MPFILTRI®
CONTAMINATION CONTROL

Operator's Guide - Patch Imaging Kit

PRODUCT OVERVIEW

Patch Imaging Kit - Overview

This offline analysis product is designed to enable visual analysis of fluids.
Prior to taking any fluid testing, systems should be activated and ideally reach full working condition in order for the fluid and also the contaminants to be mixed homogeneously.

Product Presentation

In hydraulic fluid power systems, power is transmitted through a liquid under pressure in a closed circuit.

The use of increasingly sophisticated devices requires users to control fluid contamination. Monitoring solid particulate contamination is a particularly effective tool.

The presence of solid contamination causes wear, reduces efficiency and the lifespan of components, and adversely affects functionality and performance.

Fluids generally used in fluid power systems are:
- Mineral Oil
- Synthetic Oil
- Bio-based Oils
- Water-based emulsions
- Water glycol

Their physical properties are influenced by the following parameters:
- Working pressure
- Solid particle contamination
- Liquid contamination
- Age
- Lifespan

One of the simplest methods of keeping fluids under control is to check solid particle contamination - for this reason it is useful to have special devices such as a fluid contamination kit.

Microscope features

- Digital microscope that connects direct to PC/laptop
- Fully rotatable monocular head for easy shared use, perfect for laboratories and one-on-one instruction
- Available magnification settings of 40X, 100X and 400X
- A dual-illumination system allows examination of both transparent and solid specimens while cool LED lights protect eyesight
- Sleek design with metal carrying handle and base combine with cordless capability to make this microscope practical for field experiments

Digital Microscope analysis

The digital microscope allows operators to examine and easily determine the nature and sizes of solid particles inside the fluid.

1 General warnings and information for the operator

1.1 General safety warnings

Do not operate, maintain or carry out any procedure before reading this manual. Any individual operating the unit is advised to wear the following Personal Protective Equipment:

- Protective eyewear
- Safety shoes
- Gloves
- Overalls (or other suitable protective clothing)

Before carrying out any procedures and before use, the operator should follow the instructions listed in this manual. It is necessary to comply with the current regulations related to occupational accident prevention and safety in the workplace.

1.2 Product decomissioning

The unit shall be taken out of service and/or dismantled in accordance with the current regulations in force in the country where the machinery is installed

⚠ NOTE

1.3 Dangers and hazards that cannot be eliminated

- Caution must be taken when taking samples of fluid from hydraulic system, fluid maybe hot.
- Burn risk because of high temperatures
- Accidental oil leaks with consequent risk of slipping
- Hose breakage and resulting lubricant loss

1.4 Personal Protective Equipment

The PPE listed in the table below should be worn when using this equipment:

ACTIVITY	PPE
Ordinary operation	Shoes, safety spectacles/googles, overalls gloves 

2. Scope of Supply

1. Hand-pump
2. Microscope power adaptor
3. USB Datastick
4. Calibration slides
5. Self-adhesive patch test cover
6. Patch test membrane
7. Spray bottle
8. Tweezers x 2
9. Waste bottle
10. Reusable Nalgene filter assembly
11. Certified clean bottles x 3
12. Microscope camera
13. Microscope eye piece (10x magnification)
14. Microscope
15. Microscope cables
16. Patch test cards
17. Hose pouch and 2 x hoses

3. Spares

Part number in brackets.

- Heavy-duty orange pelicase (443.061E20)
- Pelicase foam insert (443.062020)
- Self-adhesive patch test covers (444.029001)
- Patch test membranes -1.2 micron filter (444.010000)
- Spray bottle (444.018J10)
- 2 x Stainless steel tweezers (444.011120)
- Hand-pump (BS0020)
- Waste bottle (444.032J00)
- 3 x Clean bottles (P.02)
- Reuseable Nalgene filter assembly (444.024000)
- 0.01mm Calibration slides (444.025000)
- Microscope power adaptor (444.033000)
- USB Data stick (13.055001) (includes microscope software and PDF manual)
- Hose pouch (7.106)
- 1 x Hose - 8 x 6mm (444.026000) Nalgene vacuum cable
- 1 x Hose - 6 x 4mm (7.107) Hand pump sampling cable
- Swift Microscope SW150 and accessories including cable and viewer. (Call your local MP Filtri sales team for details).
- Microscope camera - 1.3MP (444.016010)
- Serial plate for patch imaging kit (484.314000)
- A5 document wallet (444.027001)
- Patch test report card (444.028001)
- Optional electric vacuum pump (444.009000)

