



GAPPSCAN PROCEDURE

Procedure: ET GTP 007 issue 9

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GAPPSCAN

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TEST CONSULTANTS
Unique Test Equipment Manufacture

Authorisation	Procedure
TM/ QM M.K.Bowling	E.T.GTP 007

Document Change Control

ISSUE	Description of change	Date
1	Initial issue after field testing	23.07.2012
2	Amendments to text files	30.07.2012
3	Insert 'Aborting a test' page 11.	19.10.2012
4	Page 9 useful tips	13.11.2012
5	Page 8 G = water temperature	04.12.2012
6	Upload software description on page 12	05.12.2012
7	Removing water for transporting, page 9, useful tips No 9.	16.01.2013
8	Temporary workaround for fault issues	21.06.2013
9	Address change and included assessment of hole size on page 13	21.11.2013

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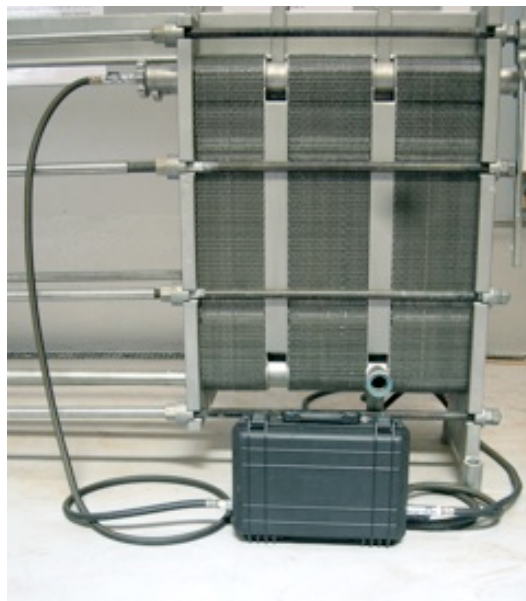
PURPOSE

1. The purpose of this procedure is to identify the operational methods through GAPPSCAN for testing the integrity of PHE, Tubular, duo safety plate heat exchangers, Jacketed tanks, DE aerators, heater or cooler Coils etc. whilst in situ, for defects such as cracks and pinholes which may cause cross contamination of the product, due to leakage from the heater, cooler, or non pasteurised side of the heat exchanger, into the adjacent finished product side.
2. When using the GAPPSCAN system, minute defects may be detected that are too small to see with visible dye penetrants when the pack is opened (dismantled). This may create major issues for the processor, as he would need to identify these defects in order to isolate the defective plates from the good ones. To overcome this problem it is considered that defect diameters > 20 microns shall be cause for rejection. Therefore defects 20 microns and below shall be recorded and tested more frequently until repaired, this is backed up by the University tests that show no leakage from defects below 20 microns when pressure differentials are under 1 bar. In order to prevent these defects from blocking, it is also recommended that a 5 micron filter is fitted to the inlet of the high pressure side when searching for the said minute defects.
3. Another thing to consider when carrying out On-situ testing is that some cracks close when pressurised. So you may find a crack with dye penetrant when the plate is out of the machine, and not find it when back in the machine and under pressure. This is due to the crack configuration. Dendritic (tree like) cracks for example may have a cross section propagating in many directions and when there is a pressure applied from one side, the two planes are squeezed together and the crack is closed. But when the pressure is increased the crack opens again. This can happen at varying pressures; therefore differential pressures should be as high as possible, but staying within the heat exchanger manufacturers limitations. We recommend between minimum 3 bar and maximum 10 bar in order to maximise the quality of the test results, and also we recommend testing from both sides where practicable.

