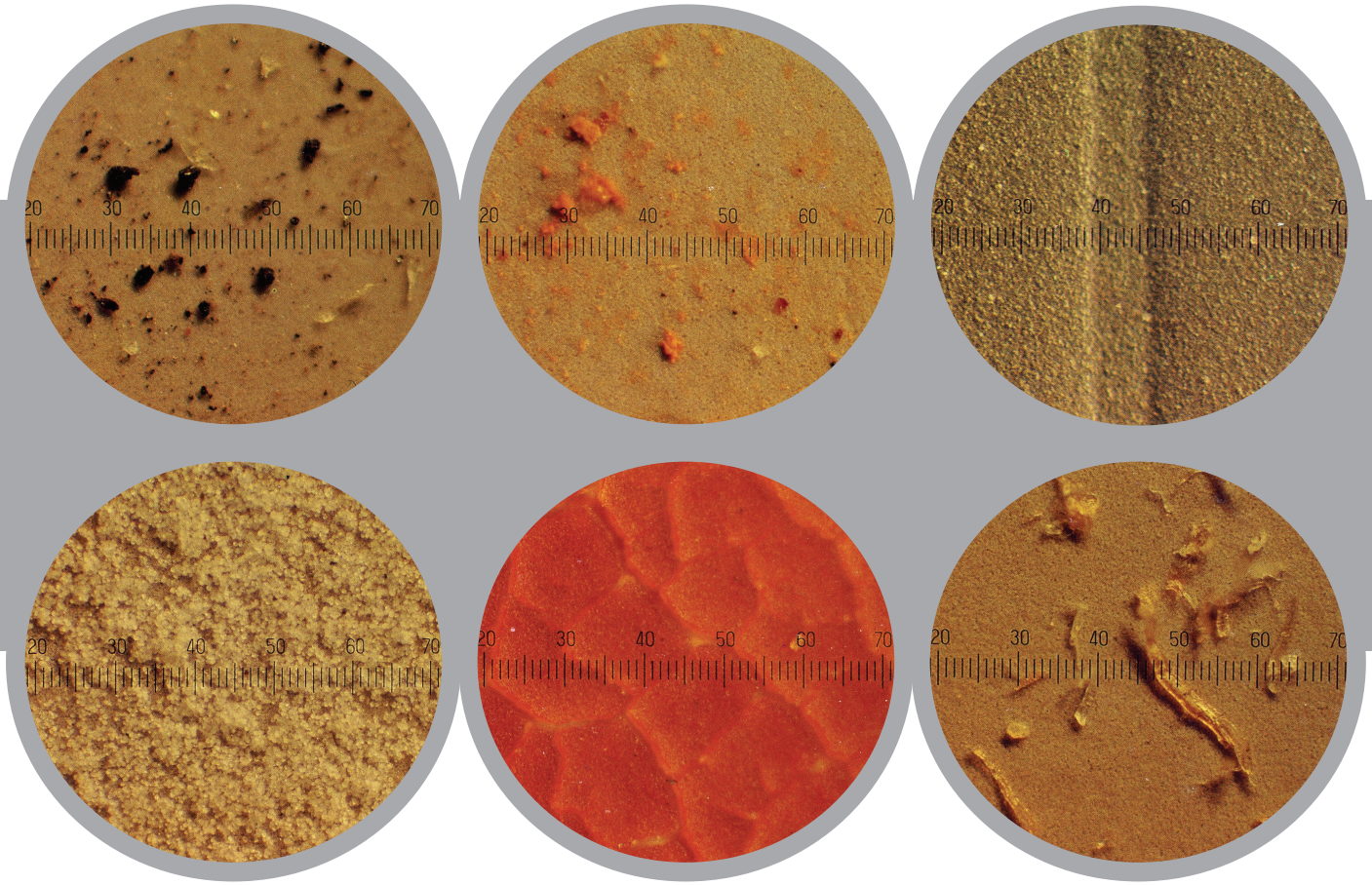
Filtertechnik

Contamination Reference Handbook



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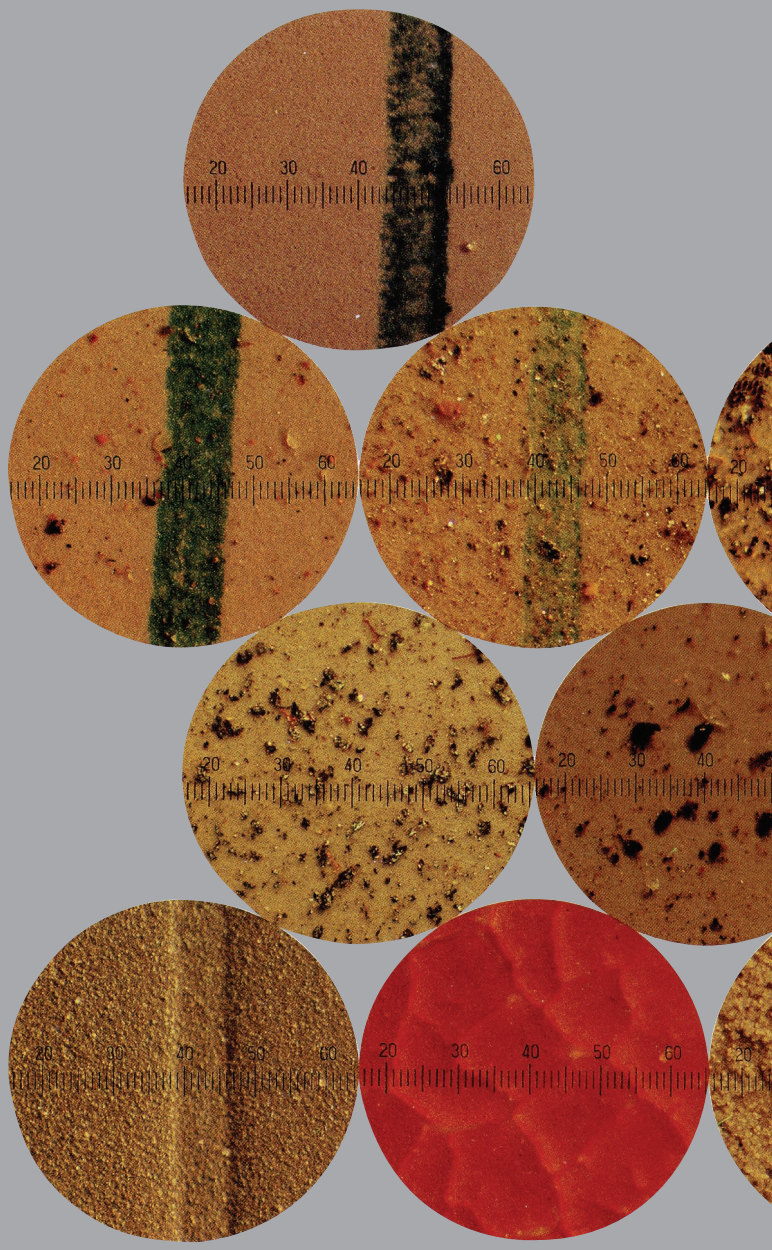
Contents