4. Product Test Kit Operation

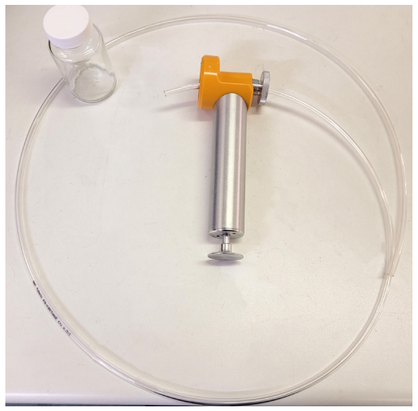
4.1 Step-by-step guide to taking samples

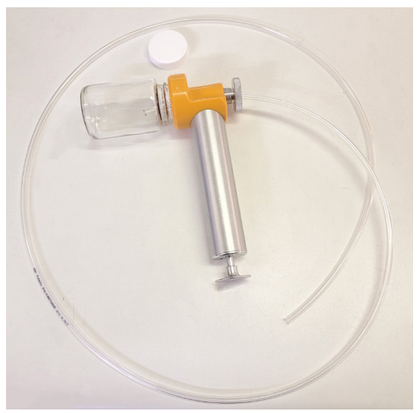
4.1.1 Before taking a sample you will need the following equipment:
Hand pump hose (smaller ID) 6 x 4mm with weight attached; BS0020 Handpump; P.02 certified clean bottle

4.1.2 Dependent on where the sample is to be taken from (barrel, reservoir etc) you will need to decide how long the hose is going to be – we recommend taking the sample from the centre of the fluid mass/bulk

NOTE: The hose must be long enough to fit through the hand-pump and into the bottle.
Cut hose to the required length. Fix the weight to the end of the hose

4.1.3 Take the P.02 certified clean bottle and carefully remove the lid – placing the lid face down on a clean surface. Screw the bottle onto the hand-pump making sure it seals onto the bottle – hand-tighten.





4.1.4 Slowly unscrew the top knurled screw on the handpump until it is no longer pressing down on the internal seals (about 1.5 turns from start).

4.1.5 Feed the cut hose through the hole in the top knurled screw and into the bottle so that there is 2-3 cm of hose in the bottle.

4.1.6 Tighten the top knurled screw – this should be finger tight.

4.1.7 Feed the other end of the hose into the fluid container – to the desired level.

4.1.8 Pull the pump handle out and push back in, in a pumping motion to create the vacuum, this should be done for 3 -4 cycles until resistance is felt. The fluid should be seen moving up the hose.

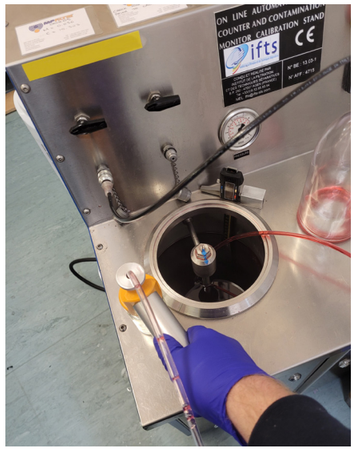
NOTE: If no resistance is felt after 3-4 cycles, check whether the end of the hose is within the fluid and the knurled screw is sufficiently tight. You should also check that the bottle is tight onto the hand pump.

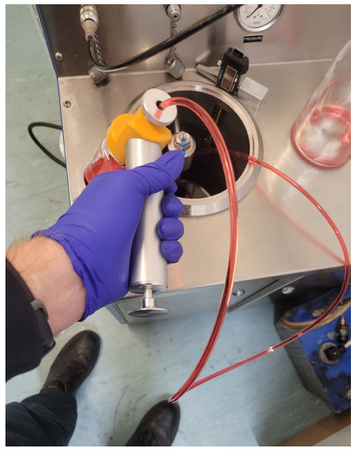
It is important to keep the end of the hose in the fluid for the full duration, failure to do so will cause the vacuum to be released. The more viscous a fluid is, the longer the sample will take to be collected and may require additional vacuum (and additional 2-3 pumping cycles).