EQUIPMENT MANAGEMENT

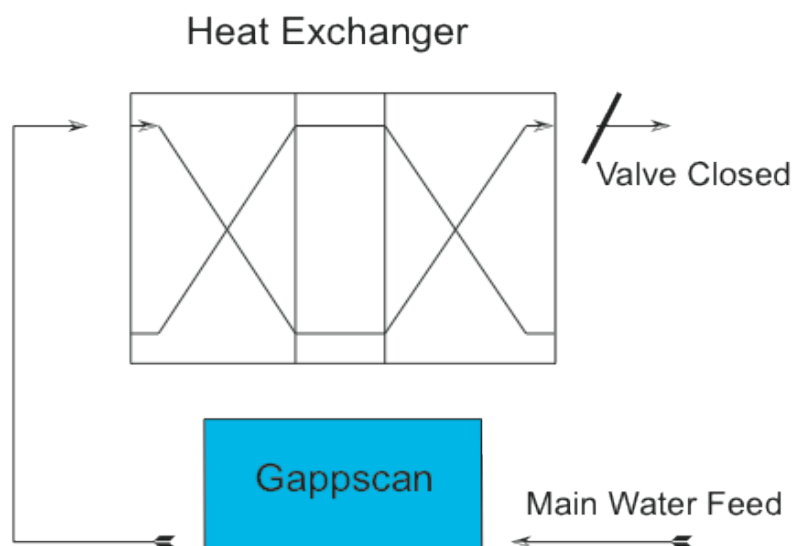
- **USE BY QUALIFIED TECHNICIANS ONLY.** The Equipment may be used only by your duly qualified employees and strictly in accordance with the use contemplated in this TECHNICAL PROCEDURE.
- You shall keep the Equipment in your sole custody and shall not permit the Equipment to be used in violation of any laws.
- **DO NOT REMOVE SERIAL NUMBERS OR COVER COMPANY LOGOS.** You may not remove or cover over any serial numbers, tags, nameplates, or identifying logos on the Equipment showing ownership by EIT International.
- **EQUIPMENT DAMAGED OR DESTROYED WHILE IN THE FIELD**
AS SOON AS YOU DISCOVER THAT EQUIPMENT IN THE FIELD IS DEFECTIVE, you should notify EIT International Limited of the problem and if necessary return the Equipment to EIT International, freight preN paid, for evaluation. **DO NOT ATTEMPT TO OPEN OR REPAIR THE EQUIPMENT.** EIT International will make a reasonable effort to repair or replace the Equipment in the shortest amount of time.

Picture shows PHE and GAPPSCAN S/Tx unit. Mains water INLET into Gappscan from right side, OUTLET into exchanger on left side.



Mains water inlet

SCHEMATIC OF GAPPSCAN



GAPPSCAN BLACK BOX TECHNOLOGY

All equipment required to carry out test procedure, apart from the liquid side hoses and multi-fit adaptors etc. is located inside the black box, Sensor transmitters, Control unit, charger and connectors.



When carrying out the test procedure, it is important to have the black box in an upright position where it cannot rock or be subject to vibration as shown in this picture. When transporting, ensure that not sudden shocks are encountered, as this equipment is to be treated as fragile.

INSIDE GAPPSCAN BLACK BOX

Just off centre and fixed to the black box, is the transmitter units, these should be fixed and not moved. Just to the right side in picture, you will see the battery charger unit and leads. Just to the right again is located the Control unit inside of the soft bag. 'KEEP AREA DRY'



The battery charger is fitted with a standard 240v plug, although 110 may be used, simply connect relevant plug for country. The unit should be connected for at least 4 hours to apply full charge from empty, and should last for approximately 10 hours.

GAPPSCAN CONTROL UNIT



Connecting control unit to charger



First connect control unit, then charger unit to charge both items.

I/O button shall remain in 'ON' position unless in storage



BATTERY CHARGER CONNECTION TO BLACK BOX (S/Tx)



WATER INLET FROM MAINS WATER SUPPLY



WATER OUTLET FROM GAPPSCAN TO HEAT EXCHANGER



WATER INLET INTO HEAT EXCHANGER FROM GAPPSCAN UNIT

The heat exchanger should be filled with mains water and valves locked before connecting Gappscan unit into the circuit.

The mains water is then connected to Gappscan inlet, and outlet into the heat exchanger using Nito fittings rated to 10 bar. These tubes should be tested regularly at 15 bar to ensure no leakages are detected from the fittings as this may affect the Gappscan results.



ON/OFF SWITCH ON GAPPSCAN UNIT

The Gappscan on/off switch should be pressed and held for 2 seconds to switch on, and 3 seconds to switch off.



THE GAPPSCAN CONTROL UNIT Press the I/O button for 2 seconds to switch on the control unit and 3 seconds to switch off. When switched on, the first screen will display serial number of unit, Expiry date (always ensure this is within date for testing, when expired it will not work), the battery life is displayed and Firmware level, this may change when upgraded.