Introduction.....1

Contamination Level Comparisons.....2-12

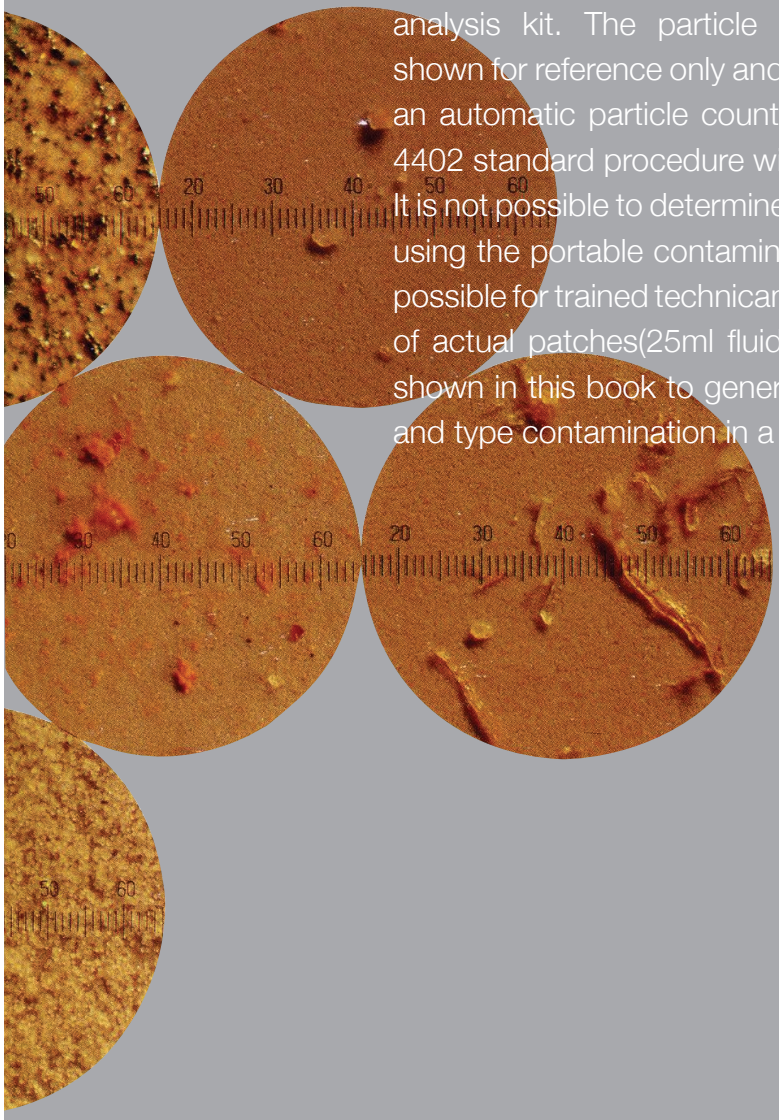
Types of Contamination.....13-16

Understanding the Cleanliness Code.....17



Introduction

The Portable Contamination Analysis Kit is a valuable tool for estimating the amount and type of solid contamination in hydraulic fluid or lubrication oil. The examples in this book were prepared using actual field samples and laboratory equipment similar to that in the porable contamination analysis kit. The particle count information is shown for reference only and was generated using an automatic particle counter calibrated per ISO 4402 standard procedure with AC FIne Test Dust. It is not possible to determine exact particle counts using the portable contamination analysis kit. It is possible for trained technicans to use comparisons of actual patches(25ml fluid volume) and thoese shown in this book to generally class the amount and type contamination in a fluid sample.



Cleanliness Code

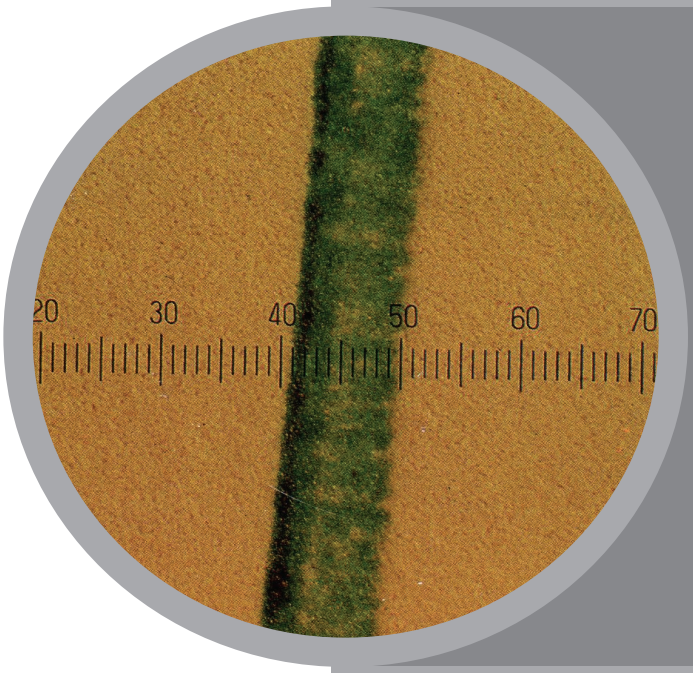


Photo Analysis

Clean membrane. No contamination present.