4.1.9 Once 100ml fluid has been collected, release the vacuum by lifting the hose out of the fluid.

NOTE: Do not let the fluid touch the hose inside the bottle, as this could cause additional contamination to be introduced to the sample.

The vacuum should be released before the fluid level is within 10mm of the hose.





4.1.10 Carefully unscrew the bottle from the handpump and screw the bottle lid back on as soon as possible to avoid possible ingress of contamination from the atmosphere. If another sample is required (from the same fluid source) repeat step 4.1.3 then carry out steps 4.1.7 - 4.1.10

NOTE: When replacing the bottle lid, care should be taken to place the handpump with the hose attached in an upright orientation so nothing touches the hose.

NOTE: It is recommended to use a new unused sample hose (Part number 7.107) for each individual fluid system in order to eliminate additional contamination from fibre and dust particles adhering to the hose.

4.1.11 Once all sampling has been taken, remove the sample hose from the hand-pump by unscrewing the top knurled screw and pulling it out. Dispose of left-over fluids in accordance with relevant disposal legislation.

4.2 Patch test of a fluid sample.

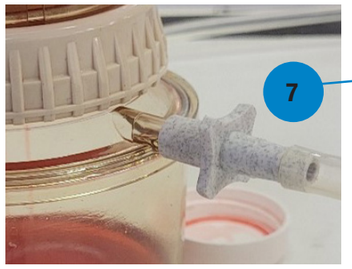
4.2.1 Items you need to test the fluid sample.

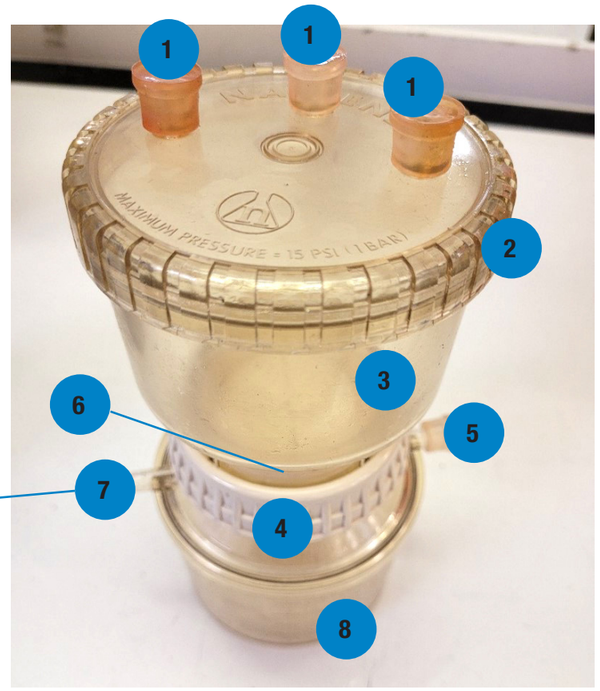
- 1.2 micron patch test membranes
- Stainless steel tweezers
- Filter spray bottle. (Fill this bottle with a solvent)
- Nalgene filter assembly
- 500ml waste bottle
- Patch test report card
- Self-adhesive patch test covers
- Hose pouch with vacuum hose (larger diameter hose 8 x 6mm)
- Hand-pump
- Certified clean bottle containing the previously taken sample fluid.

PRODUCT OPERATION

4.2.2 Place the Nalgene filter unit assembly on a stable flat clean surface.

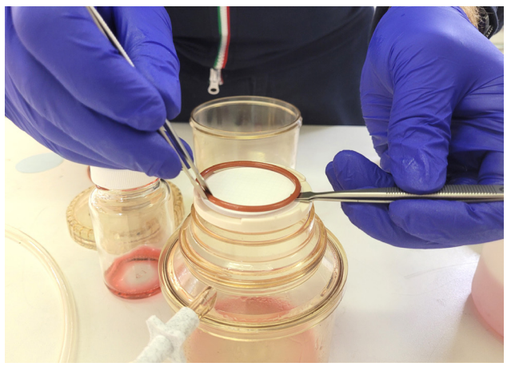
1. Cover caps x 3
2. Cover
3. Upper chamber
4. Locking ring
5. Side arm with port cap
6. Analytical support plate
7. Side arm with tubing adaptor
8. Lower receiver





