WCS Environmental Engineering

A WCS Group Company

HYBRID SAF

INSTALLATION OPERATION & MAINTENANCE MANUAL

Site name:

Reference number:

.

Contents

Revision History:

Date	Change description	Owner	Checked	Revision
19/06/2017	First issue	TWC	RT	A
26/10/2018	Air admittance valve added	RT	TWC	B
08/11/2018	Lifting Weight increased	TWC	RT	C
05/12/2018	Updated border	TWC	RT	D
12/07/2021	Updated border	TWC	BD	E
17/11/2022	Revised WCSEE	TWC	BD	F

1. SAFETY

It is extremely important that maintenance procedures in this document are followed. Any deviation from this could cause serious injury or have a detrimental effect on the filter and its operation.

1.1 Health and safety at work act 1974:

Section 6a of this act requires manufacturers to advise their customers on safety and handling precautions to be observed when operating, maintaining and servicing their products.

The user's attention should be drawn to the following:

All sections of this manual should be read before undertaking work on the equipment.
Suitably trained personnel must carry out the installation.
Normal safety precautions must be taken and appropriate procedures observed to avoid accidents.
Refer to WCSEE for further technical advice or product information.

1.2 General health and safety:

The plant will be or should be laid out to ensure that health and safety on site is optimised. It will be vital that the routes to all of the equipment are laid out in a proper manner and they are followed implicitly. Lone working in the plant should be prohibited.

1.3 Leptospirosis:

The following is extracted from a health warning card issued to WCSEE staff. It is the client's responsibility to ensure that the relevant Personal Protective Equipment (PPE) is available and used.

There are two types of Leptospirosis that effect people in the UK and they are as follows:

1. Weil's disease, which is a serious infection transmitted to humans by contact with soil, water or sewage that has become contaminated with urine from infected rats.
2. Hardjo-type Leptospirosis, which is transmitted from cattle to humans.

The typical symptoms for both diseases start with a flu like illness, with a persistent and severe headache, muscle pains and vomiting. Jaundice generally appears on the fourth day of the illness.

The bacteria can enter your body through cuts and scratches or through the lining of the mouth, throat and eyes.

1.4 Sensible precautions:

After working with contaminated fluid or other materials it is important that hands and forearms are washed thoroughly with soap and water. If your clothing or boots become contaminated then they should also be washed immediately after use.

Immediate action should be taken, so that any cuts scratches or abrasions are washed thoroughly with clean water, prior to applying any protective covering (plaster or bandage).

Do not handle food, drink or smoking material without first washing your hands. If you display any of the symptoms described after coming in to contact with sewage; report to your doctor immediately advising them of the circumstances.

1.5 Vaccinations:

To avoid the possibility of illness it is recommended that all site personnel have the following vaccinations. WCSEE also recommends that you that you consult your doctor for any additional vaccinations that you may require. The general vaccinations WCSEE use for all personnel are as follows:

- Hepatitis A
- Hepatitis B
- Polio
- Tetanus
- Typhoid/cholera – probably carried out as a child.

2. Warranty:

WCSEE will provide the following warranty to the items listed below:

2.1 SAF tank enclosures:

WCSEE will provide a 25 year warranty period for the external structure of the Submerged Aerated Filter (SAF) tank.

Note: Warranty period will be active from the day, from which the tanks are positioned on the base slab, or passes on to the customer's premises/construction site.

2.2 Blowers:

If the unit is supplied with 2 blowers, then is covered by a two year standard manufacturer's guarantee.

2.3 M&E installation

The warrantee period for M&E components detailed in the following will be guaranteed for a 12 month period:

1. Blower air distribution manifold, associated valves and gaskets.
2. EPDM hoses.
3. Internal diffusers and header manifold.

WCSEE takes no responsibility for improper storage, or bad installation/maintenance performed by unqualified personnel. This also covers the overloading of the filter, above that of normal conditions, and any other accidental cause, or disregard for the information in this document.