Magnification: 100x
Scale: 1 Division=14µm

BLANK

Particle count summary			
Particle size	No. of ML. greater than size	Particle count range	Range code

NOT EVALUATED

Cleanliness Code

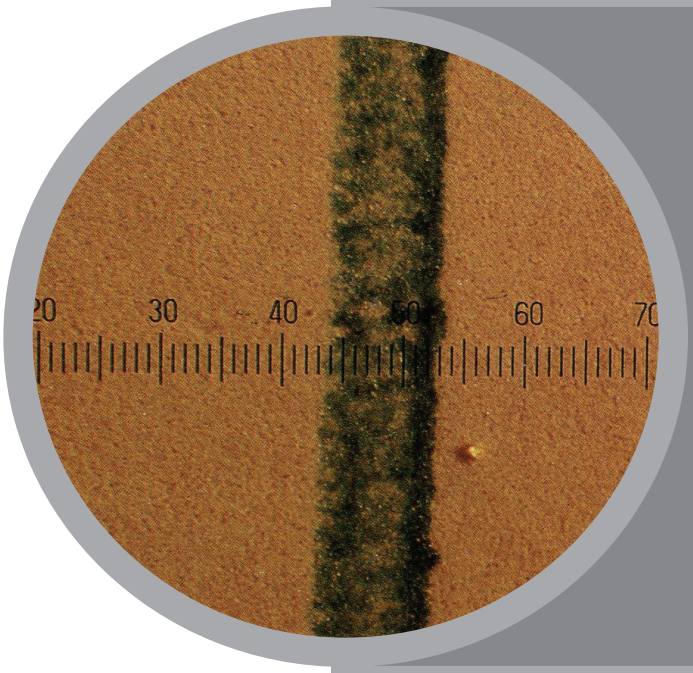


Photo Analysis

Very little contamination is present. The visible particle is silica.

Magnification: 100x
Fluid volume: 25ml
Scale: 1 Division=14µm

13/12/10

Particle count summary			
Particle size	No. of ML. greater than size	Particle count range	Range code
2µm	56	40-80	13
5µm	37	20-40	12
10µm	25		
15µm	7	5-10	10
25µm	3		

Cleanliness Code

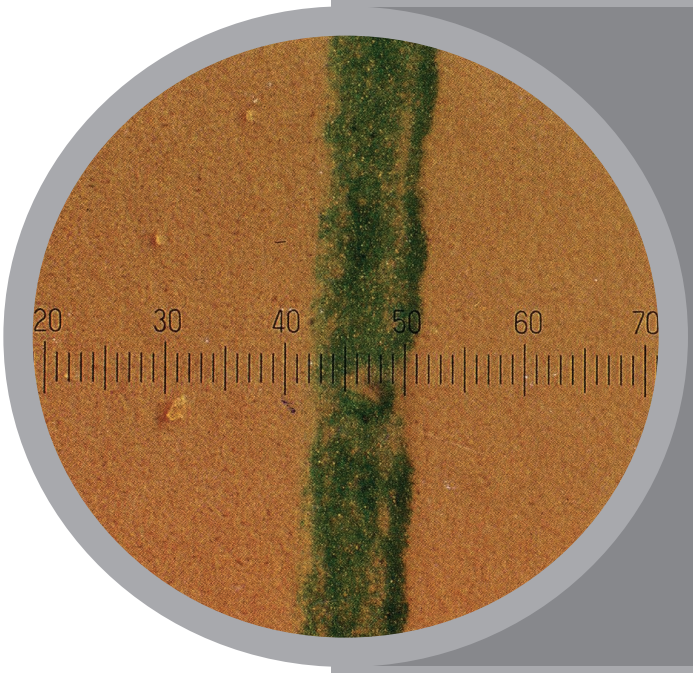


Photo Analysis

Visible contamination is silica.

Magnification: 100x
Fluid volume: 25ml
Scale: 1 Division=14µm

15/14/12

Particle count summary			
Particle size	No. of ML. greater than size	Particle count range	Range code
2µm	221	160-320	15
5µm	154	60-160	14
10µm	66		
15µm	33	20-40	12
25µm	10		

Cleanliness Code

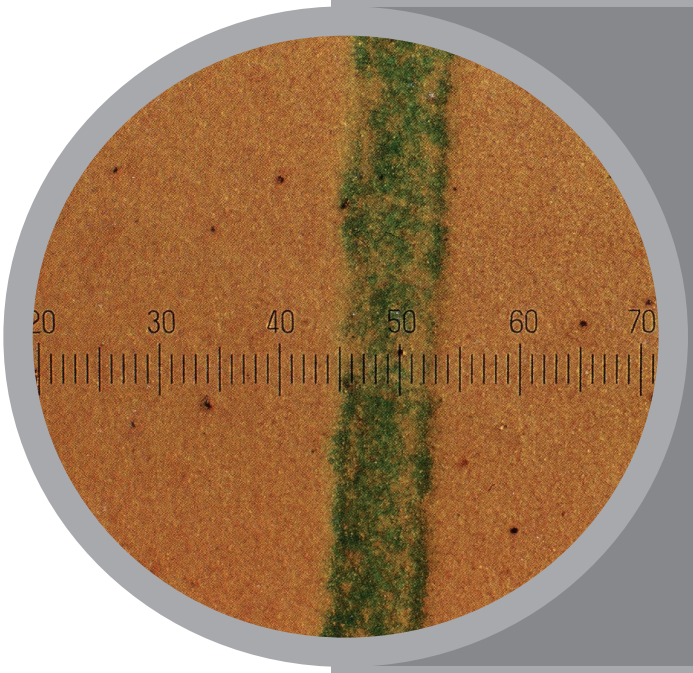


Photo Analysis

The visible contamination is mostly metallic with some silica particles

Magnification: 100x
Fluid volume: 25ml
Scale: 1 Division=14µm

16/15/13

Particle count summary			
Particle size	No. of ML. greater than size	Particle count range	Range code
2µm	587	320-640	16
5µm	222	160-320	15
10µm	104		
15µm	51	40-80	13
25µm	13		