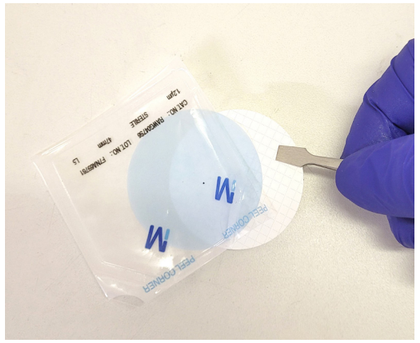
4.2.3 Holding the lower receiver, unscrew the locking ring and remove the upper chamber.

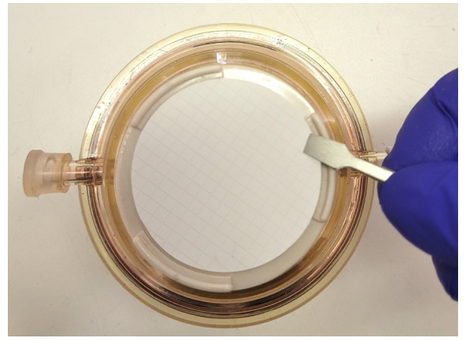
4.2.4 This should expose the analytical support plate where the patch test membrane will sit. Please note: It is possible that the seal that sits on top of the patch text membrane is on the analytical support plate. If it is please remove with tweezers and place into the groove on the locking ring.



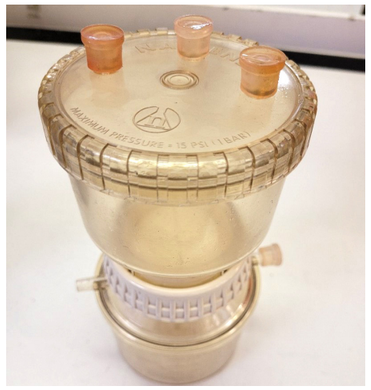
4.2.5 Very carefully unpeel the protective covering from the 1.2 micron 47mm diameter patch, making sure not to touch the patch.

4.2.6 Using the stainless steel tweezers, carefully remove the patch and place onto the analytic support plate. Very carefully unpeel the protective covering from the 1.2 micron 47mm diameter patch, minimising contact with the patch.





4.2.7 Gently place the upper chamber onto the receiver making sure that the seals sits squarely onto the patch. Hand-tighten the locking ring.



4.2.8 Shake the sample bottle for a minimum of 30 seconds.

4.2.9 Remove the upper chamber cover and pour in 100ml of sample fluid into the upper chamber. This can be confirmed by using the gradations on the side of the upper chamber. Replace the upper chamber cover and hand tighten.

4.2.10 Remove one of the top lid bungs. – This must be done to provide proper ventilation so the fluid will flow.

4.2.11 Take the bottle that contained the fluid sample before it was emptied into the chamber and carefully remove the lid – place the lid face down on a clean surface.

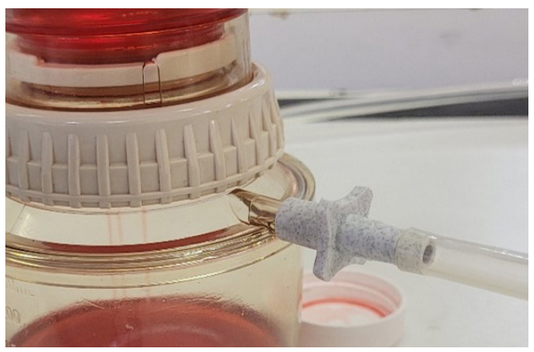
Screw the bottle onto the hand-pump making sure it seals onto the bottle – hand-tighten.

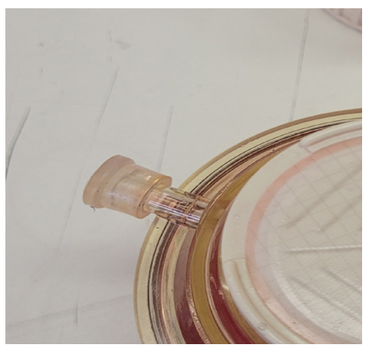
4.2.12 Slowly unscrew the top knurled screw on the hand-pump until it is no longer pressing down on the internal seals – about 1.5 turns from beginning.