2.4 Warranty limitations and exemptions:

WCSEE shall not be liable for any labour involved for the removal or replacement of its equipment or the subsequent transportation, handling or packaging of any part or parts thereof. In no case will WCSEE be liable for loss incurred because of interruption of service or for consequential damages, labour or expense required to repair defective units, nor shall this constitute a cause for the cancellation of the contract of purchase and sale. Specifically exempt from this warranty are limited life of consumable components subject to normal wear and tear, such as air pump vanes, diaphragms and filters.

2.5 Chargeable non warranty work:

Service charges will be incurred (including parts and labour), due to the following:

- Unauthorised alteration.
- Accidental damage, caused by plant or movement on site outside of WCSEE's control.
- Improper use.
- Abuse.
- Tampering.
- Failure to follow installation instructions or failure to follow operating and maintenance procedures.

The above will not be covered by this warranty. All service visits for non-warranty work are chargeable at the standard engineer day rate plus mobilisation. This warranty gives specific additional benefits. Statutory rights are unaffected.

Note: WCSEE will not uphold the guarantee on the purchased equipment if the routine maintenance has not been performed and documented.

WCSEE strongly recommends that the installation of the purchased product is carried out by a qualified and experienced installer. Dependent on the site a qualified civil engineer may need to be consulted for the construction of suitable base slab to support the imposed load.

3. Risk assessment:

3.1 Introduction:

This section of the manual is intended as a guide and as such does not cater for every situation encountered on site. WCSEE assume that the necessary permissions have been granted prior to the installation of the plant. It is also the assumption that working methodology abides by the Health and Safety at work act and that all civil engineering design is undertaken by a chartered Civil Engineer.

Please ensure that due consideration is given to the following:

- Costs, legal implications and siting in consideration to shared systems.
- The whereabouts of other services, cables and ducting.
- Local ground conditions. Specialist knowledge of civil engineering required, catering for specific ground condition requirements.
- The water table at the time of installation, taking in to account the seasonal variations.
- No special provision has been made for the venting of the treatment plant. If venting is required this will not be the responsibility of WCSEE.
- Electrical supply: a qualified electrician should undertake the electrical installation. A reliable power supply will be required at all times, so an indication of power failure will be required, which can be audible or visual.
- Any visiting personnel should report to the site office and acquaint themselves with the specific site health and safety protocol.
- Before carrying out any maintenance or installation on the equipment it should be electrically isolated, unless a trained electrician is carrying out specific checks under controlled conditions. When performing works of this nature, warning signs should be erected to alert others of the works in progress.

- For all works, risk assessments and method statements will be required to carry out work on site. These should identify the method of work and the risks associated.

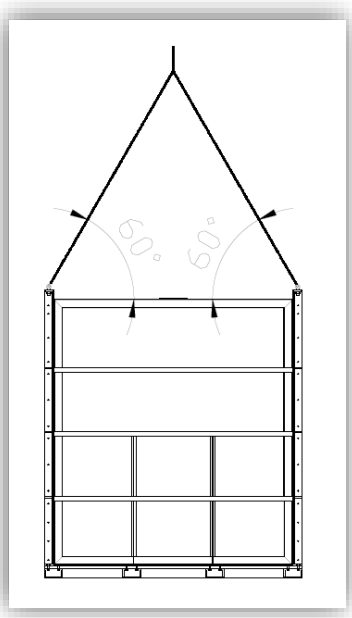
4. Site specific information:

4.1 Plant loading and design data:

Influent (per Hybrid / Single unit)	Unit	Average	Maximum
Flow	lt/sec	9.7lt/sec	16lt/sec
DWF	lt/sec	7.1kg/d	
BOD load	Kg/d	12.7kg/d	
Ammonia	Kg/d	5.3kgNH3.d	

4.1 Installation:

All installation procedures should be carried out observing the requirements of the Health and Safety at Work Act 1974 and involve a safe system of work for all activities, whilst applying the general principles of prevention. Only suitably qualified persons should perform any construction work relating to, installation, commissioning and maintenance of WCSEE plant. Any damage caused, which is not a manufacturing defect will be chargeable.



The top of the Hybrid-SAF is fitted with 4 off lifting eyes. When lifting the tanks into position the chains should be long enough to achieve a minimum lifting angle of 60deg as shown in the image on the left.

