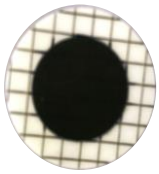
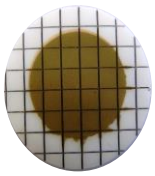
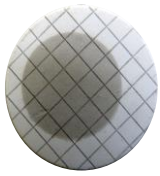
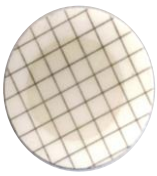
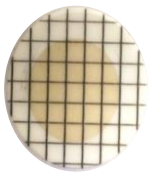
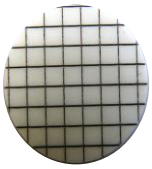
Gravimetric patch test examples using 0.8µ x 25mm diameter membrane patches.
This involves drawing a quantity of oil through a 0.8µm membrane. This detects more contaminants than the ISO 4406 or NAS 1638 methods, including oil oxidation products which are responsible for varnish formation.
This reference chart provides a simple comparison test for field checks of the condition of hydraulic fluids.

Conventional Hydraulics Patch Test Examples		**>10mg /100ml of oil contamination** An example of high contamination level that is critical to hydraulic equipment. **Warning Level- Extreme**
		**>4mg /100ml of oil contamination** An example of high contamination level that requires immediate cleaning or filtering. **Warning Level- Bad**
		**>2mg /100ml of oil contamination** An example of contamination level that could benefit from cleaning or filtering. **Warning Level- Marginal**
		**<1mg /100ml of oil contamination** An example of oil contamination level to which the oil has to be cleaned or filtered. **Warning Level- Good**
Servo Valve Controls		**>2mg /100ml of oil contamination** An example of high contamination level that requires immediate cleaning or filtering. **Warning Level- Bad**
		**0.5mg /100ml of oil contamination** An example of oil contamination level to which the oil has to be cleaned or filtered. **Warning Level- Good**

For reference, the grid lines in the membrane patches are approx. 100µ wide

Recommended Oil Cleanliness Level	
Application	**Oil Cleanliness required in accordance with ISO 4406**
Systems with high dirt sensitivity and high availability requirements such as servo valve technology	**< 18/13/10**
Systems with proportional valves and pressure >160 bar	**< 19/14/11**
Vane pumps, piston pumps, piston engines	**< 18/16/13**
Modern industrial hydraulic systems, directional valves, pressure valves	**< 20/16/13**
Industrial hydraulic systems with large tolerances and low dirt sensitivity	**< 21/17/14**

NAS Grade	ISO Code	Condition
4	15/13/10	Good
5	16/14/11	Good
6	17/15/12	Good
7	18/16/13	Acceptable
8	19/17/14	Marginal
9	20/18/15	Bad
10	21/19/16	Bad
11	**22/20/17**	**Extreme**
12	**23/21/18**	**Extreme**

Contamination levels mg / 100 ml oil	Condition
<1.5 mg / 100 ml oil	Good
>2- <4 mg /100 ml oil	Warning
>4-<6 mg / 100 ml oil	Bad
>6 mg / 100 ml oil	Extreme

FA-ST Filtration Analysis Services Technology Ltd,
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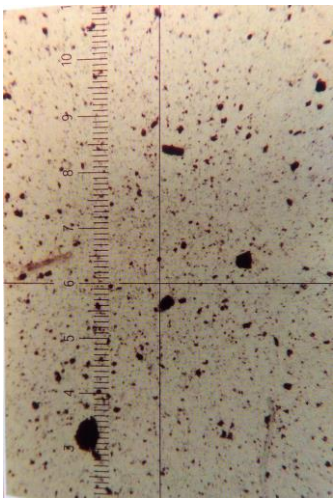
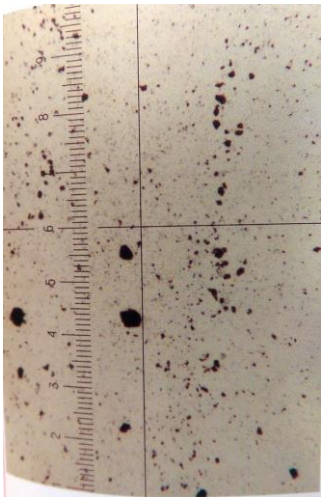
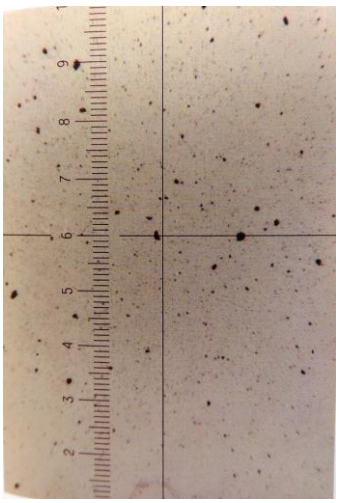
Reference Comparison Charts ISO / NAS Grades & Particle Identification guides. 100 x magnification.
Use these guides to estimate the ISO / NAS contamination grades of the oil samples.