Cleanliness Code

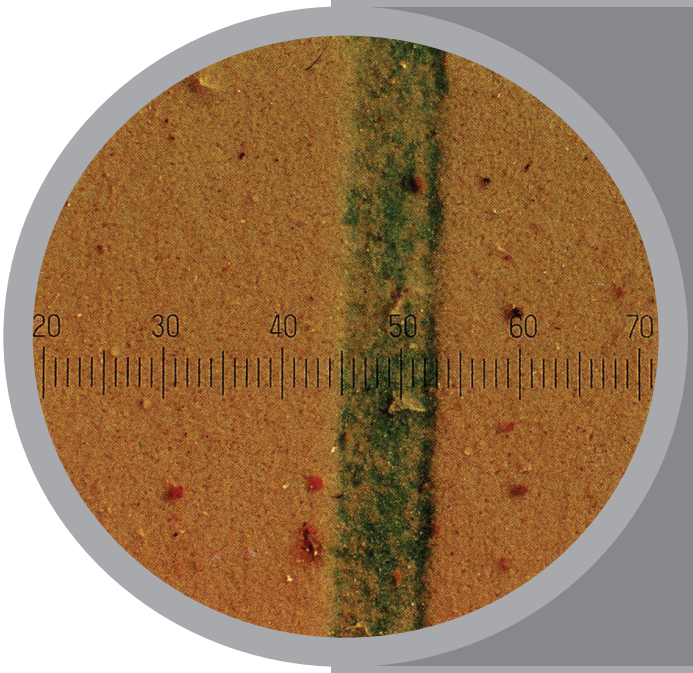


Photo Analysis

The visible contamination is mostly silica with some metallic and rust particles.

Magnification: 100x
Fluid volume: 25ml
Scale: 1 Division=14µm

18/16/14

Particle count summary			
Particle size	No. of ML. greater than size	Particle count range	Range code
2µm	1,978	1300-2500	18
5µm	396	320-640	16
10µm	230		
15µm	132	80-160	14
25µm	24		

Cleanliness Code

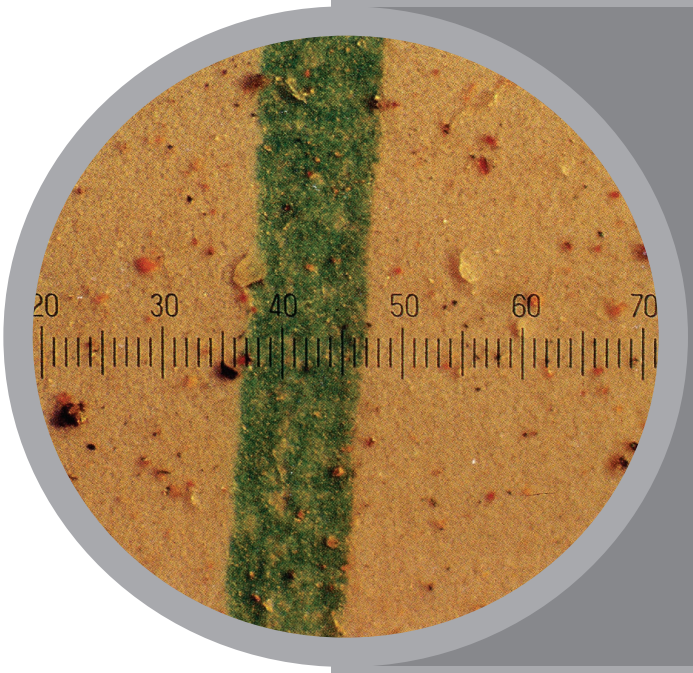


Photo Analysis

The visible contamination includes silica, metallic and rust particles.

Magnification: 100x
Fluid volume: 25ml
Scale: 1 Division=14µm

19/17/15

Particle count summary			
Particle size	No. of ML. greater than size	Particle count range	Range code
2µm	3,548	1300-2500	18
5µm	892	320-640	16
10µm	456		
15µm	233	80-160	14
25µm	46		

Cleanliness Code

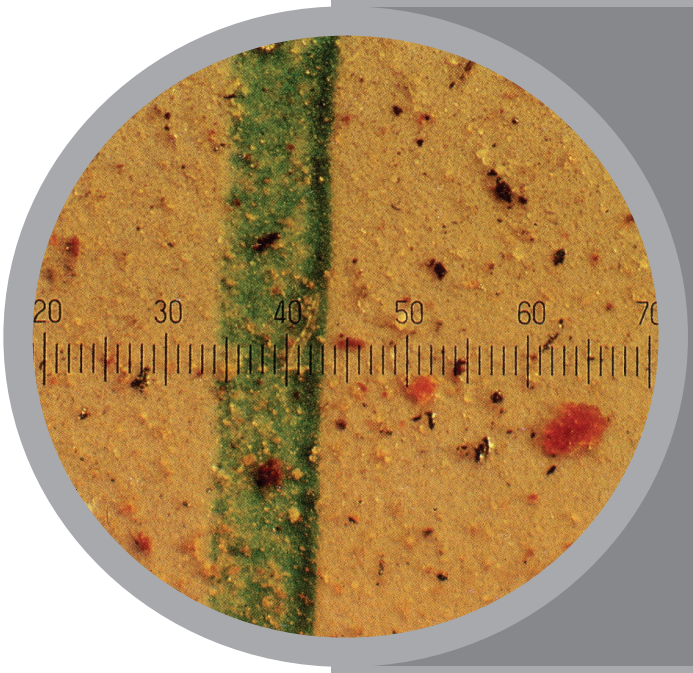


Photo Analysis

Contamination includes silica, metallic and rust particles.

Magnification: 100x
Fluid volume: 25ml
Scale: 1 Division=14µm

20/19/17

Particle count summary			
Particle size	No. of ML. greater than size	Particle count range	Range code
2µm	7,514	5,000-10,000	20
5µm	3,431	2,500-5,000	19
10µm	456		
15µm	233	640-1,300	17
25µm	46		