The Hybrid tanks have been carefully inspected and thorough examination has taken place as required by the lifting operations and lifting equipment regulations 1998 (L.O.L.E.R), Regulation 9. This certificate can be found in appendix 1, item 13.

A concrete base slab should be installed prior to the tank installation. This base slab should have a tolerance of ±5mm.

If the Hybrid tank is supplied with no steel base for a permanent installation, a flat slab should be installed prior to the tank installation. This base slab should be suitable for a 25 year expectancy.

4.2 Plant Description:

The plant has been designed to operate with the minimum of maintenance after it has been fully commissioned. The plant will provide effluent of the designed consent standard after an initial start-up period of 4-14 weeks; dependent on environmental conditions and water temperature. It is important that the sewage conditions are kept consistent and are not drained down during the seeding process.

	Hybrid-16-SAF Plant Data.		
Information	**Hybrid-16**	**Hybrid-16-NB (NO BASE)**	**Additional Comments**
Length	2.82m	2.82m	
Width	2.82m	2.82m	
Height	3.35m	3.20m	Includes Lids
Media Volume	16m3	16m3	± 3% Fill Rate
Inlet/Outlet Pipe	8"	8"	DN200/PN16
Empty Weight	4,500kg	4,500kg	
Empty Weight after operation	5,500kg	5,500kg	
Operating Weight	25,000kg	25,000kg	
Lifting points	4 off	4 off	Lifting eyes
Aeration Diffuser Connection	1 off	1 off	2" Hosetail
Total Tank Vol	19.2 m3	19.2 m3	Total working fluid capacity
Supplied Loose	10m Hose	10m Hose	(per tank)

5. Introduction to plant

The pre-treated effluent from the existing plant is pumped into the SAF where the carbonaceous material is oxidised biologically. As the fluid passes through the SAF modules the soluble organic matter is degraded to a point at which nitrifiers can out-compete heterotrophic bacteria; thus meaning that nitrification can be achieved. It should be noted that the pH of the fluid will drop during the process as the autotrophs consume the alkalinity from the fluid. WCSEE have assumed that there is sufficient alkalinity available for the nitrification process, but if full nitrification is not achieved, and there is an accumulation of Nitrite (NO_2^-) alkalinity may need to be dosed in the form of Calcium Carbonate ($CaCO_3$). The WCSEE's patented aeration system ensures that the sludge age within the system remains high. This means that the slow growing nitrifiers are accumulated and have the right conditions to grow and re-produce; enabling high efficiency nitrification can be achieved.

The effluent from the SAF then exits the plant via the SAF outlet. During periods of Dynamic solids Dispersal (DSD), the excess biomass is constantly removed from the media by using high velocity jets of air from the installed diffusers. It should be advised that the flow from the outlet is diverted back to the head of works, but specific site conditions may differ. Co-settlement will then occur between the influent solids and the scoured biomass. The flow diversion should occur for the period of the DSD with the addition of 20mins to ensure that the solids retained from the DSD exit the plant through the outlet. It should be noted that it is impossible to precisely calculate the biomass yield for a specific project and as such the DSD/media movement routine should be tailored to the requirements of the site. The DSD regime will need to be set to the diurnal variations of the site, ensuring that, as well as, movement of the media the bacteria is provided with more air for the oxidation of the contaminants in the wastewater.

6. Plant Operation - Submerged Aerated Filter (SAF)

WCSEE's innovative submerged aerated filter combines fixed film and suspended growth, which offers high rate bacteriological oxidation. The torturous path that the air bubbles take through the media beds, maintains prolonged contact with the fluid, heterotrophic and autotrophic bacteria. This means that higher rates of oxygen transfer can be achieved, maintaining high rates of BOD and NH_3 reduction, which is relatively tolerant to shock conditions. The submerged aerated filter has been specifically designed to suit the influent loadings and accommodate the concentrations defined in the subcontract of works.

The Biologically active zone contains a high voidage (ε) plastic media (90%). The plastic media, with the assistance of the large functional area, enables a wide variety of microorganisms to grow; forming a gel like substance known as biomass. This gel like substance is extracellular polymeric substances that are excreted by the bacteria, enabling them to bond to the surface of the media.