G.P.S. You need to make sure that you are in a good position with control unit in order to get a GPS signal, as test will not commence without GPS. In the bottom right side you will see 2 ticks appear when GPS has been fixed, this may drop to 1 tick when outside GPS signal, but the control unit will still operate with 1 tick.



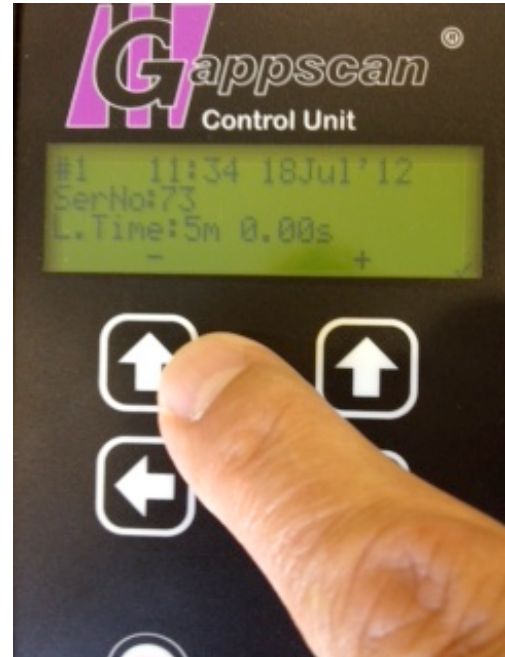
RETURN SWITCH

When you press the return switch as indicated, you are allowed to scroll through the application. You can press records button to move into records section, monitor or test button to move into monitor mode or test mode.



RECORDS

In this screen you can scroll through the records from previous tests and by pressing the I/O button when in a test, you can see the defect size. If you hold down the I/O button and return button at same time, you will be able to delete records, either 1 record or all records.



MONITOR MODE If you press the monitor mode switch, you will be able to monitor the test parameter, this will enable you to see when stabilisation has occurred and the test is ready to start.



MONITOR MODE EXAMPLE This is an example of the screen that you will view in monitor mode, starting top left, the screen shows P = Pressure in looped system. T = Target pressure either 3 bar or 5 bar. M = measured flow over test period. G = Water temperature



USEFUL TIPS

1. Switch unit on and when in first screen place unit face up, outside to get GPS fix
2. Charge both units overnight day before testing
3. Always keep unit upright when testing or monitoring
4. Never open the black box in damp or wet areas, never attempt to charge during test
5. Fill heat exchanger with water prior to connecting Gappscan unit, then when Gappscan connected let water flow for around 1 minute before closing circuit
6. Open and close outlet valve to extract air from exchanger
7. If transporting in cabin on aircraft, inform security that dry cell batteries are inside the unit, only if they ask. Wet cells are not allowed on board
8. To delete records simple go into records, press 3 arrow keys and follow instructions
9. When transporting Gappscan unit, to remove liquid from internal components, first switch off Sensor transmitter unit, place finger over outlet nozzle, then switch on and wait for LED light to come on and go off, then remove finger from outlet and wait until all water extracted

REPORTING AND RECORD STORAGE



RESPONSIBILITIES

PROCESSOR RESPONSIBILITIES

- The Processor is responsible for ensuring that the heat exchanger is prepared for test by removing the product and cleaning the internal surface (CIP).
- The Processor must ensure that any permits to work, safety instructions, drawings and any site specific rules are available to the Operator prior to test.
- It is the Processor's responsibility to ensure that any site-specific equipment is supplied, also to ensure the safety of the Operator whilst on the Processor's site.
- It is the responsibility of the Processor to clean the heat exchanger, isolate any steam or coolants remove for test, and replace any pipe-work and fittings after testing has been completed.

INSPECTOR RESPONSIBILITIES

- The Qualified Inspector is responsible for carrying out the test method and producing the test reports / Certificates, highlighting any limitations to the Processor.
- The Qualified Inspector shall ensure that he has available clean overalls for each site that is visited and that necessary protective footwear, eye, hand and headgear are available at all times.
- The Qualified Inspector shall ensure that the equipment he is to use is clean, free from dirt, calibrated and maintained in accordance with this procedure prior to leaving for site.
- The Qualified Inspector is also responsible for ensuring that all site requirements, including health and safety and specific site conditions are complied with and work permits must be obtained.
- On leaving site, the Qualified Inspector is responsible for ensuring that the site is left as found and that the Processor's representative has been informed of the test being completed and the results.