Cleanliness Code

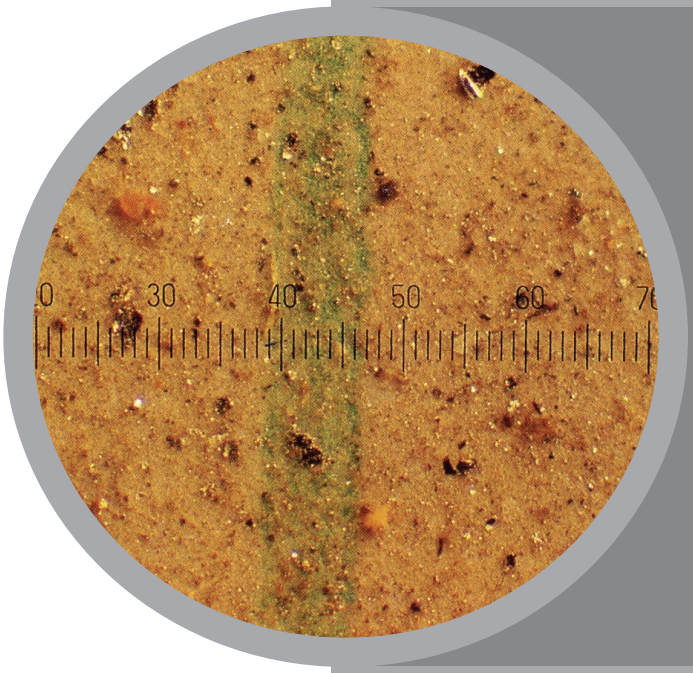


Photo Analysis

Contamination is mostly silica, with some metallic and rust particles. Also, a single fiber is visible.

Magnification: 100x
Fluid volume: 25ml
Scale: 1 Division=14µm

21/20/18

Particle count summary			
Particle size	No. of ML. greater than size	Particle count range	Range code
2µm	14,992	10,000-20,000	21
5µm	8,688	5,000-10,000	20
10µm	3,570		
15µm	1,950	1,300-2,500	18
25µm	437		

Cleanliness Code

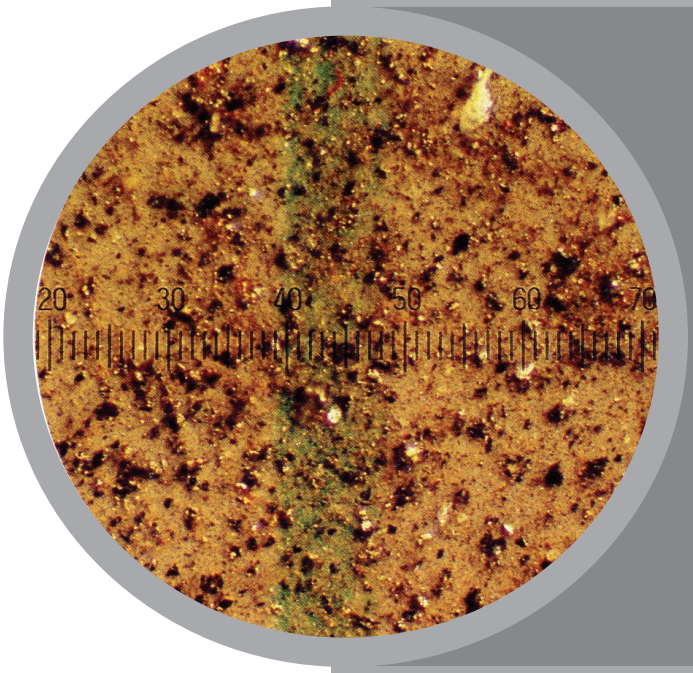


Photo Analysis

Contamination is mostly metallic, with some silica and a few rust particles.

Magnification: 100x
Fluid volume: 25ml
Scale: 1 Division=14µm

23/22/20

Particle count summary			
Particle size	No. of ML. greater than size	Particle count range	Range code
2µm	57,030	40,000-80,000	23
5µm	31,964	20,000-40,000	22
10µm	14,400		
15µm	8,109	5,000-10,000	20
25µm	811		

Cleanliness Code

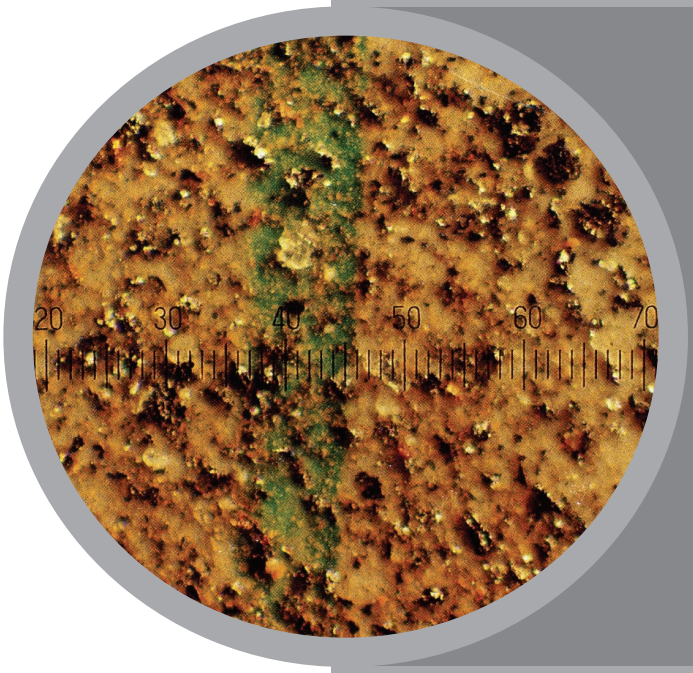


Photo Analysis

Contamination is mostly metallic, with some silica and a few rust particles.

Magnification: 100x
Fluid volume: 25ml
Scale: 1 Division=14µm

26/24/22

Particle count summary			
Particle size	No. of ML. greater than size	Particle count range	Range code
2µm	373,430	320,000-640,000	26
5µm	155,635	80,000-160,000	24
10µm	59,999		
15µm	31,090	20,000-40,000	22
25µm	1,160		

Cleanliness Code

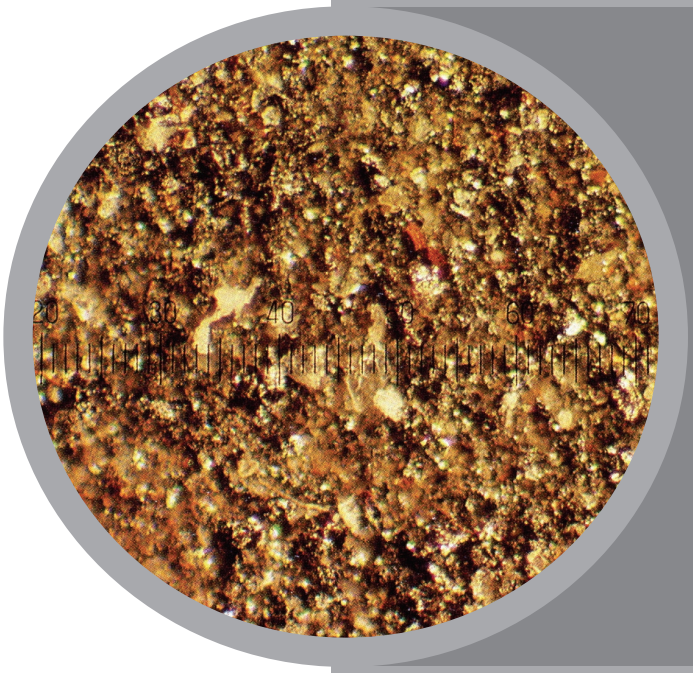


Photo Analysis

Sample is grossly contaminated with metallic, silica and some rust particles. The contamination level in the sample is too high to evaluate using the Portable Contamination Anaylsis Kit.