Over time the bacteria at the surface of the biofilm die meaning that they are retained in the system, and at this point it is important for them to be scoured from the media and removed from the system. Prolonged periods without providing additional air could cause a build-up of inert organic matter in the media beds and could, in the worst case, blind the media beds. It will be critical for the solids from the filter are monitored in normal operation and also under conditions so that there can be early indication of problems within the plant.

The process of biological oxidation gives off carbon dioxide and humus sludge as by-products. Compressors (Blowers) are used to aerate the filter, running continuously. The humus sludge produced as a result of bacteriological oxidation is transferred to on site humus tanks for settlement.

Each air diffuser is fitted with a high level air admittance valve to prevent syphoning. No maintenance is required for the valves. In the case of failure (a pressure drop is indicated on the air gauge), the valve will need to be replaced.

7. Air blower control:

The air blowers used will be project specific: - The blowers will work in a Duty/Standby configuration as follows:

7.1 Running of the blowers

The blowers will run continuously (24-7) to supply the SAFs with air to allow the bacteria to oxidise the carbonaceous matter and ammonia. The duty only blower will run continuously for 7 days until the SAF plants are seeded. A second standby blower will switch on twice a day to provide additional air to the plant. Once the plant is seeded and is treating within the sites discharge consent, the blowers can be turned off for 15min, then on again for 15min (and so on) reducing the power consumption by up to 45%. Please contact WCSEE for further information.

7.2 Hand operation

The operation of the blowers in hand means that the blowers can be run and operated manually; thus meaning that the operative can have control over the operation of the blowers. This operation will not run any of the timers in the panel, so they will not run in their pre-set operation.

7.3 Off operation

This operation will not allow running of any of the functions, no operations can be initiated.

7.4 Automatic operation

Automatic operation will run the internal timer program inside the panel so that the blower changeover/scour routine runs.

7.5 Dynamic Solids Dispersal “DSD” cycle

The following is meant only as an indication if using 2 or more Hybrid SAF tanks or if required:

The DSD cycle ensures that the biomass growth is maintained at an acceptable level; dependent on the growth rate of the carbonaceous and nitrifying bacteria. This will be done manually by the site operator by closing off 2 of the 3 shut off valves on the manifold according to which tank you are operating. This can be repeated a further 2 times for all 3 tanks.

7.6 Safety protection

The blower(s) will be pre-fitted with thermistors for over temperature protection. When an over temperature is experienced, the blower will stop and there should be an alarm to telemetry to alert the operative to the issue.

The blower(s) will also be fitted with anti-condensation heaters, which will provide sufficient heat, such that the blowers will not encounter internal condensation and corrosion. The anti-condensation heaters should only operate when the blower is not in operation.

8. Air Blowers

Please refer to the manufacturers operation and maintenance manual for their recommended maintenance routine.

Blower(s) are supplied to suit individual plants oxygen demand required for carbonaceous degradation and nitrification.

All blowers should be isolated from the electrical supply before maintenance is performed. The control panel should have provision for the locking off of the power supply with an operatives padlock. This avoids forgetting to isolate and is good working practice in most water utility applications.

Please note - The ambient temperature inside the enclosure/kiosk should not exceed 40^{O}C. Ensure no dangerous mixtures (i.e. solvent), excessive humid air, water vapour, or aggressive gases or traces of oil or greases can be sucked in to the blower(s) air intake.

When installing the blower(s) it should be remembered that the inlet filter and removable covers must be readily accessible for ease of service. The cooling air entry and exit should be unrestricted allowing a free passage of air. Care should also be taken that the blowers are installed in such a way that the exhausted cooling air is not re-circulated back into the blower inlet filter.

8.1 Starting up:

Compare the current, voltage, and frequency of the incoming supply against the motor nameplate. A suitably competent person or qualified electrician should make all electrical connections; any deviation from this will affect the warranty of the aforementioned project.