GAPPSCAN TEST EQUIPMENT

THE EQUIPMENT COMPRISES:

- Calibrated Intelligent Sensor transmitter unit
- Flexible hoses and valves to connect heat exchanger outlet adjacent to product side.
- Control unit
- Battery charger unit.

Gappscan User Instructions

Filling the Exchanger

- 1) The Sensor/Transmitter (S/Tx) unit must be placed on the floor on a level surface, where it cannot rock or be subjected to vibration or other disturbances.
- 2) Fill the heat exchanger to be tested. This should be done before the S/Tx unit is in the circuit, when the heat exchanger is full, connect the S/Tx unit to the circuit with the incoming water supply attached to the female Nito connector on the S/Tx and the output from the S/Tx is taken from the male Nito connector to the heat exchanger.
- 3) When the S/Tx is switched on, an internal valve will open and allow the filling process to begin.
- 4) The incoming mains supply should ideally be capable of providing over 3 bar of pressure, but no more than 10 bar!
- 5) In the event of a system failure, the incoming mains pressure could be applied to the exchanger – for this reason a pressure relief valve is incorporated and will vent to atmosphere if the fill pressure reaches 6 bar nominal.

- 6) It is possible to monitor the filling process by switching on the logger unit and selecting Mon/Test, then Monitor mode.
- 7) The S/Tx will attempt to fill the exchanger to be tested by modulating its internal fill valve
- 8) As the exchanger is closed off and pressure is allowed to build, the valve may be heard modulating the input supply.
- 9) The bottom RH corner of the monitor screen shows real-time valve status as either OPEN or CLOSED.
- 10) During the fill process, the system will modulate the levelling supply and Drains. The process is automatic, and the user just has to wait for the system to stabilise, and achieve the nominal target pressures of 3 bar or 5 bar
- 11) To change from the default target pressure of 3 bar to 5 bar - press the on/off button briefly whilst in the Monitor screen. You will be prompted to select a Target pressure!
- 12) See Appendix 1 for notes if the system cannot be filled to 3 bar or 5 bar.

Beginning a Test

- 13) Back out from Monitor Mode, and select Test from the menu.
- 14) When Test is selected, an automatic sequence begins
- 15) During this Settling period, a pre-test timer counts, showing a '-' in front of the actual time value to indicate that it is the pre-test phase – the actual time value is not significant, but should be reasonably short
- 16) Upon achieving the Test Start of Zero in the Measurement system, a further 2-second delay leads to the Test Start, which happens automatically.
- 17) When the Test has commenced, the Test Time will be seen incrementing in real time.
- 18) During the Test, the Test Start pressure is shown (T, for Pressure Target), along with a live variable (P for Pressure), as the system attempts to maintain this level. This will vary slightly if the system loses pressure and has to be corrected internally.
- 19) The Test will complete when either the Measurement has reached a loss of fluid of approx. 18ml, or the Testing period of 300 seconds has elapsed.
- 20) The Monitor will switch to the Record screen showing the Test Data.
- 21) Test Data includes: Index Number, Time/Date of Test, Test Serial Number, Test Time Period, Rate of Loss (Flow), and Calculated Equivalent Hole Size (the last 2 items are seen by pressing the power on/off button very briefly).

ABORTING A TEST

When in test mode during a test, it is possible to abort the test by pressing 3 arrow buttons at same time, and following instructions.

Appendix 1

When the nominal Test pressure of 3 or 5 Bar cannot be achieved:

An over-ride facility is provided (by pressing the Power On/Off button briefly during the test warm-up period) to accept a lower test pressure. An additional prompt requires confirmation of the over-ride value.

The system will then run as normal, but with an alternative Test Pressure.

Note that the Test Pressure Over-ride facility can be used when the leak is known to be (or discovered to be) so large that the test period would otherwise be unreasonably short (a few seconds perhaps). By testing at a lower pressure, the rate of loss should be lower and so the Test period will be extended.