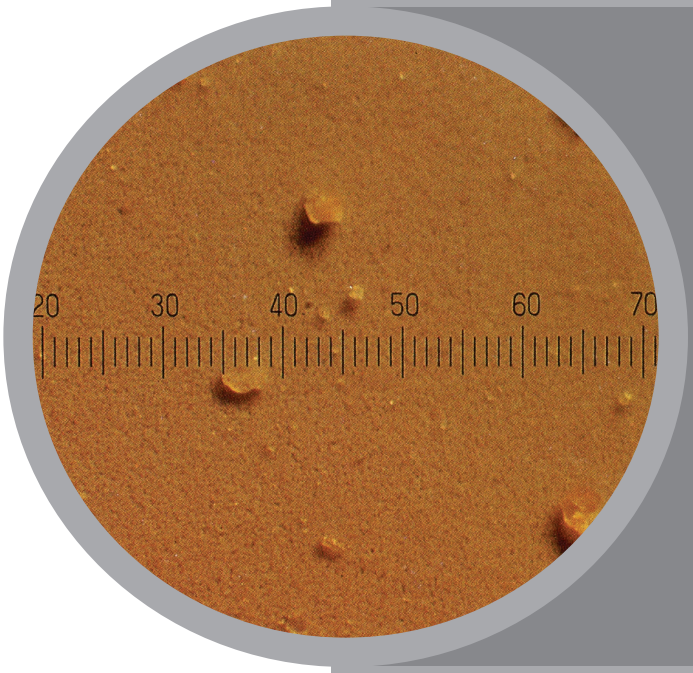
Magnification: 100x
Fluid volume: 25ml
Scale: 1 Division=14µm

TOO DIRTY TO EVALUATE

Particle count summary			
Particle size	No. of ML. greater than size	Particle count range	Range code

NOT EVALUATED

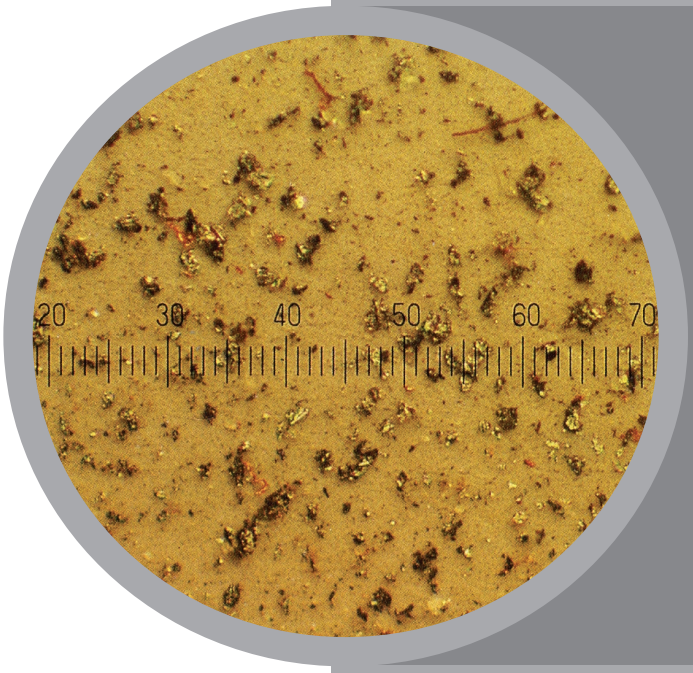
Types of Contamination



Silica

Hard, translucent particles often associated with atmospheric and environmental contamination e.g. sand, dust.

Magnification: 100x
Scale: 1 Division=14µm

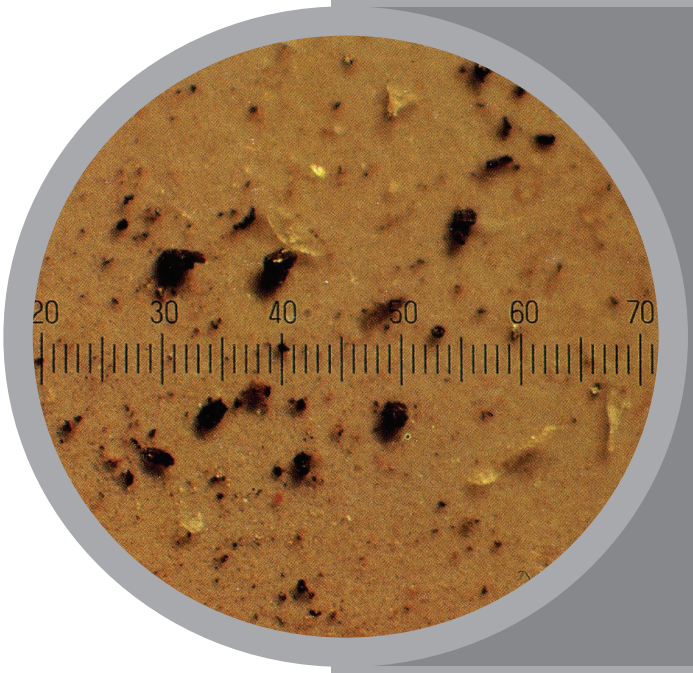


Bright Metal

Shiny metallic particles, usually silver or gold in colour, generated within the system. Generated contaminants are products of wear and often cause additional component wear and accelerated fluid breakdown.