4.2.13 Feed the vacuum hose through the hole in the top knurled screw and into the bottle so that there is 2-3 cm of hose inside the bottle

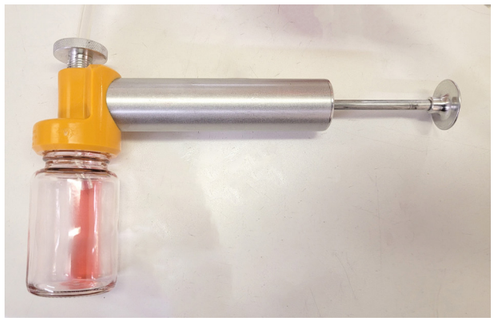
4.2.14 Tighten the top knurled screw – this should be finger tight.

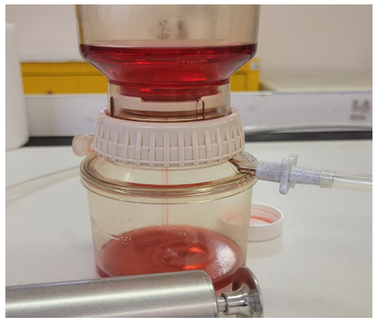
4.2.15 Attach the available end of the vacuum pump hose onto one of the side arms – if necessary use the tubing adaptor. NOTE: Ensure that the opposite side arm is sealed with the supplied cap.





4.2.16 Use the handpump to create a vacuum in the bottom part of the Nalgene chamber. The more viscous the fluid the more vacuum is required and the longer the sample will take to pass though the patch.





4.2.17 Once all the fluid has passed through the patch carefully unscrew the upper chamber cover and use the solvent from the spray bottle to spray down the sides of the internal surfaces of the upper chamber. This is to ensure that all the particles are captured on the patch.

4.2.18 Replace the upper chamber cover and hand tighten.

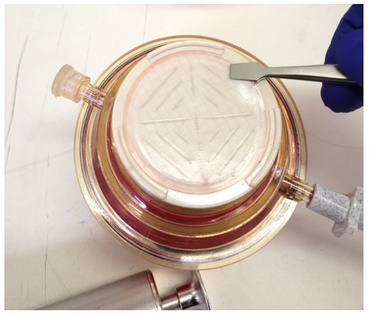
4.2.19 Create a vacuum within the receiver by pumping the handle of the hand-pump.

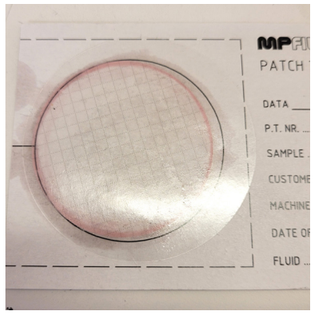
4.2.20 Once this flush fluid has fully passed through the patch, release the vacuum by removing the cap on the opposite side arm of the receiver.

4.2.21 Remove the vacuum hose from the receiver side arm.

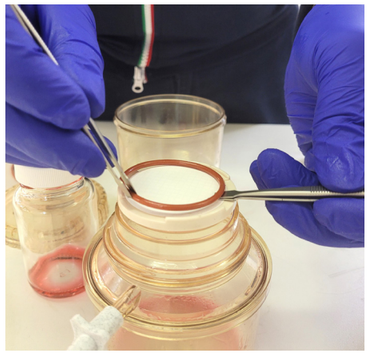
4.2.22 Carefully unscrew the locking ring and remove the upper chamber.

4.2.23 Use the stainless steel tweezers to very carefully remove the patch keeping it as horizontal as possible. Place the patch on the supplied patch test report card (Kit list - item 13). This can now be analysed using the microscope – see section 4.4





As per 4.2.4 - If the seal has remained on the patch – carefully remove using the two sets of tweezers.



4.2.24 If carrying out further tests each wetted part will need to be cleaned. This can be done by using the solvent spray bottle and lint-free wipes. The wetted parts to be cleaned are: internal surfaces of the upper chamber, the analytical support plate (both parts) and the support plate O-ring (which is in the groove at the base of the upper chamber).