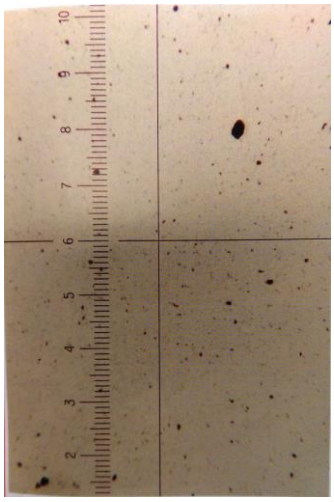
ISO 23/21/18 NAS 12



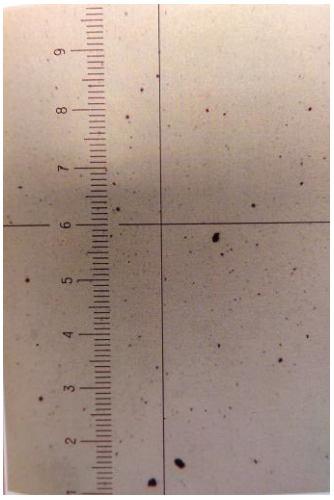
ISO 22/20/17 NAS 11



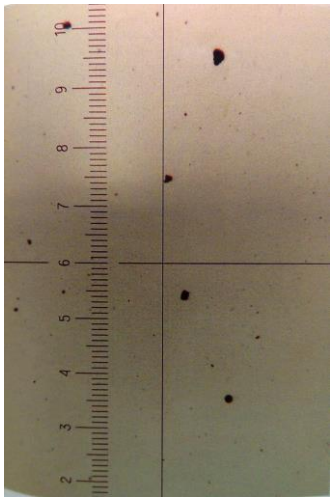
ISO 21/29/16 NAS 10



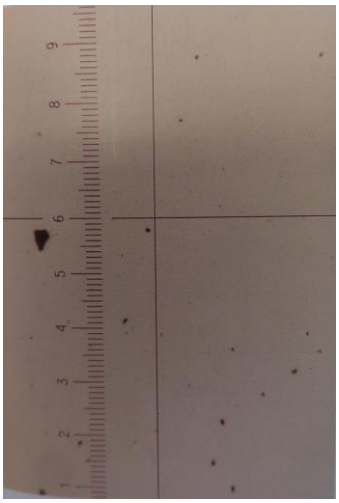
ISO 20/18/15 NAS 9



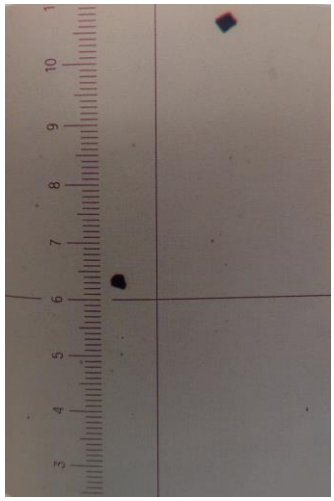
ISO 19/17/14 NAS 8



ISO 18/16/13 NAS 7

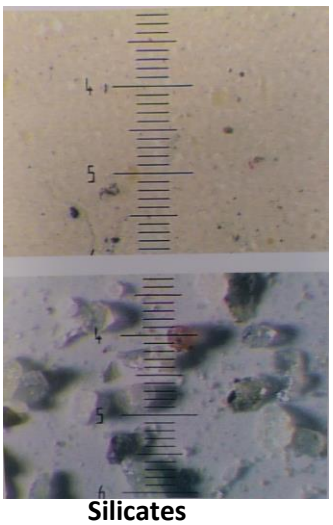


ISO 17/15/12 NAS 6



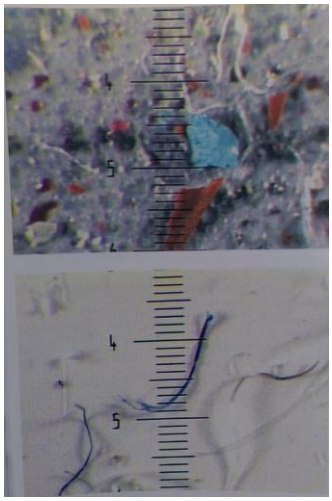
ISO 16/14/11 NAS 5

Gel residue



Silicates

Coloured particles

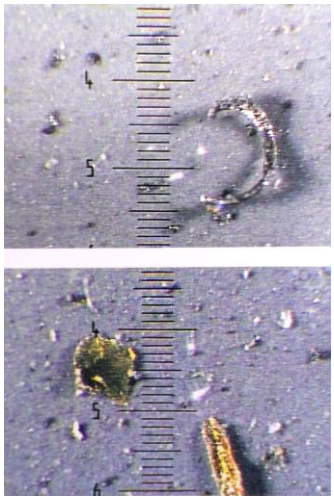


Fibres

Rust &white particles

Oil ageing Products

Metal Swarf



Bronze, brass & copper

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