Gappscan Upload Software Installation.

- 1) Insert the CDROM and run setup.exe from the root of the CD. This should be done from an account which has Administrator privileges or at least 'run as administrator' by right-clicking on the setup.exe file. Windows 7 professional users are advised to select run in XP mode for best compatibility.
- 2) There is one file on the CDROM which does not install automatically: this is the mpusbapivb.dll file, found on the root of the install CDROM. This just needs to be manually copied to the root of the C: drive on the machine where the software is to be installed.
- 3) The first time the Gappscan Control Unit is attached the Windows system will prompt for a USB driver. It is recommended that manual install is done for this, by pointing to the 'inf' sub-directory on the install CDROM, and pointing to the mchpusb.inf file. This should allow the appropriate driver for the Gappscan control unit to be installed. It is recommended that this procedure is done while you still have the CDROM handy, otherwise the need to install the USB driver will be delayed until the first time the Control Unit is attached which could be at some later date when the CDROM might not be conveniently available.
- 4) When the software package is run, it will automatically test to find the Control Unit via a USB connection. If found, the connection status box at the bottom of the application window will show in Green background colour, with the words "Device is CONNECTED" visible. If the connection test fails (or whenever the device is unplugged) the background colour will change to Orange on the connection status box with the text "Device is NOT CONNECTED" showing. Sometimes if the device is connected before the application is started, the application may fail to detect the Control Unit automatically – if this occurs, make sure that the Control Unit is switched on, and then unplug the Control Unit for a few seconds and then re-connect – this should restore the connection status correctly.

Uploading of Test Data from the GAPPSCAN Control Unit to a PC

The GAPPSCAN Control Unit contains a non-volatile memory with a capacity for up to 40 test results. The supplied PC application for GAPPSCAN data upload communicates with the Control Unit via a USB lead. The supplied USB lead is a custom item with a special plug because the waterproof connector on the logger is shared between USB and the battery charger connection.

Once the software is correctly installed, the Control Unit should show 'USB CONNECTED' on the LCD when switched on. The PC should recognise the Control Unit as a Virtual Com Port device, and allocate it a Virtual Com Port number. Looking at the PC 'device manager' window, and opening the Com Port list can confirm this. As a test, by disconnecting and re-connecting the Control Unit on the USB port, one should see the Virtual Com Port (with the allocated number) disappear and reappear.

When the GAPPSCAN Test Data Upload program is run, the main screen will be witnessed, as shown below:

Control Unit Charging

The Control Unit contains 4 x 'AA' High Capacity rechargeable batteries.

The Charger should be connected for at least 1.5 hours.

Charged batteries should last at least 8 Hours. The Control Unit has an Auto-Off facility (15 mins of no key presses).

Sensor Transmitter Unit

The Sensor Transmitter has one inlet pipe and one outlet.

The inlet is the one with the female connector.

Power

Power on the unit by pressing the push switch on top of S/Tx unit for 2 seconds.

To turn off unit press switch for 3 seconds. (The unit has a 15 min Auto Power Off, after losing communications with a Control Unit).

When the Control unit is powered a sign-on screen will greet you.

e.g. 1 (Stx)

GAPPSCAN
Exp Date: 01Jan'06
Batt: 5.4V f/w:1.0

If the Control Unit doesn't establish a comms link with a Logger within 15 seconds, then the unit will go into standby.

Expiry Date

If the Sensor Transmitter receives data indicating that the date is past that of the Expiry date, the unit will display the Expiry screen. e.g. "Expired: 01Jan'06". And the unit should be returned for calibration.

Operation

As long as a link between a Control Unit and Sensor Transmitter Unit is 'within expiry date' the Sensor Transmitter Unit will display a bar graph indicating the internal processes and readings.

Sensor Transmitter Charging

The Sensor Transmitter Charger should be connected for at least 4 hours.

Charged batteries should last at least 10 Hours. The Sensor Transmitter has an Auto-Off facility (15 mins of no Control Unit comms).

DETERMINING IF THE HEAT EXCHANGER HAS FAILED

The following criterion determines if the heat exchanger has failed the GAPPSCAN test;

- Minimum test pressure of > 3 bar not achieved, possibly due to poor seals (gaskets).
- Any consistent flow during test period showing defect diameter > 20 microns.
- If there is a defect below 20 microns, the client shall be offered more frequent testing in order to monitor the defect for propagation into the reject able defect zone > 20 microns.