Check the direction of rotation of the blower is correct by switching the unit on and off for a short period before connecting air hose (see arrow on motor fan cover). The pressure relief valve is factory set to protect the electrical motor, meaning that if an excess of pressure is encountered, by valve closure or the pressure relief valve will simply vent; thus protecting the motor from damage.

Note: all running currents voltages and frequencies should be noted on plant start-up so that a comparative analysis can be carried out on the plant if problems occur. The running currents of the blowers should be checked on a regular basis and noted in the site records.

9. Routine maintenance:

The following routine maintenance tasks should be carried out on the plant over the time period stated:

9.1 Weekly checks:

1. Check that the blower(s) are functioning correctly.
2. Check for any irregular noises coming from the blower(s).
3. Note the running currents of the blower(s) to ensure they aren't drawing an undue load. Note: this will give an indication of filter condition and internal lubrication issues. If you notice that load is significantly higher than the blower in clean/new condition it would be recommended to switch the blower to the off position and ensure that the standby blower is running. The plant should never be left without a source of air for a period longer than 48hrs. If a period of longer than 48hr's is anticipated WCSEE should be contacted: - (+44) 02392 242 600.

4. Check the operation of the fans and that the thermostat activates them correctly. If fans are fitted to the motor shaft ensure that they are running correctly, drawing air in through the louvres.
5. Remove any debris from the louvers.

9.2 Six Monthly

Carry out the weekly checks with the addition of the following:

1. Check the operation of the extractor fans in the blower enclosure (if supplied) and that the vents are not obstructed.
2. Note the running current of the blower(s), comparing them to the initial values for the 'clean condition' blower.
3. Check the operation of the pressure relief valve(s) and non-return valve(s) fitted within the blower enclosure.
4. Inspect the inside of the blower(s) enclosure for obvious leaks or damage.
5. Check the operation of the pressure switch (es) by adjusting them to the operating level so that they latch and then ensuring that they can be reset in the main control panel.
6. Remove and inspect the air inlet filter(s), cleaning and grading their mechanical integrity. If the filter(s) show signs of excessive clogging then it would be recommended that it be replaced.
7. Inspect the air distribution manifold checking for leaks or any damage to the pipework, repairing if required.
8. Sequentially providing additional air to the media beds, ensures that the biomass does not accumulate the filter beds. If this is done at the six month period it will ensure that the longevity of the filter is maintained. This is done by isolating the valves on the SAF unit to enable them to be scoured in a sequential manner for 15mins (1 cell at a time). This process will again be a requirement of the DSD routine analysis, and as such may not be required if the daily media movement routine is efficient.
9. Check that all of the trips and requisite alarms are initiated when the failures occur in the system.
10. Check the operation of the plant under full flow conditions.

9.3 Yearly

Carry out all of the above checks with the addition of the following:

1. Test all of the control panel functionality, ensuring that all of the safety features work correctly.
2. Simulate faults and ensure that they can be re-set and brought in to operation
3. Check the operation of the fan and service/replace if required.
4. Check the air inlet filter and replace if required.
5. Refer to Elmo Rietschle operating instructions for blower maintenance.

9.4 De-commissioning

When emptying the Hybrid tank after operation using the drain down valve provided, this will leave 1m3 of fluid within the tank. If the tank is required to be 100% empty, the remaining 1m3 of fluid will need to be sucked out by using either the drain down valve, or by putting a tanker hose down 1 of the 8 baffle's inside the tank. (this baffle will allow the hose to go down to the base of the tank).

10. Problem Solving:

The following are the issues that could affect the performance of the SAF treatment technology.