Repeat steps 4.2.18 – 4.2.22

4.2.25 When all tests have been completed the unit can be disassembled including rings and caps.

4.3 Cleaning

4.3.1 Disassemble the nalgene filter assembly completely. Remove O-rings and caps.

4.3.2 Soak all parts in hot detergent solution. Avoid abrasive cleansers. If necessary, use a soft bristle brush or sponge to remove difficult residues. A pipe cleaner may be used to clean the inside of the cover ports and receiver side arms.

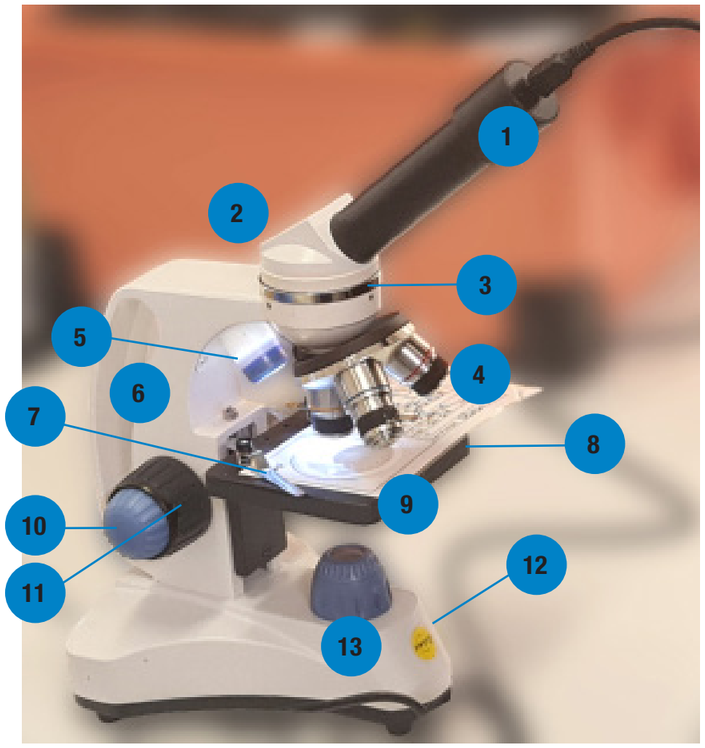
4.3.3 Rinse all parts thoroughly. Final rinse should be done with distilled or de-ionised water.

4.3.4 Air dry.

4.4 Microscopic analysis

4.4.1 Microscope Parts

1. Eyepiece
2. 360º rotating head
3. Revolving nosepiece
4. Objective lens
5. Upper light source
6. Handle
7. Stage clips
8. Diaphragm
9. Plain stage
10. Fine adjustment
11. Coarse adjustment
12. Dimming handwheel
13. Lower light source



4.4.2 Microscope Manual

The Microscope manual is available from the Swift website: https://swiftoptical.com/products/sw150
You can download a pdf copy here: https://swiftoptical.com/uploads/pdf/SW150Manual.pdf

We may make changes at any time without prior notice to the links pointing to third-party software or documentation made available on the third-party's website. NOTE: The software may be out of date, and we make no commitment to update such materials. We assume no responsibility for errors or omissions in the third-party software or documentation available from its website.

4.4.3 Microscope Software

The microscope uses Swift EasyView third-party sofware to operate. The latest software and manual are included on the Data Stick, as well as on a disc.

You can also download the latest version here:
https://swiftoptical.com/support/software-downloads/

The user manual for the software can be downloaded here:
https://www.dropbox.com/s/7jgbm9g909b8hrd/Swift%20EasyView_en.pdf?dl=0

Any links to third-party software available on this website are provided 'as is' without warranty and should be used at your own risk. You will be solely responsible for any damage to your computer system or loss of data that results from such activities and we will not be liable for any damages that you may suffer in connection with downloading, installing, using, modifying or distributing such software.

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We shall not be liable to you or any third parties for any special, punitive, incidental, indirect or consequential damages of any kind, or any damages whatsoever, including, without limitation, those resulting from loss of use, lost data or profits, or any liability, arising out of, or in connection with, the use of this third-party software.

4.4.4 Using the software

For full details on how to use the microscope and software to take digital images and record and measure particles, please consult the Swift EasyView manual.