Magnification: 100x
Scale: 1 Division=14µm

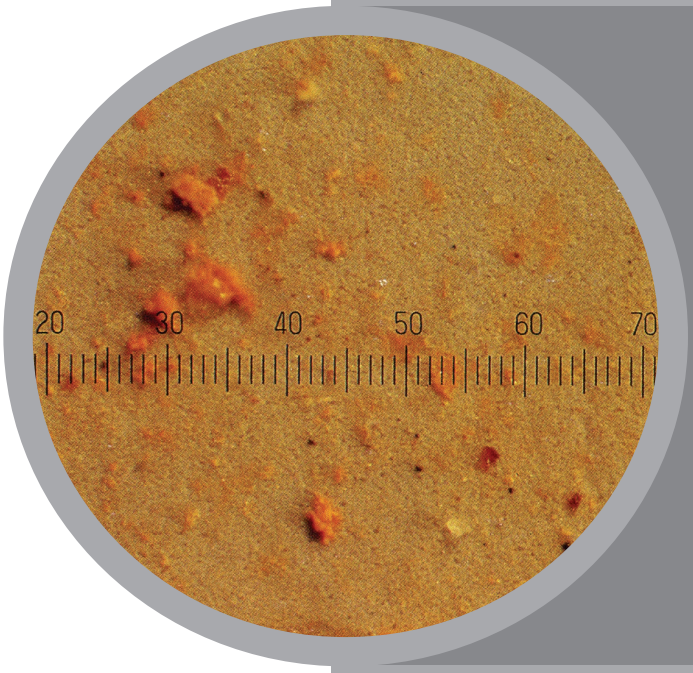
Types of Contamination



Black Metal

Oxidized ferrous metal inherent in most hydraulic and lubricatin systems; built-in contaminant and generated within the system by wear.

Magnification: 100x
Scale: 1 Division=14µm

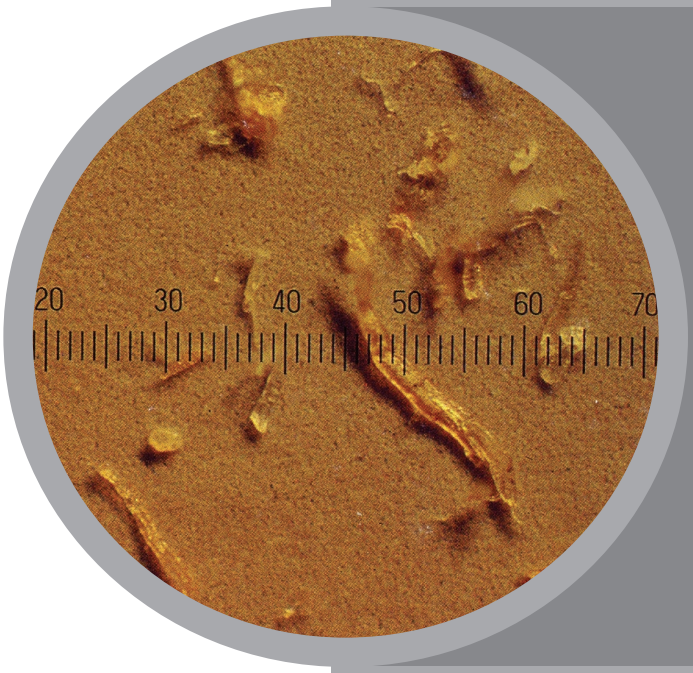


Rust

Dull orange/brown particles often seen in oil from sytems where water may be present, e.g. oil storage tanks

Magnification: 100x
Scale: 1 Division=14µm

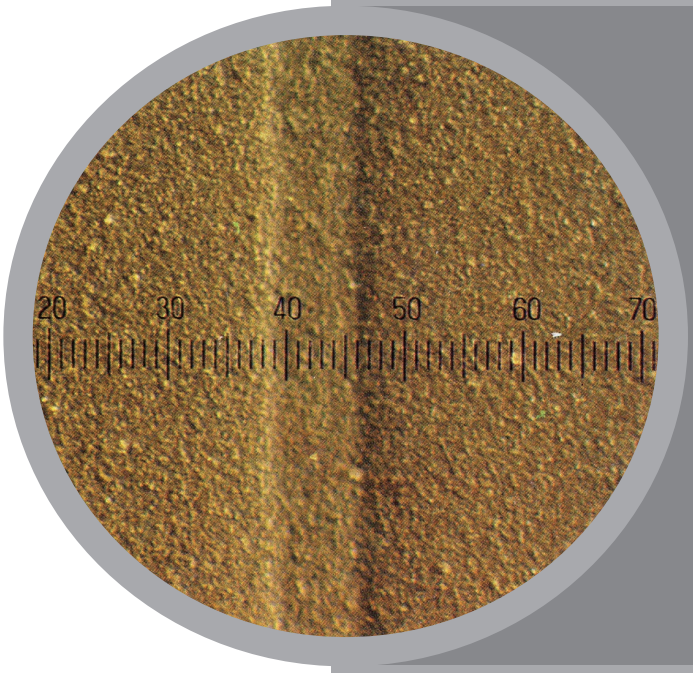
Types of Contamination



Fibers

Contaminants most commonly generate from paper and fabrics e.g. shop rags.

Magnification: 100x
Scale: 1 Division=14µm

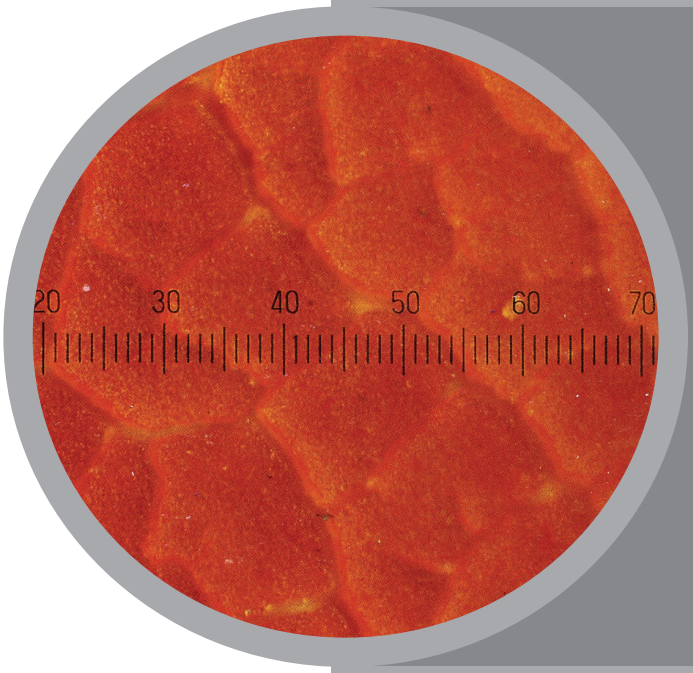


Cake of Fines

Very large concentrations of small-size particles coat the analysis membrane and build up into a cake. The cake obscures the larger particles on the membrane making contamination evaluation impossible.