10.1 Blower not running:

Symptom	Corrective actions
Power cut	If temporary (24/48 Hours) do nothing; if extended obtain alternative source of power or tanker sewage away. Important – If a generator power has been used on three phase supplies, check for correct rotation of blower/s. **Note: the correct generator should be supplied by client, as voltage drop or variations in voltage will cause damage to the blowers. A qualified electrical engineer should be consulted when selecting a generator.**
Power supply fault	Switch off blower(s), check fuses and any RCD breakers. On 3-phase supplies check for correct rotation. Switch blower to hand and the blower should start. If not, switch off and call electrician. If a surge is experienced then all equipment should be isolated and tested by a qualified electrical engineer before the plant is put back in to operation. **Note: If a period of longer than 48hrs without aeration is anticipated then alternative means of aeration will need to be sought. 48hrs will be the limit at which an aerated plant can be left without air, and as such the bacteria within the process will start to die.**
Blower overload has tripped	Check for any obvious causes, reset overload and switch on; blowers should start. If not, switch off and call an electrician.
Blower runs intermittently	Check that the cooling fan is running and the air ducts are clear. Overheating in the cabinet will cause the high temperature trip to switch off the power to the blower. Replace fan if it has failed. Temporary solution if the weather is fine: leave the enclosure door open but ensure that no-one can gain access to electrical or rotating mechanisms. Check the operation of the PRV's valves, have they seized shut and require freeing up?

11. Plant start-up:

11.1 Introduction:

The bacteria necessary to provide the biological oxidation are present in normal sewage and will rapidly multiply if given the right conditions. The process breaks down most of the wastewater into carbon dioxide (CO_2) and water.

11.2 Bacteria types:

There are two main types of bacteria, which are as follows:

Carbonaceous bacteria which, as the name suggests will break down the carbon based solids, and is promoted by the addition of nutrients up stream.

The carbonaceous bacteria are more prolific and also less prone to damage by chemicals (cleaning agents) than the nitrifying bacteria. Both are adversely affected by low temperatures or low pH that may be found in soft water areas. The nitrifiers are more critical and cease to be effective in temperatures below 10°C or pH below 7. Low temperatures are not normally found in domestic sewage, this will rarely drop below 15°C unless the pipe runs are very long or the flow very small.

The right conditions to grow bacteria are to have both oxygen and food available and these conditions are found in the Submerged Aerated Filter.

11.3 Startup:

11.3.1 Procedure:

A. Switch on Blower(s) and check that air distribution is correct.

IMPORTANT: On blowers with 3-phase motors, check for correct rotation BEFORE CONNECTING THE HOSES TO THE BLOWER(S).

B. Introduce the clarified fluid into the tanks at the normal or reduced rate.
C. Check after 12 to 24 hour's that blower(s) are running correctly and have not overheated.

11.3.2 Time taken:

Under normal conditions a plant being used for BOD reduction and nothing else will promote the stable growth and decline of carbonaceous bacteria up in 4-6 weeks; however it should be noted that this process is subject to the environment in which the bacteria grow. For nitrifying processes seeding of the plant can take up to 14 weeks, due to the sensitivity of the bacteria at low temperatures and inhibitory chemicals.

Temperature, loading and the correct nutrient source can be limiting factors in the start-up of a treatment plant capable of BOD reduction.

11.3.3 The seeding process:

It would be prudent to monitor the BOD reduction during the start-up process so that it can be plotted graphically. This will help in the future to give an indication of the seed up time on the specific effluent if there is a toxic shock or a period of non-operation

12. Appendix 1 – lifting certification document for Hybrid Tanks

Industrial Safety Inspections Ltd
Lea Lodge, Monwode Lea
Ansley, Nuneaton
Warwickshire
CV10 0QU

Tel: +44 (0) 1675 481779
Fax: +44 (0) 1675 481780
Web: www.isisafety.com
email: info@isisafety.com
VAT Reg. N° 346 0592 55

Certificate of Test of Lifting Equipment as required by the Lifting Operations and Lifting Equipment Regulations 1998 (L.O.L.E.R.), Regulation 9