An example image is included below. It shows two particles measured in microns.

5 Reference

5.1 Standards

ISO 4406 Hydraulic fluid power – Fluids - Method for coding the level of contamination by solid particles.

ISO 4407 Hydraulic fluid power – Fluid contamination – Determination of particulate contamination by the counting method using a microscope.

ISO 3722 Hydraulic fluid power – Fluid sample containers – Qualifying and controlling cleaning methods.

ISO 4021 Hydraulic fluid power – Particulate contamination analysis – Extraction of fluid sample from lines of an operating system.

ISO 5598 Fluid power systems and components – Vocabulary.

5.2 Product Support

A video of the full product unboxing and a walkthrough of a sample patch test will be avilable via the company's website.
You can find these on the product page for the Patch Imaging Kit:
www.mpfiltri.co.uk/products/contamination-monitoring-products/

6 Transportation and storage

6.1 Transportation and handling conditions

The unit is shipped in a cardboard box, encased in polyurethane foam.

The packed weight of the Patch Imaging Kit is 12.5kg.

6.2 Storage

The unit should be stored in a suitable location away from the production area when not in use. This location should not impede any other production or personnel.

7 Warranty, Limitations and Disclaimers

MP Filtri warrants that the products that it manufactures and sells will be free from defects in material, workmanship & performance for a period of 12 months from the date of shipment.

Hardware
Should the hardware prove defective during the warranty period, MP Filtri, at its discretion, will either repair the defective product or replace it with an equivalent product in exchange for the defective unit without charge for parts, labour, carriage and insurance.

Eligibility
This warranty extends to the original purchaser only or to the end-user client of a MP Filtri authorised affiliate.

How to obtain service?
To obtain service under the terms of this warranty, the customer is required to notify MP Filtri before the expiration of the warranty period and to return the item in accordance with MP Filtri product return policy. Any product returned for warranty repair must be accompanied by a full fault report specifying the symptoms and the conditions under which the fault occurs. Should MP Filtri incur additional cost as a result of a failure to complete the appropriate paperwork, an administrative charge may be levied.

Exclusions
This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate care. MP Filtri shall not be obligated to provide service under this warranty if:

a) Damage has been caused by a failure to make a full and proper inspection of the product (as described by the documentation enclosed with the product at the time of shipment) on initial receipt of the product following shipment;

b) Damage has been caused by the attempts of individuals, other than MP Filtri staff to repair or service the product;

c) Damage has been caused by the improper use or a connection with incompatible equipment or product including software applications.

Charges
Under cover of this warranty, MP Filtri will pay the carriage and insurance charges for the shipment of defective product back to site of manufacture and for its return to the client's original site of despatch except when:
a) MP Filtri product return policy has not been followed.

b) Product failure is caused by any of the exclusions described above, when the customer will be liable for the full cost of the repair (parts and labour) plus all carriage and insurance costs to and from MP Filtri premises.

c) The product is damaged in transit and a contributory cause is inadequate packaging. It is the customer's responsibility to ensure that the packaging used to return equipment to MP Filtri is the same, or has equivalent protective qualities, to that used to ship the product to the customer in the first instance. Any damage resulting from the use of inadequate packaging will nullify MP Filtri obligations under this warranty. Should the customer's product be damaged in transit following a repair at MP Filtri site, a full photographic record of the damage must be obtained (packaging and the product) to support any claim for recompense. Failure to present this evidence may limit MP Filtri obligations under this warranty.

THIS WARRANTY IS GIVEN BY MP FILTRI IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY, NON INFRINGEMENT OR FITNESS FOR A PARTICULAR PURPOSE. MP FILTRI LTD SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES (INCLUDING LOSS OF DATA), WE SPECIFICALLY DISCLAIM ANY AND ALL WARRANTIES TO CUSTOMERS OF THE CUSTOMER. THE CUSTOMER'S SOLE REMEDY FOR ANY BREACH OF WARRANTY IS THE REPAIR OR REPLACEMENT, AT MP FILTRI DISCRETION, OF THE FAILED PRODUCT.

Disclaimer
As part of our policy of continual improvement, MP Filtri reserves the right to alter the specification without prior notification.

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PASSION TO PERFORM

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