/membrane/water/spectro-chemical/microscopic photo analysis

Note: Please allow 24-48 hours of laboratory time plus mailing/shipping time to receive your test results.

Par-Test™ Charts

PAR :TEST Fluid Analysis

PARKER NO.	CLIENT NO.	UNIT NO.
1000.	27	4714

OTHER 295

LOCATION **RETURN**

FILTER MANUF **PARKER**

PUMP MODEL **LINE TRUCK**

FLUID MANUF

FLUID TYPE

NUMBER COPIES 2

TYPE NUMBER 2

MICRON RATING **10NOM**

SAMPLE DATA / SPECTROCHEMICAL ANALYSIS

VALUES EXPRESSED IN PARTS MILLION (PPM) BY WEIGHT

LAB#	DATE TAKEN/ TESTEN	DATE FILTER SERVICE	IRON	CHROMIUM	LEAD	COPPER	TIN	ALUMINIUM	NICKEL	SILVER	MANGANESE	SILICON	BORON	SODIUM	MAGNESIUM	CALCIUM	BARIUM	PHOSPHORUS	ZINC	MOLYBDENUM	TITANIUM	VANADIUM	CADMIUM
9261	30JUN89		3	0	0	2	0	0	0	0	0	9	0	0	2	29	29	1339	233	0	0	0	0
	02JUL89																						
9262	28JUL89		2	0	0	2	0	0	0	0	0	9	0	0	4	24	25	156	244	0	0	0	0
	30JUL89																						
9263	20AUG89		1	1	0	1	0	0	0	0	0	7	0	0	1	29	24	133	207	0	0	0	0
	22AUG89																						

PHYSICAL PROPERTY DATA

VIS 40°C (VIS 104 °F)	VIS 100°C (VIS 212 °F)	WATER 100% Vol
32.7	N/A	0
32.8	N/A	0
32.3	N/A	0

ANALYSIS RECOMMENDATIONS

LAB#	ISO	RATING
9261	20/	17
9262	19/	14
9263	16/	12

PARTICLES PER 100 MILLILITER GREATER THAN INDICATED SIZE

>5	>15	>25	>50	>100
667,488	67,608	15,440	872	88
315,466	12,052	2,496	296	8
41,758	2,280	664	112	16

LAB# ANALYSIS RECOMMENDATIONS

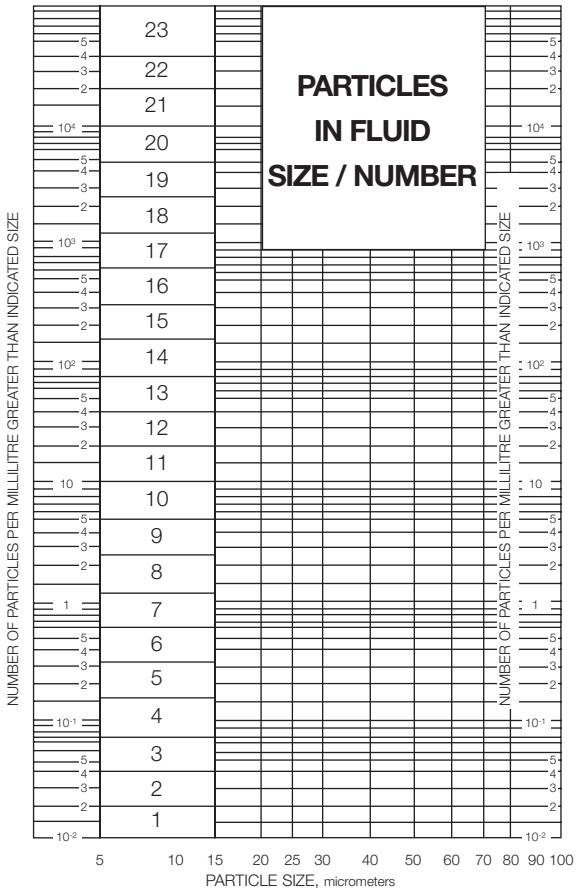
9261 EXTREME LEVELS OF CONTAMINATION INDICATE POSSIBLE WEAR PROBLEMS. HIGHER PRESSURE SYSTEMS(.1500 PSI) SHOULD RECEIVE IMMEDIATE FILTRATION ATTENTION. SAMPLE AGAIN WITHIN 30 DAYS

LAB# ANALYSIS RECOMMENDATIONS

9262 EXTREME LEVEL OF CONTAMINATION INDICATE POSSIBLE WEAR PROBLEMS. HIGHER PRESSURE SYSTEMS (>1500 PSI) SHOULD RECEIVE IMMEDIATE FILTRATION ATTENTION. SAMPLE AGAIN WITHIN 30 DAYS

9263 CLEANLINESS LEVEL SUITABLE FOR MOST SYSTEMS. SERVO CONTROLS REQUIRE CLEANER FLUID. CONTINUE REGULAR PREVENTIVE MAINTENANCE. SAMPLE AGAIN IN 2 - 3 MONTHS.

Since remedial advice is based on test results provided by others, and since corrective action, if any is performed by others, remedial advice is rendered without warranty or liability of any kind.



Viscosity Conversion Chart

cSt (centistrokes)	SUS (Saybolt Universal Seconds)
10	46
20	93
25	116
30	139
32.4	150
40	185
50	232
70	324
90	417

Comparisons are made at 100ºF (38ºC).
for other Viscosity Conversion Approximations, use the formula: $cSt = \frac{SUS}{4.635}$

Cleanliness Level Correlation Table

ISO Code	Particles/Millilitre ≥ 5 Micrometers	≥ 15 Micrometers	ACFTD Gravimetric Level, mg/L	NAS 1638 (1964)	Disavowed "SAE" Level (1963)
26/23	640,000	80,000	1000		
25/23	320,000	80,000			
23/20	80,000	10,000	100		
21/18	20,000	2,500		12	
20/18	10,000	2,500			
20/17	10,000	1,300		11	
20/16	10,000	640	10		
19/16	5,000	640	10		
18/15	2,500	320		9	6
17/14	1,300	160		8	5
16/13	640	80	1	7	4
15/12	320	40		6	3
14/12	160	20		5	2
14/11	160	20		5	2
13/10	80	10	0.1	4	1
12/9	40	5		3	0
11/8	20	2.5		2	
10/8	10	2.5			
10/7	10	1.3		1	
10/6	10	.64	0.01		

For more information: Contact Parker Filtration's Condition Monitoring Centre: Tel: +44 (0) 1842 763299.
Fax: +44 (0) 1842 756300. Email: conmoninfo@parker.com