ASSESSMENT OF HOLE SIZE

If the heat exchanger shows a defect above 20 microns, it is important to know whether this relates to one major defect or several minor defects, and the following procedure should be used to correctly assess this;

- Open outlet valve and release pressure
- After a short period close the outlet valve and increase pressure to 1.5 bar
- When the Control unit displays 1.5 bar close the inlet mains water supply
- When stabilised press test, you will be prompted to use current pressure, say yes and carry on with test
- If the heat exchanger shows defect above 20 microns, it has failed, if not, there may be several defects below 20 microns

REPORTING

- On completion of the test, the test results shall be recorded for certificate generation.
- The Master Certificate confirming the test results shall be produced by the GAPPSCAN Operator, and posted to the client, containing the following information;
- Hard copy of the test data.
- Client, contact, location.
- Order number, Job number, Test Procedure.
- Heat exchanger make, Type, Serial number, test restrictions. Identification of sides tested then reversed, for example “Hot HP” means HP on Hot service side, and “Product HP” means High Pressure on Product side.
- Operator, date, signature.

OPERATORS ACTIONS AFTER GAPPSCAN REJECTION OF HEAT EXCHANGER

The client is to be informed of the rejection and given the following options;

- Acceptance by the client of additional work required.
- The client is to be offered a GAPPSCAN re- test after any dismantling of defective plates.

CALIBRATION

- Calibration of the GAPPSCAN equipment is carried out annually in accordance with the requirements of the EIT International quality management System. The items requiring calibration are;
- The GAPPSCAN Control Unit / Sensor Transmitter Unit.

OPERATOR QUALIFICATIONS AND TRAINING

- All Operators shall be trained and examined for the tests they are to perform. The Operator shall be assessed through examination with a pass / fail.
- The period of validity is 12 months from the examination date. ReN qualification is the responsibility of the Operator, who shall apply in writing to EIT International, 4 weeks prior to the expiry date. Failure to reN qualify will result in withdrawal of certification. Additional training shall be given where techniques or operational procedures have been changed.
- Each Operator will be issued with a certificate showing the level of qualifications attained.

REFERENCES

- BSEN ISO9001 - Model for quality assurance in design / development / production / installation and servicing.

ASSOCIATED DOCUMENTS

- Operator qualification Certificate and training program.
- Calibration and certification of Hexteq equipment.
- GAPPSCAN Interim Report sheet
- GAPPSCAN Test Certificate
- Set-up Procedure for the client to make the heat exchanger ready for Test

GAPSCAN VALIDATION

Gapscan has been tested extensively on site and in laboratory conditions along side Hexteq during 2011/2012 and in all cases has proven to be;

1. More reliable
2. More repeatable
3. Faster due to testing from one side only of exchanger
4. Wider range of products can be tested such as jacketed vessels, duo & large volume exchangers, de aerators etc.

GAPSCAN VALIDATION – Tested over 12 month period alongside Hexteq, giving more consistent results and greater speed of test.

INDEPENDENT HEXTEQ VALIDATION DOCUMENT**Introduction.**

A Hexteq Satcomm 3 heat exchanger leak detection system was supplied for testing by EIT International, of the above address.

The requirement of the test programme was to assess the accuracy and repeatability of hole size determination when the equipment was attached to a heat exchanger circuit containing a simulated leak in the form of a nozzle of known aperture size.

The Hexteq leak detection kit is a portable test system designed to assess the integrity of plate-pack heat exchangers and consists of three items of equipment. The inlet meter measures the real time inlet manifold pressure for the duration of the test. The flow rate-measuring device measures the flow of fluid through the leak from the high pressure to the low-pressure side of the heat exchanger. Water from the low-pressure side is fed via a tube into the unit, initially filling an inlet pre-chamber. When the unit is primed with sufficient fluid, the water passes into a secondary measurement chamber, which then fills, to a set volume before automatically dumping the charge and restarting the fill cycle. The sensitivity of the measuring system is such that the magnitude of this flow rate can be only a few microlitres per second.