Magnification: 100x
Scale: 1 Division=14µm

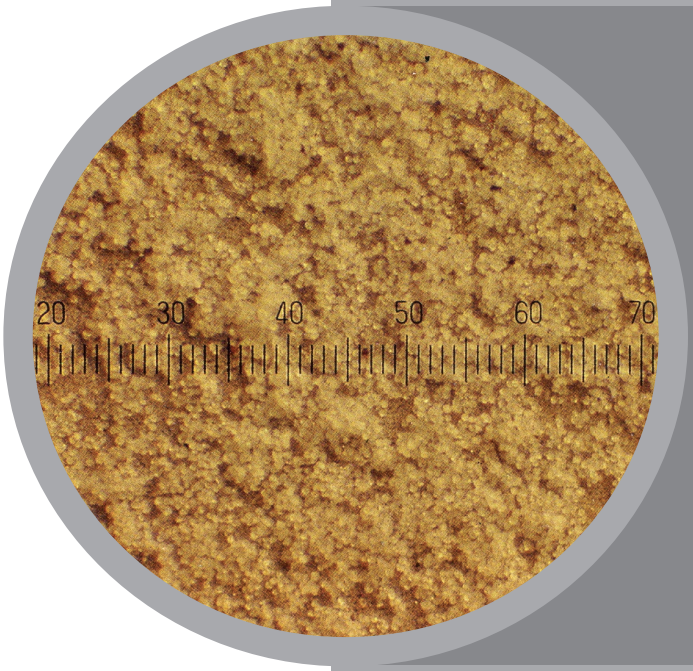
Types of Contamination



Gel Cake

A thick build up of gels on the analysis membrane making particle contaminant evaluation impossible

Magnification: 100x
Scale: 1 Division=14µm

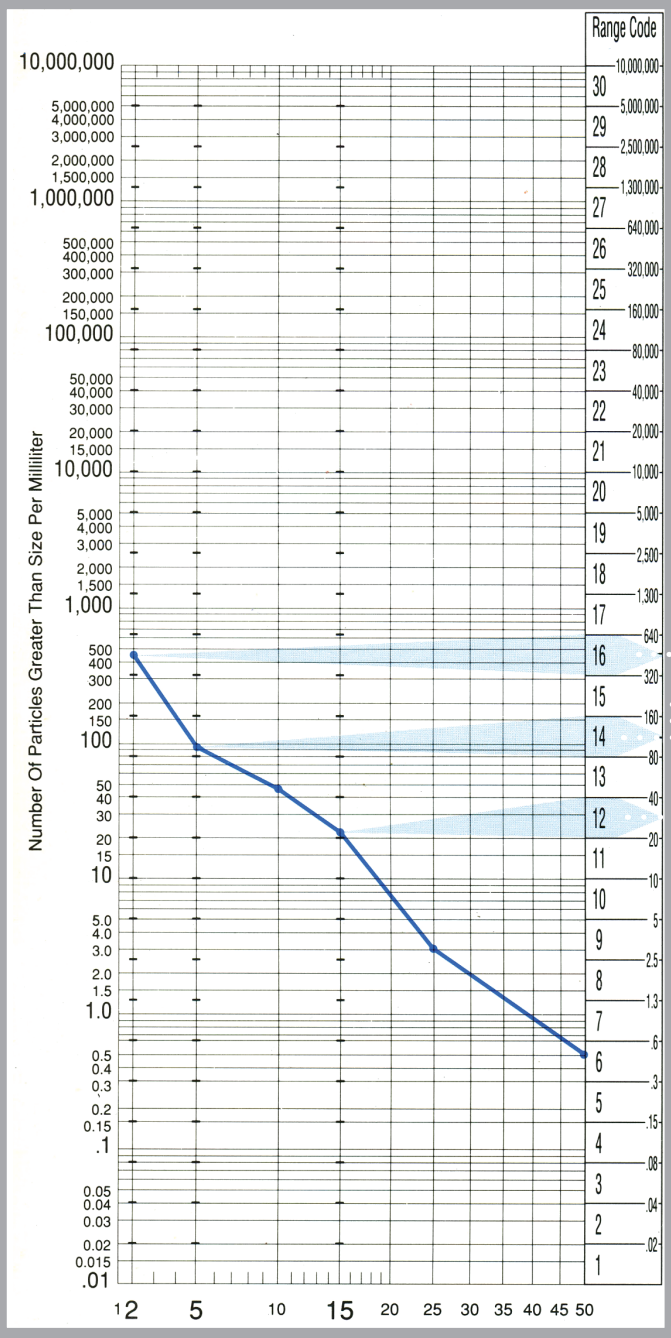


Precipitate

Particulate contaminant fairly uniform in size and colour(often white). Precipitates generally occur when an oil's additive package breaks down and 'drops out' of solution. In this condition, the additive is a contaminant and no longer performs as originally intended.

Magnification: 100x
Scale: 1 Division=14µm

Understanding the Cleanliness Code



16/14/12

Particle count summary		
Particle size	No. per ML. greater than size	Range code*
2µm	430.00	16
5µm	90.00	14
10µm	44.00	
15µm	21.00	12
25µm	3.00	
50µm	0.50	

The Cleanliness Code references the number of particles greater than 2.5 & 15 microns in one militer of fluid. The results of particle counting are plotted on a graph (shown left). The corresponding Range Code, shown at the right of the graph, gives the cleanliness code number for each of the three particle sizes.

The Cleanliness Code is an extension of the ISO Cleanliness Code (ISO4406/SAEJ1165). By including a Range Code for particles greater than 2µm in size, it provides an estimate of the silt level in the fluid sample. For this example, the Cleanliness Code is 16/14/12.