TEST CERTIFICATE No: isi/ 099964/210915/14

Customer:	WPL Limited, Units 1 -2 Aston Road, Waterlooville, Hampshire PO7 7UX
Item description:	UK Hybrid 14 tank 2800 mm x 2800 mm x 3100 mm
Item net weight:	4500 kg
Identification numbers:	S/No: 210915/14
Location of test if different from above:	As above
Item material:	As per manufactures specification
Test procedure:	Application of tank + 4500 kg for 10 minutes
Equipment used:	Load link No: 6701 calibrated on 11/03/2015 Load link No: DEDC2501591 calibrated on 11/03/215
Test results:	Careful inspection during and thorough examination of the item after the test revealed no evidence of cracking, permanent deformation, paint flaking or any damage which may affect function and safety. No connection has been loosened or been damaged. Further M.P.I. N.D.T of the welded lifting points performed after test - satisfactory.
Defects noted and alterations or repairs required before item is put into service:	None
Other defects requiring attention:	None
Notes:	This item will require statutory inspection by a 'competent person' at 6 monthly intervals or in accordance with a written scheme. This certificate is not a certificate of conformity.
Safe working load:	Weight of tank empty (4500 kg)
Date of test:	21st September 2015
Test Engineer:	J B Inglis I.Eng. M.I.Plant.E. M.S.O.E. M.B.E.S.
Signed:	J.B. Inglis
Date of certificate:	28/09/15

13. Appendix 1 – Pipe Datasheet – 8" PVC, FLANGE

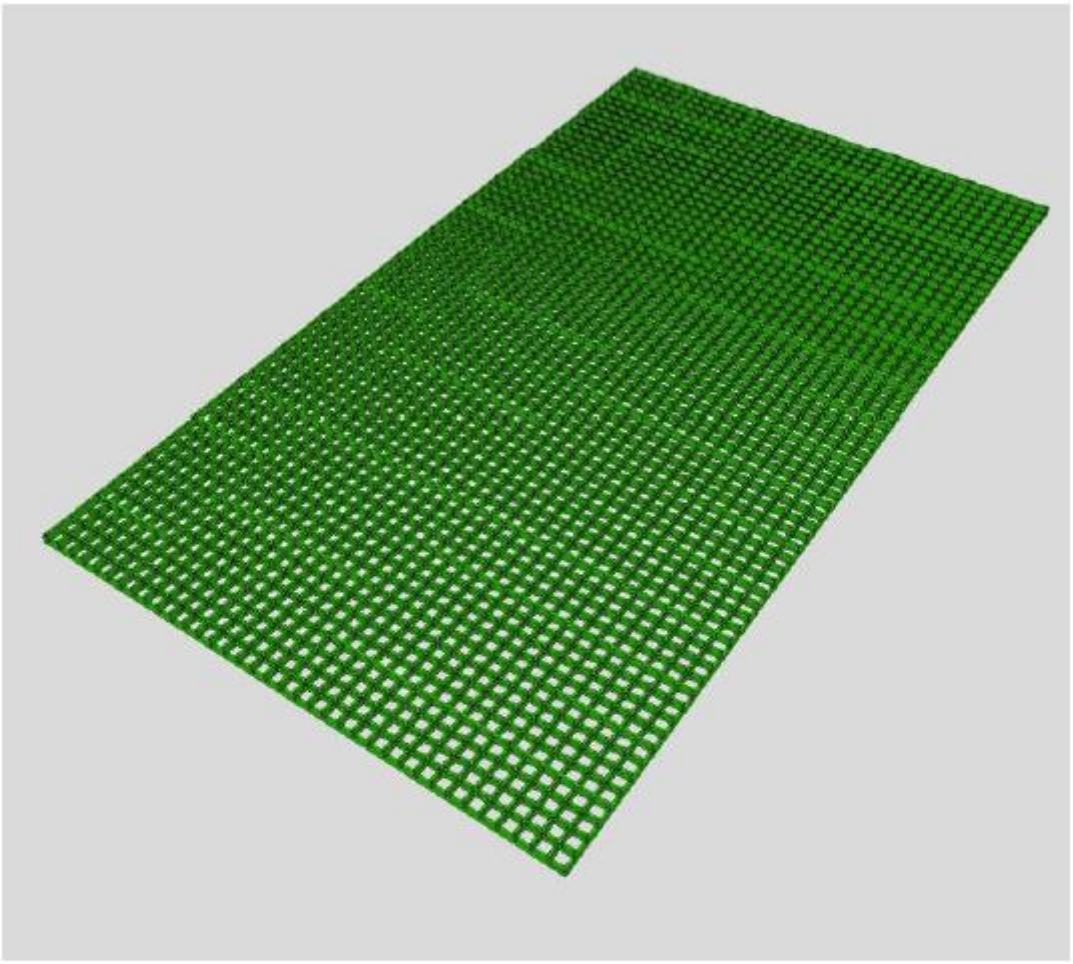
EFF-TM2-IND	DECEMBER 2008

Effast PVCu and ABS

High performance PVCu and ABS Pressure Pipe Systems

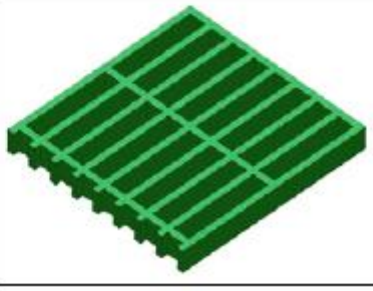
14. Appendix 1 – Grid Datasheet

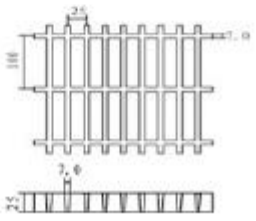
Moulded Grating Data Sheet & Installation Guide



FG22

Grating Name	FG22
Grid Pattern	25X25X100
Load Bar Thickness	7
Load Bar Centres	25
No. Bars per foot	-
Open Area	67%
Approx. Weight	13 kg's/sq.m
Panel Sizes Available (mm)	3007 x 1007





15. Appendix 1 – Hose Datasheet

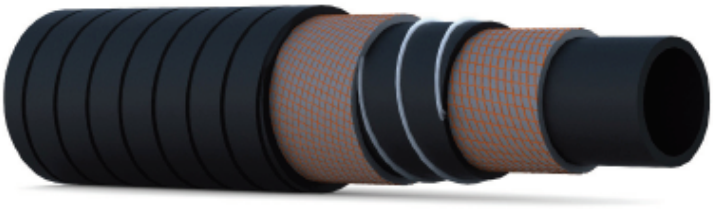
FlexTECH
HOSE SOLUTIONS

T5400SRC

Rubber Hose

Textile Reinforced Steam Delivery Hose

Hot Water & Steam Applications



Description

A 5 bar suction and delivery hose for hot water and coolant fluid, applied in engine cooling and heating systems. This radiator hose has outstanding flexibility making it perfect for installations with restricted space.

Construction

Liner
Smooth, black, EPDM rubber compound
Reinforcement/s
High strength synthetic plies with steel wire spirals
Cover
Black, helix grooved cloth impression EPDM rubber compound which is abrasion, ozone and weather resistant.

Temperature Range

-40°c to +120°c

Specification									
Size	ID (mm)	OD (mm)	Wall (mm)	Bend Radius (mm)	WP (bar)	BP (bar)	Vacuum (bar)	Weight (g/m)	Product Code
5/8"	16	24	4.0	60	5	15	0.8	450	T5400SRC-016
3/4"	19	27	4.0	70	5	15	0.8	500	T5400SRC-019
7/8"	22	30	4.0	75	5	15	0.8	540	T5400SRC-022
1"	25	33	4.0	85	5	15	0.8	580	T5400SRC-025
1 ⅛"	28	36	4.0	95	5	15	0.8	640	T5400SRC-028
1 ¼"	32	40	4.0	105	5	15	0.8	730	T5400SRC-032
1 ½"	38	47	4.5	130	5	15	0.8	930	T5400SRC-038
1 ¾"	45	54	4.5	150	5	15	0.8	1180	T5400SRC-045
2"	50	60	5.0	165	5	15	0.8	1300	T5400SRC-050
2 ⅜"	60	70	5.0	200	5	15	0.8	1700	T5400SRC-060
2 ½"	63	73	5.0	220	5	15	0.8	1800	T5400SRC-063
3"	76	96	5.0	275	5	15	0.8	2170	T5400SRC-076

WCS Environmental Engineering

A WCS Group Company

Industrial wastewater treatment
+44 (0) 15 3083 0020

Sewage treatment
+44 (0) 23 9224 2600

info@wcs-group.co.uk
wcs-group.co.uk/environmental-engineering