The hand held test process controller and data acquisition unit controls each test. This component also collects the data from the measuring head and the pressure meter at the end of each test and calculates the flow rate; from which an estimation of the hole size is also made. The data acquisition unit can store data from up to 80 separate tests before requiring download. All three items of electronic equipment are linked by wireless communication for data transfer and a GPS unit is also included to provide positional information for each individual test. At the end of a test programme the results are uploaded to a computer via a USB link for final processing.

Method.

A test circuit was assembled to simulate a faulty heat exchanger consisting of a number of heat exchanger elements held within a suitable manifold. A series of nozzles, each with a laser-drilled hole of different nominal size were used to represent the actual leak. A high pressure water supply produced via a hand pump was applied to one side of the heat exchanger and the resulting egress from the nozzle, plumbed in parallel with the heat exchanger, was fed to the Hexteq flow rate measuring system via the heat exchanger open side circuit to simulate service conditions. The equipment as set-up for testing is shown in figures 1 to 4.

A number of combinations of differing inlet pressures and nozzle sizes were tested in order to assess the repeatability and hole size estimation accuracy of the test system.

Further verification of the hole sizes in the test nozzles used was carried out using images produced in a scanning electron microscope, these images incorporating a scale bar for direct measurement of aperture size.

Nozzles with 100um, 50um, and 25um apertures were used for the tests and an inline filter was incorporated into the circuit to minimize the risk of partial or complete blockage of the test nozzles. All nozzles were ultrasonically cleaned and blown through with compressed air prior to use.

Each of the other three nozzles were tested at 5, 3 and 1 bar inlet pressure. The suitability of the hole size calculation formula embedded in the software of the test equipment was also assessed. Minimums of three tests were carried out for any one set of conditions.

Results.

At the end of the test program all results were uploaded to a computer and the flow rate charts containing all relevant test data were printed off. The estimated hole sizes for each test were extracted from the test charts and are shown in table 1 along with the calculated flow rates and start and finish test pressures. Copies of all the test charts are included at the end of this report.

Images of the apertures in the three test nozzles used during the course of this program are shown in figures 5 to 7. These were taken using a JEOL 6310 scanning electron microscope after the tests were completed. The hole size (or an estimate of) can be determined by reference to the scale bar shown in each image. It can be seen that although the 100-micron aperture appears clear, there is significant disruption to the profile of both the 50 and the 25-micron nozzles. It is noted that the 25 micron nozzle gave some of the most consistent results during use but that no flow was observed when the 1 bar tests were started despite two attempts at cleaning. For this reason, no further tests were carried out at this lowest pressure.

Discussion.

From the data shown in table 1 it can be seen that the repeatability of measured values within any one test group is good but the estimated hole sizes do not always match with the stated nominal hole size. The main reason for this apparent discrepancy in actual and calculated hole size in some of the test condition groups probably lies in the susceptibility of the test nozzles to partial flow restriction by particles within the water circuit. Examples of the nozzle apertures directly after testing, as shown in the SEM images, show clearly the potential for blockage to have an impact on these measured values.

The required objective of this test programme was to assess the repeatability of test results and estimate of measured hole size under a range of different operating conditions. The results show that given a set of stable flow conditions the measured values are consistent but that in some instances the measured aperture size does not match the stated nominal nozzle size. However, given that the test nozzles are very susceptible to partial blockage it can be assumed that the actual flow rates used to calculate the nominal hole size have all been accurately and consistently determined by the test equipment. The embedded formula for calculating the size of the aperture is based on flow through a uniformly round aperture, a condition unlikely to be encountered in a corroded heat exchanger cell. This approach does however give a good first estimation of the likely size of aperture present and the sensitivity of the equipment to flow of any kind is a first and most important step to determining whether or not a fault exists.

N Gathercole,, Fluid Dynamics Department, Bath University, North Somerset, United Kingdom.

20th February 2007

HOURS	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
TRAVELLING							
TESTING							
WAITING							

Certified that the items have been tested in accordance with the client's requirements, and the results relate to the condition as found, and unless stated, do not confer a warranty of future serviceability, nor the quality of manufacture, assembly or functioning of the items tested. The contents of this report are confidential and may be legally privileged. The information in this document is intended only for the person or entity to whom it is addressed.

Inspector:	Signature:	Date:
Client:	Signature:	Date: