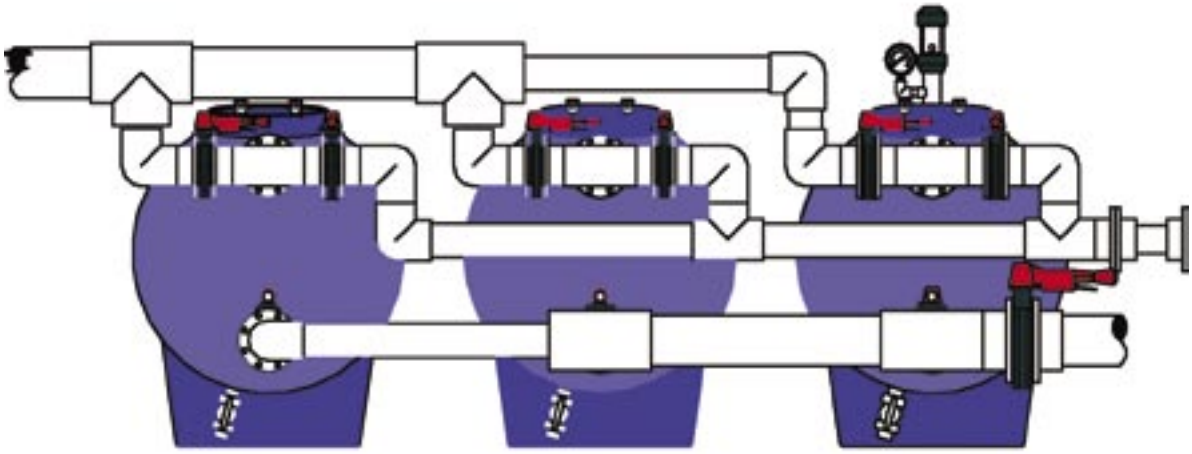
CGF

FloModuLata ™

INSTALLATION & OPERATING MANUAL

"Multiple Filters with a Shunt Backwash System"



CHADSON GRANULAR FILTERS

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PREFACE

Congratulations on your purchase of a CGF filter. This product is designed & made in Australia specifically for Australia's harsh conditions. Providing that the product is installed and operated according to Instructions it will provide many years of reliable service. Please take the time to read & understand these Instructions before commencing work or starting-up the filter system. This will help you obtain all of the benefits and the features that are built into this product. Prior to the proposed handover date, the Installer should issue this Booklet to the Pool Operator with any other information that he may be required to provide.

These Instructions supersede all previous information and are effective from January 2004. The information provided within this Document is the property of Chadson Granular Filters (CGF) and it is subject to Copyright that prevents it from being copied, modified, or used for any purpose other than originally intended.

Whilst the Information provided within these Instructions is the best available at the time of publication, it may be subject to future change or periodic revisions. Fulham Engineering Services Pty Ltd & Chadson Granular Filter Systems assumes no responsibility for the use of this information. It is the Installers and the Operator's responsibility to obtain and to check all current specifications and requirements prior to undertaking any work, procedure, and or revision.

Given our commitment to provide the best possible information that is available, we welcome any comments & advice from Installers and or Operators. Send your comments & suggestions to **enquiries@chadson.com.au**.

1. INTRODUCTION

- These Instructions refer to an installation with at least three filters that are arranged in parallel for "shunt backwashing". Unlike most other backwash methods, the CGF shunt backwash method uses "clean filtered" water for backwash purposes. This backwash method will help to maintain the permeability of your filter bed.

- The performance of your Chadson Granular Filter has been carefully ascertained and proven in many similar applications.

- This product must be installed and commissioned by an accredited filtration contractor.

- These Instructions are generic by nature and they should be read in conjunction with a specific Data Sheet that relates to the filter Model nominated in the supply Contract.

- Shunt backwashing permits the use of conservative "filter rates" without compromising the requirement to provide the required wash water rate of $42m^3/hr/m^2$. Apart from simplifying the commissioning process, the shunt backwashing provides many operational benefits.

- For details on other filter arrangements (and different backwash methods) refer to other CGF Instructions. Whilst CGF shunt backwashing is commonly specified and recommended, it is not the only backwash option that is available for CGF filters.

- The face plumbing & the backwash valving for this application may be supplied as an integral part of the supply contract. Alternatively, it may be supplied and installed by the filtration contractor/installer.

- The maximum recirculating rate for a shunt backwash system should be considered to be no more than the total number of filter vessels, minus one, times the filter area of each filter module, times the maximum filter rate of $42m^3/hr/m^2$. For example, the recommended maximum recirculating rate for a four tank filter system (with a filter areas of $4m^2$) would be calculated as 3 vessels times $4m^2$ times $42m^3/hr/m^2$ equals $504m^3/hr$.

- The minimum recirculating rate for a shunt backwash system must not be less that the required backwash flow as stated in the relevant Data Sheets, plus 20%. Given that the wash water rate for say a 4m² filter is 168m³/hr, the minimum recommended recirculating rate for a bank of 4m² filters would be 202m³/hr.

- These Instructions apply to all Model Numbers from MHS-1500 to MHS-7250 as well as all vertical format filters. Reference to product Data Sheets will provide specific information on physical dimensions, media requirements, required backwash flow, product service weight, etc.,

- Provision for air scouring is one of the many options that may be supplied with this product. As a general comment, air scouring is not commonly recommended for “shunt backwashing”. The provision of air scouring will only tend to slow down and to complicate the shunt backwash process. In cases where air scouring is specified a mandatory requirement, it is suggested that air scouring be considered as “maintenance provision” that does not form part of the normal “day-to-day” backwash requirements.

- Unless certified otherwise, the filters outlined within these Instructions shall be used for commercial swimming pools using either fresh or salt water. Other uses (such as aquaculture, aquariums, equine pools, and industrial applications) may be subject to specific Instructions and different operating requirements. Such advice is customarily provided in **Section 27** as an Addendum.

- Do not connect any standard filter models to mains water supply. Custom-made filters are specifically available for this purpose. The operating pressure of a city water supply is customarily far higher than that required for a swimming pool application.

- Keep the filter label in good condition. Be sure to obtain a replacement label, if you discover that the filter label is damaged or is missing.

- Record your filter’s serial number in a suitable asset register. You will need this serial number to obtain future service and or spare parts.

- Trapped and compressed air inside a pressure vessel can cause serious damage and risks - ensure that all air is out of the system before testing and or operating the system. Conversely, excessive vacuum may cause implosion – install the vacuum breaker and any other devices that are necessary to ensure that the filter is not subject to vacuum, excessive pressures, or sudden surges (water hammer).

- The excessive use of chemical flocculants may clog your granular filter. Use chemical flocculants judiciously and do not exceed the recommended dose rates.

- If fitting a “salt water chlorinator” (or any other similar device) great care must be taken to ensure that the appliance is installed in strict accordance with that manufacturer’s Instructions. Such work should also comply with any local Codes and or Standards that may be applicable.

- Salt-water chlorinators must have some form of “gas trap” or safety device. Failure to adequately address these requirements could affect your safety and result in serious damage.

- When installed and operated according to instructions, the Original Equipment Purchaser (OEP) is provided with a Warranty which states that the product is free from manufactured defects.

- This product requires regular service and maintenance. This work must be undertaken by an Authorised Service Centre (ASC) using genuine Chadson spare parts.

- Do not operate or change any plant or equipment settings unless suitably trained or qualified. Any operational problems, water leaks, or anomalies must be reported and attended to as soon as they become apparent.

- Improper or negligent operation of a filter plant can result in costly damage to numerous system components. It is essential that the installed filter plant be correctly operated and maintained at all times. Product Warranty is conditional upon correct installation & operation.

2. THE CGF SUPPLY SCOPE

The components supplied with this filter system are as follows:

- Three or more filters as defined by Data Sheet or Supply Contract.
- One Kinetic air release/vacuum breaker assembly with relevant pressure gauge(s) for each filter.
- One Screened Drain Cock assembly for each filter.
- Installation & Operating Instructions.

Check that all components have been delivered and that there are no signs of obvious transport damage. Read the identification label that is fixed to each filter and confirm compliance with the supply Contract. Report all claims in writing within seven days of the delivery date.

Subject to the specific Contract details, face plumbing and backwash valving may be included in the agreed supply scope. Filters may also be supplied with selected options that include air scour provisions, automatic backwash, high-pressure rating, etc., Refer to the Supply Contract for specific details.

3. TRANSPORT & FILTER HANDLING

“Delivery” and “the point of delivery” are as determined by a supply Contract.

To protect the product from transport grime and dirt, CGF filter vessels are wrapped in bubble wrap. This wrapping should be removed from the vessel when it first arrives at site. If left in direct sunlight for long periods of time (particularly during the hot summer months) this wrapping could melt, and it could adversely affect the exterior finish of the filter.

The timber board supplied on the filter’s inlet and outlet should be left in place until the installation time. They will reduce the risk of foreign materials entering the filter vessel. Filter accessories and sundry items (air release, vacuum breaker, screened drain, pressure gauge, etc.,) for this application are shipped within a separate supply container/box that is despatched with the filter vessels.

The shipping weight of individual filters is as nominated on the relevant data sheets. Whilst some of these weights do not necessarily preclude man handling, on no account should the vessel be moved or lifted via the filter’s inlet and outlet connection. Horizontal filters are best moved into position by using a forklift (with extended tynes) or a lightweight (floor) crane using canvas type slings located under the belly of the filter.

Subject to their diameter, vertical type vessels may be supplied strapped to a timber transport pallet. Vertical filters (larger than 1500mm diameter) are supplied with lifting lugs. Do not roll vertical vessels on their support skirt. Mechanical lifting plant must be operated in accordance with statutory requirements by trained and authorised staff.

4. WHAT YOU NEED TO COMPLETE THE INSTALLATION

- A full understanding (and job experience) with all of the procedures that are necessary to install “mechanical piping systems”. These Instructions are not intended to provide any detailed information on the method of joining of pipe, or fitting valves, etc., These requirements are deemed to be fully understood by the trade qualified Installer.

- A design, a diagram, or at least a sketch plan, detailing how the filter is to be arranged to suit the planned connection to the filtered water line, the soiled water line (from the pump) and the wastewater line (to the backwash detention system).

- Copies of relevant project specifications, relevant Standards, Guidelines, and Codes that apply to mechanical plumbing, filtration, water treatment, and other related subjects.

- An adequate supply of all necessary pipe, fittings, and supports/brackets - to suit a material take-off that is best determined from the above design, diagram, or sketch plan.

- Standard consumables (such as Teflon tape, solvent cement, cleaning agents etc.,) a high quality torch, and all the tools hat are required and expected for mechanical plumbing.

- The required quantity and grades of filter media conforming to the requirements of the AWWA B100 Standard. Note that CGF Data Sheets recommend the placement of a gravel substrate.

5. FILTER PLANT DESIGN

In order to obtain optimum performance from your CGF filters it is important that the filter system be correctly designed and sized. If a specific filter model has not been specified we suggest that you seek advice from a recognized Consultant. Alternatively, we recommend that you contact a representative of Chadson Granular Filter Systems for detailed advice and assistance.

The effectiveness of your installation will largely depend upon the use of an appropriate filter area in combination with an efficient backwash regime. Whilst "filter rates" may legitimately vary, the delivery of a 42$m^3/hr/m^2$ backwash rate is a mandatory requirement that must be satisfied by the Installing Contractor. The "total filter area" required for your project will vary according to the pool volume, the water depth, the type of application (indoor or outdoor pool) water temperature, process design, turnover rate, and bather load. Given the extent of potential variables, the case history of other similar projects can be a very useful tool in assessing the load carrying capacity of a specific plant. Subject to specific details being provided, CGF will provide advice on filter sizing and possible options. Various classes of engineering drawings are also available upon request.

Ignoring any specifics of the shunt backwash process, the recommended "filter rates" for common applications are as follows:

- Industrial applications 10 to 15 $m^3/hr/m^2$
- Indoor heated pools 20 to 28 $m^3/hr/m^2$
- Outdoor Pools 25 to 42 $m^3/hr/m^2$

Designers & filtration contractors should note that shunt backwashing is not the only backwash option that is available for CGF filters. As noted in **Section 1**, there are hydraulic limitations (in both the maximum & the minimum recirculation rate) for an effective shunt backwash system. If any doubt, obtain further guidance from your Consultant or direct from CGF.

In practical terms, "shunt backwashing" should not be applied to any more than six filter modules in any one "filter bank". For example, if your project required twelve filter vessels, the use of at least two separate filter banks would be recommended. The use of "shunt backwashing" will tend to simplify the "application engineering" that is usually required when selecting a pumping system that required to provide different "filter" and "backwash" flows, at potentially different duty points.

To cater for variable "high and low load" conditions, the use of two "half-duty" pumps is commonly recommended. When selecting pumps for this application, remember that two half duty pumps rated at say 250m^3/hr will not provide a total system flow of 500m^3/hr. Conversely, when operating with only one of the "half duty" pumps, the system flow will be significantly more that "half of the full system flow". The

same/similar theory applies to installations using more than two pumps. All “multiple pump” installations should be electrically installed on a lead/lag basis.

If using two “full duty” pumps (as in a “duty/standby arrangement”) it is imperative that each pump be electrically installed so that the pumps cannot be inadvertently operated at the same time. Such pumps should be arranged to operate on an alternative basis.

Notwithstanding the pumping arrangement that may be provided, all recirculating pumps must be fitted with suitable pre-pump strainers that provide effective screening of solids that are larger than 4mm. Contact CGF for further details on the range of pre-pump strainers & pump connectors that are available.

Whilst the filter’s maximum operating pressure is 175 kPa, an appropriate “system design” should provide a clean start-up pressure in the order of 40 to 70 kPa. Given that it is “flow that cleans pool water”, higher operating pressures do not provide any technical benefit. With appropriate design, the shut-off head of the recirculating pump should not exceed 20m head. CGF filters are pressure tested to 350 kPa (twice the recommended maximum operating pressure). If assistance in pump selection is required do not hesitate in obtaining specialist advice.

To ensure that filter vessels are not subject to vacuum conditions, all downstream boost pumps must be electrically interlocked (with the main recirculating pumps) so that they cannot be operated unless there is an adequate water supply flowing through the filters.

When planning your installation, be sure to provide adequate service clearances for the future replacement of filter media. Subject to specific conditions the service life of a conventional sand media may vary from 5 to 8 years. Suitable access must also be provided for the initial installation and the possible/future replacement the filter vessels.

6. FILTER VESSEL LOCATION

For best performance locate the filter system as close as possible to the pool and to the associated services, such as the pool’s balance tank, the system’s backwash tank etc., Refer to **Section 20** for further details on the disposal of waste wash water.

Subject to the specific installation requirements, the filters may be installed above or below the pool’s water level. In either case, the relative invert levels of the pool’s water level & the plant room floor slab should be kept to a minimum. If the filters are a long way above water level or have long discharge lines to either the pool or the backwash detention tank, a negative pressure (vacuum) could be created inside the filter vessels. In these circumstances the risk of filter “implosion” needs to be adequately addressed in the process design phase.

If located above the pool’s operating water level the recirculating pump may require a footvalve for “priming” purposes. In these cases, a “hartford loop” (in the filtered water return line) is also required to minimise the syphon effect that will “drain down” the filter when the recirculating pump is shut down. This loop must rise above the height of the filter vessel, or at least above the sand bed depth. Contact CGF for details on the range of available footvalves.

If located below water level, isolation valves will be required for future filter servicing. When filters are installed below the pool water level, the system designer is required to ensure that the plant room is effectively drained under all possible conditions. The CGF filter warranty excludes any consequential water damage.

If the filters are to be installed within an open filter yard it is best to shade them from continuous and direct heat from the sun. Exposure to the elements may result in some discolouration and powdering of the outside surfaces of the filter. If this were to occur it is recommended that the exterior surfaces of the filters be painted with a solar resistant acrylic paint (like Wattyl Solagard or equal).

The filters should be placed on a level concrete slab that is capable of supporting the full service weight of the filters (including its filter media and its water contents). The service weight of each filter is as detailed on the filters data sheets. Filters should be levelled-up (by using a spirit level) so that inlet & outlet flanges are square & true. If required pack & grout the filters support skirt/cradle as required.

Do not proceed to fill the vessel with filter sand at this stage. The filter media is best placed when the filters are installed and plumbed in their final position. No attempt should be made to move or re-position filter vessels once it has been filled with filter media.

7. OPENING THE FILTER

Subject to the filter Model and the Supply Contract, the number and the type of media access hatch may vary.

When first opening the filter, it is essential that the elliptical cover plate (of the standard “inward opening” access hatch) be prevented from falling into the filter. Failure to observe this requirement could damage the filter’s underdrain. Caution is required as this type of accident is not covered by warranty. Keep a tight hold of the manway cover during all of the following procedures:

1. Slacken both hexagonal nuts that secure the davit clamps into position. Do not fully remove the nuts at this stage.

2. Remove one of the above nuts and remove one clamp completely.

3. Push access cover inwards to break the seal - note the second clamp will prevent the cover from falling into the filter.

4. Slacken the second nut further whilst holding the threaded stud (exposed by the removal of the first nut and clamp). Do not fully remove this nut, but take it to the end of the thread.

5. Whilst still holding threaded stud, twist second clamp to clear manhole, and push the access cover inwards.

6. Turn the access cover through 90˚ and remove it from the filter.

7. Check inside the filter for transit damage to the filter internals.

NOTE
Step 7 is an important procedure. Use a torch & carefully look for any loose or broken pieces. If any transit damage is noted, report this immediately to your filter supplier & do not proceed with the installation without obtaining further advice. In either instance, do not leave the filter vessel open; when there is no reason for the filter to be open, refit the manway hatch as detailed in **Section 8.**

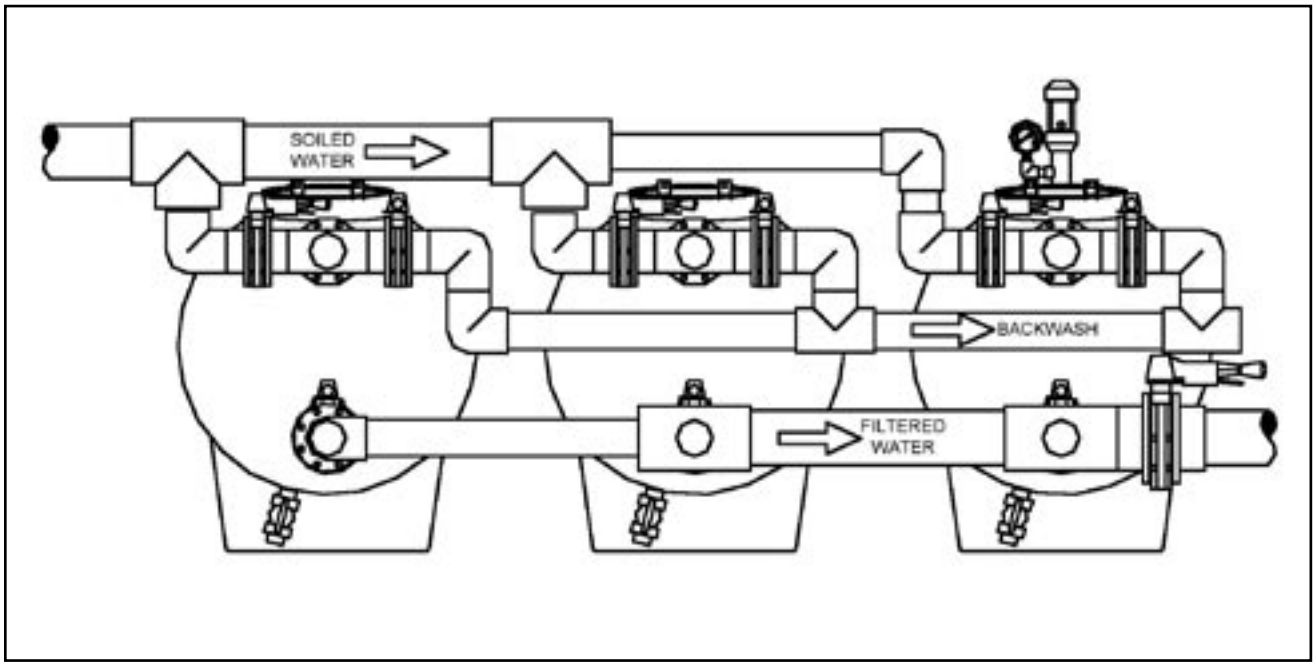
8. RE-FITTING THE MEDIA ACCESS HATCH

Reverse the procedure as outlined within **Section 7**. Ensure that the primary O-ring seal is clean and correctly seated. Do not use any sealing compounds and do not over-tighten the hexagon nuts that secure the davit clamps into position. With the “inward opening” design, the internal operating pressure of the filter will assist the sealing arrangement of this standard hatch without the need for any over-tightening.

9. FITTING THE FACE PLUMBING

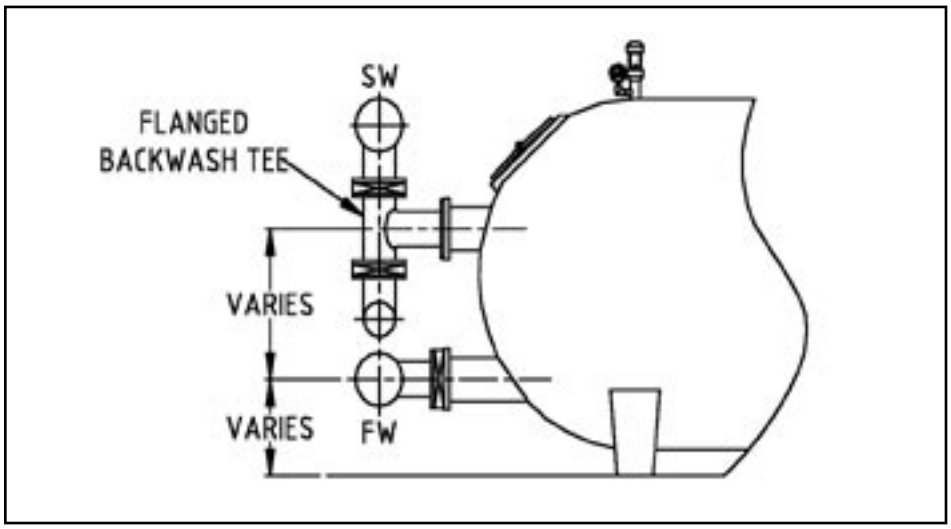
Subject to the supply arrangements, the filter's face plumbing can be supplied by CGF as a shop fabricated item. In this case, the materials of construction (and the valve specifications) may vary according the details contained within the Supply Contract. Alternatively, the Installer may elect to fabricate the filter's face plumbing on-site, using commercially available "plastic" pipe & fittings. Connection size to the filter will vary (100mm, 150mm, or 200mm) according to the filter Model.

Figure 1: Typical Face Plumbing (In this case, with an Engineering Plastic Piping System)



For these Instructions, face plumbing is deemed to comprise a flanged backwash tee (for each filter), a number of commercially available valves, and primary pipe headers for the soiled water line (SW), the filtered water line (FW) and the backwash line (BW). These primary headers are provided with flanged branches to suit the number of filters that are to be used.

Figure 2: Typical Face Plumbing Section (With shop fabricated Stainless Steel Piping)



To obviate possible “balancing problems”, the filter’s face plumbing should be sized on the basis that the line velocity does not exceed 2m/sec. The backwash line must not be smaller than the filter connection. To avoid the risk of preferential flows (and uneven dirt loads) all connecting pipework must be designed and installed according to the basic principle of “first in/last out”.

Adjoining flanges must be true and parallel to each other so that bolts are only used to make joints tight; and not to pull flanges to true alignment. On no account should flanges be over tightened. To avoid stressing of the filter connections, all pipework, valves and fittings should be loosely hung on suitable supports to allow for general alignment. When all pipework is in position, the final tightening of bolts can be completed in a systematic and logical manner.

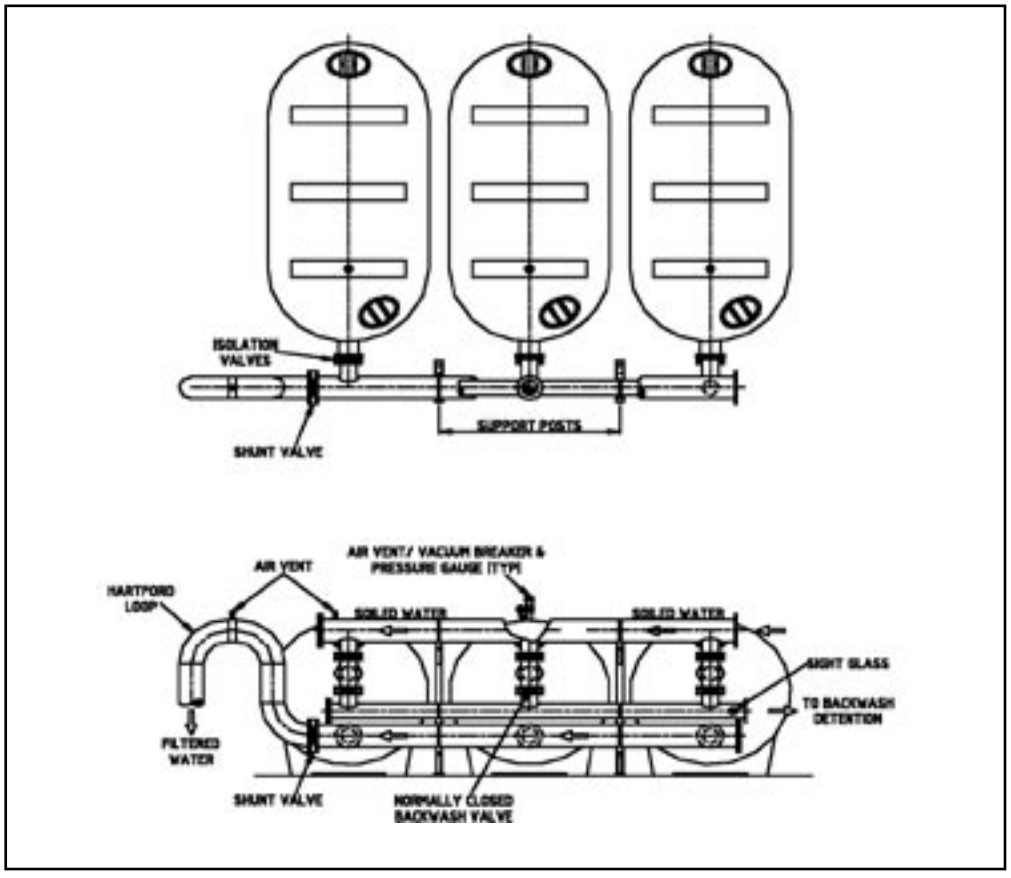
10. CONNECTING THE REMAINING PIPEWORK

The scope of work for this section is generally confined to the piping connections from the “face plumbing” as generally indicated in **Figure 1** to the pump(s) discharge, the filtered water distribution, and the backwash system. The assembly sequence for the connecting pipework may vary and as such, it is best determined by the installing contractor to suit the specific project requirements.

It is recommended that a flanged sightglass or approved equal be installed in the backwash line. It is also advisable that backwash lines be installed to be self-draining. Ideally, the backwash piping should be extended to ground level at the first available opportunity.

As stated in **Section 6**, if the filters are installed above the operating water level of either the pool or the balance tank, the parent filtered water line should incorporate a “Hartford loop”.

Figure 3: Typical Three Tank Filter System (with Stainless Steel Face Plumbing)



Connecting pipework should be designed and installed to satisfy all relevant plumbing codes. In accordance with “best Industry practice” all pipework should also be installed horizontally or vertically, in a neat and tidy manner. To avoid air locks, the Installer is required to provide suitable automatic air vents at all high points. It should be noted that “pipe fittings” reduce flow; for best efficiency, plan your installation to use the fewest possible fittings.

Connecting pipework must also be supported independently of the filter vessel (and or the face plumbing) with suitable support posts and brackets. Details and spacing of pipe supports must satisfy relevant standards and recommendations provided by the supplier of the piping. With plastic piping systems adequate allowance must be made for expansion and contraction. Refer to pipe supplier’s literature for specific details.

In accordance with normal Industry practise, pipework should be painted with approved gloss enamel that is applied as per the manufacturer’s Instructions. “Soiled water” lines to the filter plant should be painted in a green colour; “filtered water” lines should be light blue, “backwash” lines should be dark brown. For more comprehensive details on painting & labelling refer to the requirements of AS-1318 and AS-1345.

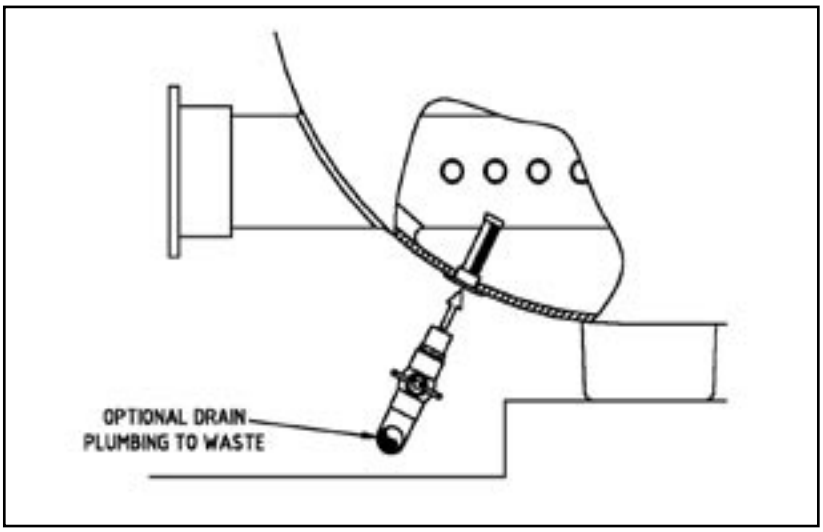
11. FITTING THE DRAIN VALVE

The standard Drain Valve Assembly is designed to drain the filter vessel whilst retaining the filter sand. It is supplied ready to thread into the female bulkhead fitting that is found at the bottom of the filter vessel. Apply at least two layers of Teflon tape to the male thread of the Drain Valve and carefully screw this fitting into the 40 BSP bulkhead fitting. Get into a good/comfortable working position, and be sure not to cross thread the start of this connection.

NOTE
Do not use a pipe wrench, stillsons, footprints, multigrips, or other similar tool for tightening. Simply “hand tighten” to provide a “snug neat fit”. Mechanical over- tightening can damage the threaded bulkhead fitting.

Notwithstanding the above warning, make sure that the screwed connection is watertight before placing the filter media. If this connection leaks under test; remove it, clean off all the sealant, re-apply new sealant, re-fit and re-tighten as instructed. If required, the outlet of the drain valve can be plumbed to divert “drain down water” to an adjacent floor waste or equal.

Figure 4: Screened Drain Valve (with 40BSP male thread)

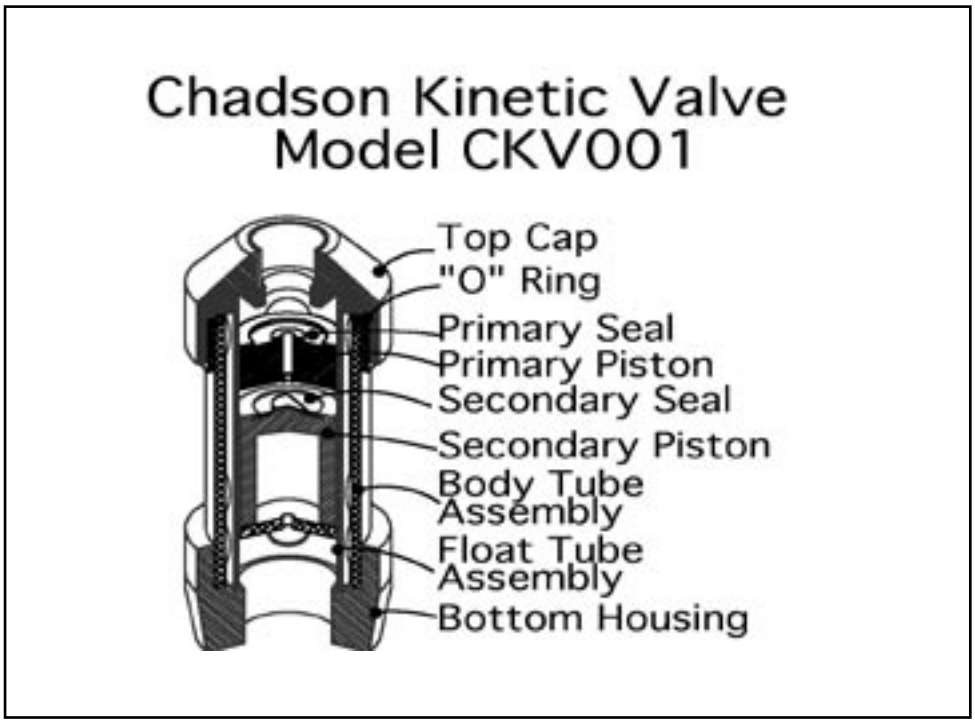


WARNING
Whilst Silastic RTC 732 (by Dow Corning) may be used as an alternative to Teflon tape, do not use other general purpose “pipe joining compounds”. Many of these compounds are designed for “metal to metal” joints and they will create stress cracking on plastic components that is not covered by warranty. Unwarranted over-tightening will also void your warranty.

12. FITTING THE KINETIC AIR RELEASE/VACUUM BREAKER

The Chadson Kinetic Valve (CKV) is designed specifically for use with Chadson filters. When supplied and installed in accordance with Instructions, the CKV valve will effectively purge air that is trapped inside the filters. It will also provide automatic vacuum relief with a fast & effective response time. Amongst other things, these two functions are vital for the effective operation of the filter.

Figure 5: Kinetic Valve Assembly



The CKV valve supplied (for filter Models up to MHS-3500) is known as a “Type A” and it is distinguished by the fact that it is supplied with a 40/20 Reducing Tee, 40mm Valve adaptor, 20mm BSP Faucet Elbow & 250kpa Pressure Gauge. Refer to **Figure 6** for typical details.

For filter Models MHS4000 and larger (that are supplied with a twin gauge panel) the CKV valve is supplied as a “Type B” which is designed for direct connection into the 40 BSP bulkhead fitting found on top of the filter. In this case, the “differential pressure gauges” are connected using the PE tubing and “snap-lok” connectors that are provided with your filter. Whilst gauge-mounting details may vary from Model to Model, the installation requirements of a twin gauge panel are as shown typically in **Figure 6**.

Figure 6: Typical Installation Chadson Kinetic Valve (Type A)

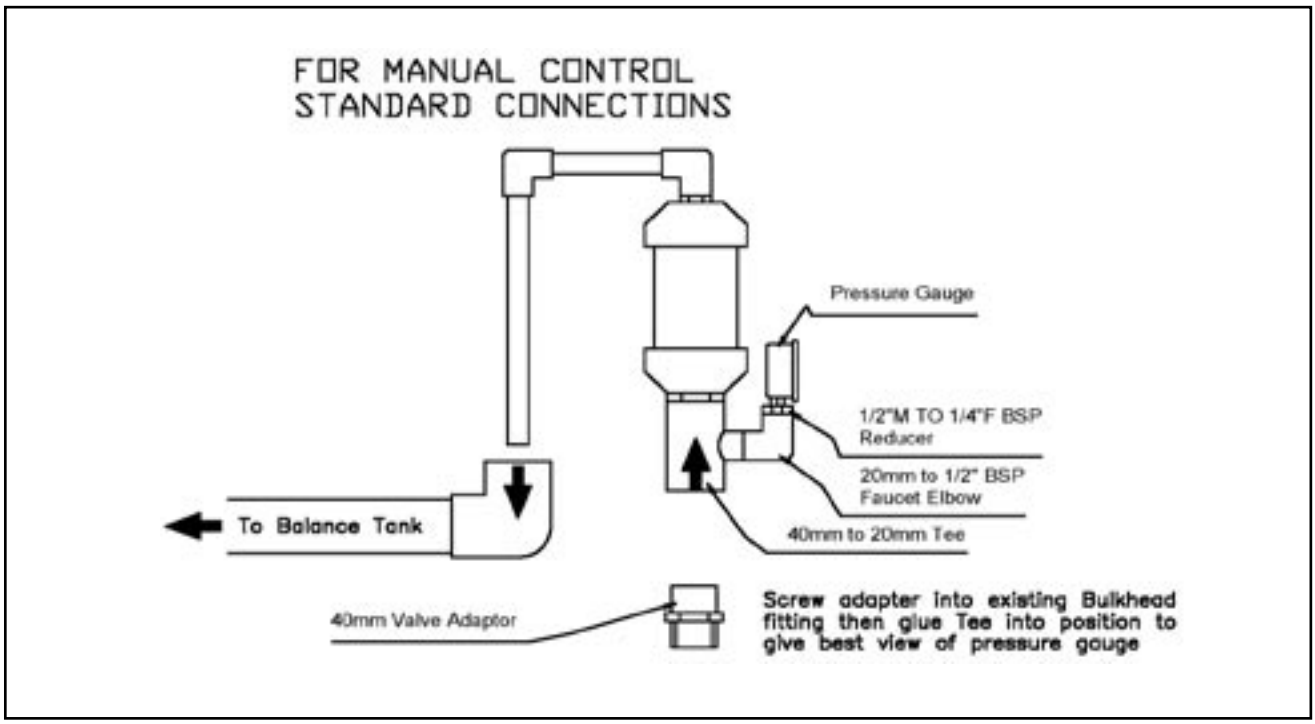
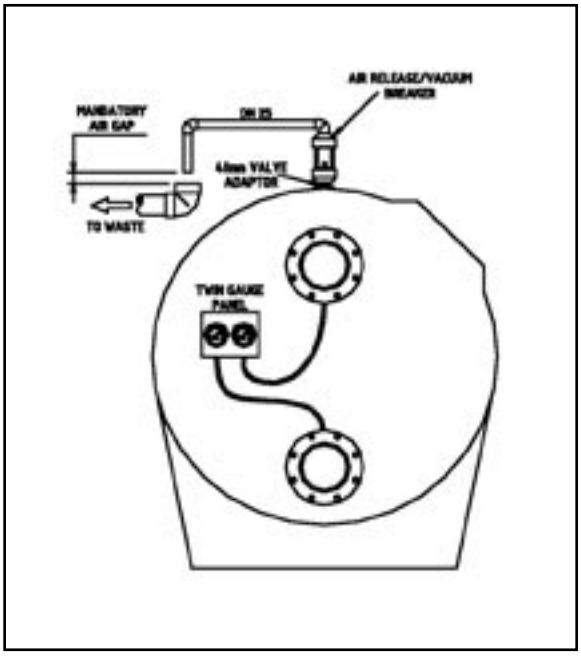


Figure 7: Twin Gauge Panel (with CKV – Type B)



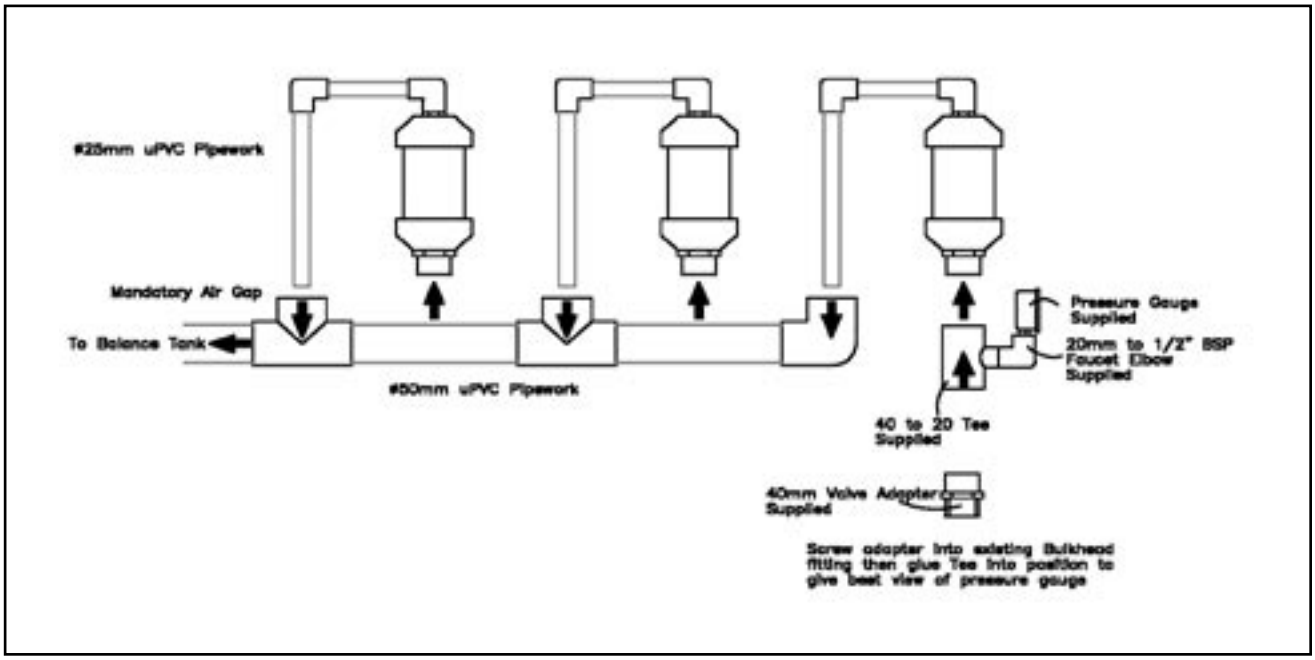
When in operation the filter vessel will be under positive pressure and the pistons inside the CKV valve will "float" to vent any air that may be present within the filter. Once all the air has been effectively purged from the filter vessel, the flow from the valve will automatically cease. The valve will re-open each time that air enters the filter.

When the filter operation is interrupted (or the filter cycle is terminated) the piston inside the valve will automatically "fall away" from the seal face to allow air to enter the vessel. As stated in **Section 6**, if the filter is located above the pool's operating water level, a Hartford loop in the filtered water return line should be

used to prevent a full filter drain down. This “drain down” action will tend to pull solid contaminants deep into the filter bed and it will make them far more difficult to remove by normal backwashing.

Note that the 40mm valve adaptor must be screwed into the filters top bulkhead fitting in the same fashion as detailed in **Section 11** (for the drain valve assembly). Use Teflon tape and hand tighten for a “snug fit”. Note that the valve must be installed vertically with the 40mm connection at the bottom.

Figure 8: CKV Plumbing for Multiple Single Filter Installations



It should be noted that in operation the CKV valve may “dribble” as it expels air from the filter or if the valve seats were to become fouled with foreign matter. The 1” BSP connection found at the top of the CKV Valve should be plumbed away from the filter, preferably to the pool’s balance tank or to a “waste tundish” with an appropriate air gap.

WARNING
The 1” BSP outlet of the CKV valve must NEVER be physically connected to the pump suction line, the return to pool line, or the backwash line. This will negate the primary functions of the CKV valve and it will void all filter warranty.

During the start-up and commissioning process, the installing Technician is required to verify the correct operation of the CKV Valve by visual inspection and reference to gauge readings. The clear body of the CKV valve will enable the air/water conditions to be easily monitored. Any abnormalities that are noted in either the start-up or shutdown procedures must be investigated immediately. If in any doubt contact your Authorized Service Centre for advice.

13. LOADING THE FILTER MEDIA

In many regards, the choice of filter media is as specified by a Consultant, or alternatively, it is a Client's choice. Apart from the wide range of conventional "sand" medias that are available, Chadson Granular Filters (CGF) may use "dual" or "chemical type" filters medias such as hydroanthracite or granulated active carbon. The required wash water rate (and the backwash procedure) for alternative filter medias must be established in accordance with the recommendations provided by the Supplier of the filter media.

When satisfied that all solvent welded (glue) joints have been made (and are fully cured) the filter can be filled with media. All face plumbing & connecting pipework should be completed prior to the media placement. Note that the drain valve assembly must also be installed (as in **Section 11**) before placing any filter media. Remember that once the filter media is placed inside the vessel, any re-work of the drain valve connection could require removal of the filter media.

The recommended procedure for media placement is as follows:

(a) Remove the Manhole cover(s) as described within **Section 7**.

(b) Partially fill the filter to cover the laterals with at least 150mm of water.

(c) Carefully feed a substrate layer of 3mm gravel into the filter. This substrate layer should provide lateral coverage and it is designed to protect the underdrain system. If using a rake to spread this substrate, take care not to damage the filter's underdrain.

(d) Continue to fill the filter with the required quantity of 16/30 filter sand.

(e) The filter media should be raked out as level as possible. There should be no need to enter the vessel to place or level-out the media. Entry inside the vessel is subject to legislation (confined spaces) and special conditions. The filter bed will be automatically levelled during the filters first full backwash.

(f) Clean around manhole, cover and seal and re-insert cover as described in **Section 8**. Do not over tighten the clamp nuts on the manway hatch. Make sure that the manway hatch is correctly and evenly seated.

In many industrial & water treatment applications it is necessary that the filter media be washed and sterilized prior to being placed into service. In these cases, the installing contractor should satisfy all specified requirements.

WARNING
Filter sand is predominantly a siliceous material and appropriate dust masks must be used in accordance with the supplier's Material Safety Data Sheets.

14. HOW IT WORKS

The primary function of a filter plant is to remove suspended solids. If these solids are not removed by filtration they will reduce the oxidizing power of the disinfection process and this will in turn, increase the need for further chemical treatment.

Whilst the removal of soiled particles by filtration is closely related to the function of disinfection, each of these functions makes an entirely different and distinct contribution to the maintenance of healthy pool water. In order to effectively manage a commercial swimming pool, these distinctions must be fully understood by the Pool Operator. Filtration will not necessarily solve a chemical problem and vice versa.

Granular sand filters of all types perform their function of dirt removal by various principles, either singly or in combination with each other. The most apparent operating principle is a screening process where dirt particles are separated from the pool water on the basis that they are too large to pass through the openings of a granular filter bed.

Another filtration mechanism involves the removal of dirt particles by physical and electrochemical attraction. This mechanism can be enhanced with the controlled dose of a suitable coagulant. Properly applied, coagulants can assist the removal of turbidity, color, bacteria, algae, taste & odor producing substances. More specific information on “Filter Operation” can be found in **Section 18**.

15. FILTER BACKWASHING

Chadson Granular Filters are fitted with hydraulically balanced internals that are designed to provide laminar water flow in both the filter and the backwash cycle. Many filters in the CGF product range distinguish themselves by being fitted with patented FloModuLatas‰.

As the filter does its job of collecting impurities, the pressure drop across the filter will increase and the system flow will diminish. The filter is restored to its peak operating condition by “backwashing”. The shunt backwash system as detailed in these instructions requires that the Operator reverses the status of the two valves that are installed on the filter’s inlet (the highest flanged connection). Any valving provided on the filters outlet (the lowest flanged connection) is purely for isolation purposes only, and its operation does NOT form any part of the backwash procedure. As stated in **Section 19**, the actuating lever on this isolation valve should be removed to prevent accidental closure.

When set into a backwash mode, water enters the filter from the bottom of the filter vessel. This upward (reverse) flow expands the filter bed so that the collected matter breaks free, and washes out of the filter vessel to a point of disposal. In order to achieve the required “upflow”, the primary “shunt valve” is partially restricted to create the desired backpressure.

WARNING
When operating the filter plant, it is important that all valves be gradually opened and closed. Failure to do so could create “shock waves” and excessive surge (known as water hammer). Whilst the duration of this “water hammer” maybe quite short, it is capable of producing very high pressures that are capable of damaging the plant & equipment that is installed within the hydraulic system. Damage due to water hammer is not covered by product warranty. The use of “soft starters” and VSD controls (on your pumping system) are recommended as a means of obviating unnecessary water hammer. If these controls are not provided, satisfactory service can be readily obtained, providing that all valves are opened and closed slowly. Filters should not be automatically started by a time clock (or PLC) without the use of soft start or VSD.

Failure to effectively backwash individual filters will result in a cumulative build-up of solids that will detract from the efficiency of subsequent filter cycles. As detailed in **Section 23**, ineffective or infrequent backwashing will result in “reduced filter cycles” and generally poor water clarity. It is important to monitor the quality of the wash water on a regular/routine basis. For an effective backwash, the filter’s wash water should be a “dark brown” to “almost black” colour. If the wash water remains fairly clear (throughout the whole backwash cycle) the cleaning operation is not effective and the backwash conditions require urgent review and correction.

NOTE
Optimum filter performance is dependent upon regular and effective backwashing. Given that the specific requirements of each installation will vary, the installing contractor is required to establish and to record the optimum "backwash settings" as a fundamental part of the commissioning process. In this case the two relevant settings are the pump's flow control valve and the filters shunt valve.

A cumulative build-up of collected solids (due to ineffective or infrequent backwashing) will quickly consume the pool's residual chlorine that is required by State Health Departments. This cumulative build-up of solids also has the potential to corrupt filter beds and to create unwanted "chloramine" problems. As outlined in **Section 21**, corrupted/biological contaminated filter beds may require chemical cleaning and or complete replacement. By modern standards, the process treatment for indoor heated pools requires some form of advanced oxidation for effective "chloramine control". The existence of "chloramines" is directly related to the chemical process.

16. START-UP PRE-REQUISITES

Competent Installers will start-up a new filter plant in accordance with an approved Check List that systematically tests, checks, and approves all individual components (and process operations) within the whole system. No attempt should be made to start-up a new filter system, until all the surrounding building works are truly completed and fully cleaned. The Installer's Check Lists should specifically address this requirement.

It is recommended that the intended water source be chemically tested to check for the presence of any high mineral or metal content before filling the pool. This knowledge may affect the possible start-up procedures and it could help to minimize the chance of staining the pool's interior.

Many minerals & metal ions found in the source water will quickly oxidize when the pool is first chlorinated. Whilst this may be unavoidable, prior knowledge of this potential problem will enable the Installer to respond quickly. Materials that are oxidized by initial chlorination should be vacuum cleaned to waste as soon as practical.

The important pre-requisites for an effective start-up are as follows:

(a) Familiarise yourself with the location and function of all valves, pipes, and controls. If unfamiliar with any aspect associated with this plant do not proceed until an experienced technician is in attendance to manage and to witness the correct operation of the plant. If unsure, do not proceed.

(b) Complete an electrical safety check and a full "name plate compliance" check. (Particularly on the pump)

(c) It is not uncommon for considerable amounts of dirt and construction debris to remain after the construction phase. Once the pool and the surrounding decks have been totally completed, it is essential that all gutters, the pool itself, and the balance tank be thoroughly cleaned before filling the pool with water. Note that ammonia or phenol cleaning compounds must NOT be used in and around the pool.

(d) Over fill the pool and super-chlorinate according to the instructions printed on the supply container. Leave the pool to settle for up to 24 hours, and then "vacuum clean" all the sedimentation "direct to waste", using a mobile vacuum cleaning cart. This will help to remove "unwanteds" and as such, it will substantially speed up the initial treatment of the raw water.

(e) Check that all gutter screens are in place. Check that the strainer basket is correctly seated inside the pre-pump strainer. The use of a suitable prepump strainer basket is a specific condition of warranty.

(f) Check that the backwash detention tank is empty and that the wastewater pump-out system is operable.

(g) To reduce the chance of any Operator error, the soiled water inlet valve, the backwash valve and the shunt valve should be clearly labelled prior to starting the plant.

As outlined below, the filter system should be started in the "filter" mode. This will ensure that any dirt, solids or foreign objects (in the suction piping system) will be retained by the filter media. By nature, this will prevent the filter's underdrain from becoming needlessly blocked. The fine colloidal dust (that is common with new filter media) will be not be retained by the filter media and it will be returned to the pool. This can be minimized by either washing the sand insitu or by installing a "filter to waste" connection. In this latter case, the filtered water line is connected and valved into the backwash line. If "fine dust" does return to the pool, let it settle on the pool's floor, and then vacuum clean it to waste using a mobile cleaning cart.

17. INITIAL START-UP

Preliminary Work

(a) Make sure that all of the pre-requisites in **Section 16** are fully satisfied and review all the Notes & Warnings that are provided in these Instructions.

(b) If the plant is located above the pool's true water level "prime" the recirculating pump by filling the pre-pump strainer with water. If below water level, secure the pre-pump strainer's lid, open all isolating valves, and open the vent on the strainer lid until such time that it is noted that the strainer is full of water. When a discharge of water is noted, close the strainer's air vent.

(c) Set & double check the status of all valves as follows:

- All isolation valves on the suction side of the pump – "fully open"
- Pump Discharge valves – "fully closed"
- All isolation valves on the filter's outlet (the bottom flanged connection) – "fully open"
- All isolation valves provided on any associated plant (chemical dosing & heating) – "fully closed"
- Primary shunt valve (downstream of the filter bank) – "fully open"
- All backwash valves (discharging to the BW tank) – "fully closed"
- All soiled water inlet valves (discharging into the filters) – "fully open"

(d) Double check that both filter drain valves are closed & that the Kinetic air release/vacuum breakers have been correctly installed.

Initial Filter Operation

(e) Start the recirculating pump(s) and gradually open the "flow control valve" found on the discharge side of the pump to about 75% open. As water is pumped through the system, the CKV valve will start to "work" by discharging trapped air (from the empty filters) direct to atmosphere. Note that the pressure gauges should also respond to the flow that is being applied through the filters. If the pump is equipped with VSD controls (or "soft start" provisions) the pumping system will slowly "ramp-up" to speed and in this case, the importance of using the flow control valve may be somewhat diminished. If the initial start-up pressure is more than 100kPa, shut down the pump(s) and review all conditions, including the status of all downstream (partially closed) valves. "Normal" conditions require a clean start up pressure in the order of 40 to 70 kPa. If this clean start-up pressure can not be provided, obtain advice before proceeding.

(f) Satisfy yourself that water is flowing through the system as intended. If a "filter to waste" connection has not been provided, do not be alarmed if a considerable quantity of fine dust is returned to the pool. Once this dust settles, it can be vacuum cleaned direct to waste. Also look for any obvious water leaks

that require repair or replacement.

(g) Run the filter plant for about ten minutes. This should ensure that any foreign objects and dirt in the suction piping will be retained by the filtering media. Note that the operation of the CKV valve will "settle down" and it will cease, as soon as all the air is purged from the system. If this doesn't happen, review the suction piping and look for connections and joints that may be permitting air to be drawn into the system. These joints may not leak water, but under the pump's vacuum they could be faulty.

(h) After ten minutes running, slowly close the pump's flow control valve and shut down the pump. Note that the piston in the CKV valve will "drop" and it allow air to enter the filter. The filter gauge will also return to its zero pressure reading. Resolve any abnormalities before proceeding.

NOTE
This initial backwash operation (outlined below) does not necessarily subject individual filters to the required backwash flow. This comes later in **Section 19** – "Backwash Commissioning". The following initial backwash is primarily designed to wash the clean filter media and to level out the filter bed.

Initial Backwash Operation

(i) Before re-starting the pump, review the status of all valves as outlined in paragraph (c).

(j) Start the recirculating pump(s) in accordance with the manufacturer's instructions. Note the pressure gauge reading displayed on each filter vessel. If the gauge readings are 100 kPa or less, proceed as follows. (If the gauge readings are higher than 100 kPa, double check the conditions and look for an incorrectly closed valve. If all valves in the system are correctly set, reduce the system flow by partially closing the flow control valve on the pump's discharge. Alternatively, if half duty pumps are fitted, shut down one of the recirculating pumps so that the filter pressures are less than 100 kPa.

(k) Select the first filter to be backwashed. With the pumps running (and water flowing freely through the system) gradually open the backwash valve and then gradually close the inlet valve on the filter. In order to create sufficient backpressure to adequately fluidise the filter media; partially restrict the primary shunt valve to about 50% to 75% closed. Note the quality of the "wash water" via the recommended sight glass. Alternatively, check that wash water is being physically discharged into the backwash detention tank. Continually monitor the response of all gauges and instruments during these procedures.

(l) Run the first filter in the "backwash mode" for four or more minutes. Monitor the quality of the dirty wash water and the operating levels within the balance tank and the backwash detention tank. At the end of the first filter's backwash, fully open the primary shunt valve; gradually open the filter's inlet valve; AND THEN gradually close the backwash valve. This returns this filter back to its normal "filter" mode.

(m) Precede to backwash the other filters in exactly the same fashion. When going into a backwash mode remember to open the backwash valve first, and then close the inlet valve. When finishing a backwash, open the shunt valve, then open the inlet valve first, and finally, close the backwash valve.

(n) When the last filter module has been backwashed, return it back to the filter mode, and fully open up the shunt valve. You can now gradually close the pump's flow control valve and shut down the pumping system. Now is a good time to review your performance and to correct any minor leaks that have become apparent during the initial start-up. When you are comfortable with the required backwash procedures, there is no need to shut the plant down after a backwash operation. Simply, leave the pump running and continue with the next filter cycle.

NOTE
By carefully following the above Instructions, there is no need to shutdown the recirculating pump during the required backwash operation. If you have not felt comfortable in conducting this initial backwash operation, do not proceed without the presence of an experienced technician.

First Full Filter Cycle

(o) Now that the suction lines have been purged (by an initial filter operation) and the filters have been backwashed (albeit rather crudely) its time to start your first real filter cycle. After double-checking the required valve status (as in paragraph c), start the pumping system and slowly open up the flow control valves to establish the required system flow.

(p) With the filter plant operating successfully, progressively, bring all the other associated plant on-line (chemical treatment, plant for advanced oxidation and pool heating system) in accordance with other manufacturer's Instructions.

(q) When the plant is fully operation, proceed to commission the system by making appropriate adjustments that are based on the results of volumetric analysis, pressure gauge results, or flow meter readings. Depending upon the nature of the system, the filter pressures should be in the range of 40 to 70 kPa.

(r) Record all gauge and flow readings. At the end of this process, clearly mark the notch plate position on the primary flow control valve(s) to indicate the setting that is required to achieve the desired/specified system flow with clean filters. Record this information in the Operator's Log Book. Refer to **Section 19** for further details on commissioning.

NOTE
Be prepared that the commissioning process outlined in paragraph (q) may take some time. You may find that even minor adjustments, may affect previous settings. Work through these issues in a systematic way, checking and proving each adjustment that is made.

Subject to the quality of the source water, it may take several days to obtain the desired pool water quality.

18. FILTER OPERATION

After the starting the filter system, an initial clean start up pressure will be displayed on the filter's pressure gauge. Depending upon the nature of the system, this pressure should be in the range of 40 to 70 kPa. The initial "clean" start-up pressure should be recorded at the time of commissioning for the Operator's future reference.

As the filter gets dirtier, the filter pressure will rise until it reaches a "terminal" level. At this point the filter is in its "dirtiest acceptable" condition and it should be backwashed. For normal use, the required pressure rise for backwashing should be considered to be 50 kPa above the "initial start up pressure". If for example the initial start up pressure was 40 kPa, the filter should be backwashed when the pressure gauge indicates 90 kPa. If the clean start-up pressure was 60 kPa; backwashing should occur when a pressure of 110 kPa is reached. Note that these pressures are well within the boundaries of the product's maximum recommended pressure.

Pool water treatment plants are customarily operated twenty-four hours per day. This practise is as much for mixing of the dirt load and the distribution of pool chemicals, as it is for the function of filtration.

Routine filter duties should include monitoring of the CKV operation and monitoring all pressure gauge readings. If a filter system is to be taken off-line for any length of time (eg., annual maintenance, or a winter shut down period) all filter vessels should be drained and vented. This is particularly important for chemical type filter media that adsorb impurities.

Given the construction materials used in the manufacture of CGF filters, filter beds may be effectively sterilized with sodium hypochlorite (and or other chemicals). An Authorized Service Agent should be engaged to undertake this service type of service.

19. BACKWASH COMISSIONING

Although a preliminary backwash cycle was conducted when the plant was first started, the installing Contractor is required to commission the system so that the correct backwash flow can be consistently and regularly applied to each filter. The required backwash flow is as noted on the filter's identification label and in the product's data sheet.

Whilst the necessary backwash steps are as broadly outlined in **Section 17**, the installer needs to establish the extent in which the primary shunt valve needs to be restricted in order to create the required backwash flow. This assessment needs to be done in combination with settings on the primary flow control valve located on the pump's discharge.

Whilst gauge readings and flow meters are useful commissioning tools, the most reliable means of verifying the correct backwash flow is to calculate the volume of the backwash tank and to time "how" much wash water is pumped into the tank in a set period. For example, if the backwash tank were 4m x 4m, it would have a surface area of $16m^2$. If in one minute, the waste water level in the backwash tank rose by say 100mm, this would mean that backwash flow was 1600 litres/min (ie., $16m^2$ x 0.1m = $1.6m^3$ x 1000 = 1600 litres per minute or alternatively 27 l/sec).

For the above method to be valid, the operation of the wastewater pump must be suspended or shutdown. If this is not done, you need to subtract the pump-out flow rate in order to obtain an accurate assessment of the backwash flow.

Once the optimum setting of the Shunt Valve has been established, this should be clearly marked on the valve's notch plate. This setting should also be noted in the Installer's commissioning sheets for inclusion in the Operation and Maintenance Manual that the Installer provides to the Pool Operator.

NOTE
Once the correct backwash setting has been established, the shunt valve must be modified to prevent its full closure. This is best done by fitting a "lock pin" through the shunt valve's notch plate. To avoid any confusion in the Operator's mind (and as stated elsewhere) the installing contractor is also required to remove the actuating lever(s) from any and all isolating valves that are installed on the filter's outlet port.

Subject to the project's specific details, the nature of the shunt backwash method is such that it may not be necessary to shutdown any or all of the downstream equipment, prior to undertaking a backwash cycle. This will depend upon the project specifics and it does not detract from the installer's fundamental responsibility to fully commission the system. If any doubt, adopt a standard approach, and simply shutdown or isolate any downstream "flow dependant" equipment (such as heating, chemical dosing, etc.) prior to starting a backwash process.

NOTE
To prevent preferential flow through individual filters, each filter (within the filter bank) must be sequentially backwashed on a rotational basis. This means that if number one filter were to be backwashed first, it would be the last filter to be backwashed the next time the filter system required backwashing. As noted in **Section 20**, the system Designer has a fundamental obligation to provide sufficient "wash water capacity" for the intended backwash method.

On a pool that is recently filled with raw water, it may be necessary to backwash the filter plant within the first twenty-four hours of operation. Before handing the filter plant over to the Operator, the installing contractor must verify the efficiency of the backwash cycle by noting the quality of the wash water in either a backwash sight glass or the backwash detention tank. Refer to **Section 16** for details on the desired wash water quality.

Although the frequency of backwash is load related (as indicated by pressure gauge rise) CGF filters should be backwashed at least once a week. As part of the commissioning process, the installing Contractor should establish a suitable timetable for regular backwashing. Whilst the normal backwash duration for sand filters should be 4 minutes, heavy bather loads could require longer and or multiple backwashes. Some high load applications may require backwashing every two to three days.

20. DISPOSAL OF WASH WATER

Wash water from a pool water treatment plant is required to be discharged to sewer via a suitable backwash detention tank. Most local Authorities require that this backwash detention tank be sized to accept the total wash water consumption of the whole filter plant with an allowance for plant over-runs and solids sedimentation. Backwash tanks are best located so that the backwash lines from the filters are self-draining.

To satisfy its basic design requirement, the backwash detention tank should be constructed with specific geometry that encourages sedimentation. Subject to specific site approvals, wash water from the backwash detention tank is discharged to sewer at a controlled rate (usually 2 l/sec) and at a specific time of day. These requirements will usually dictate the supply of various "controls" that will assist the Operator's management of the plant. For example, level indicators in the backwash tank, could be used as the basis of confirming that adequate backwash storage capacity is available for the next backwash cycle.

It is imperative that backwash pump-out system be maintained in peak operating condition. The effectiveness of the filtration plant is totally dependent on regular and effective backwashes. In light of recent State & Federal initiatives, the beneficial re-use of wash water is strongly recommended. Refer to CGF for possible options.

21. OPERATOR'S DUTIES & RESPONSIBILITY

Once the installing contractor has commissioned the system, the Pool Operator is required to "operate and maintain" the plant in a safe and efficient condition. Apart from maintaining accurate records, it is important for the Operator to appreciate that:

- The plant must be operated in strict accordance with the instructions and or recommendations that are given on start-up and or detailed within the Installing Contractor's Operational & Maintenance Manual.
- Pool water must be maintained and balanced in accordance with the Langelier Saturation Index with chemical concentrations as recommended by the relevant State Health Departments.
- The filter plant must be effectively backwashed according to a proven timetable that is adequate for the

pools “true load/actual” conditions.

The fundamental maintenance requirements of a typical pool water treatment plant are as follows:

(a) Keep all work areas in a neat and orderly fashion.

(b) Follow a systematic plan for the execution of the daily operations that are outlined within this Manual.

(c) Routinely maintain the plant and its finishes.

(d) Establish a routine schedule, whereby individual work areas or plant rooms are vigorously inspected. If problems or water leaks are discovered they must be reported and repaired as soon as they first become apparent.

(e) Maintain meaningful records on all major items of plant. Apart from logging any repairs, record any unusual incidents or faulty operating conditions.

(f) Observe all common sense safety measures.

(g) Do not operate or tamper with equipment unless suitably trained & qualified.

(h) At the end of each month, review all log sheets and test results and compile a summary of events.

NOTE
If an apparent defect occurs within the first twelve months of operation, its relevance and its significance could vary in importance. Be that as it may, the Pool Operator is required to notify the installing contractor of a possible problem (or any water leak) immediately it becomes apparent.

The Warranty provided with your Chadson Granular Filter does not relate to the system design, the installation, or any other items of associated plant and equipment that may be provided. Furthermore, the product Warranty does not allow for any failure to operate the product according to Instructions, or any form of abuse, water damage, negligence, and or accident. Refer to product Warranty details.

Prior to the expiry of the Installers’ “defects maintenance period”, the Owner/Operator is required to establish some form of Service & Maintenance Agreement with either the installing contractor or an Authorized Service Centre (ASC). Whilst these Agreements may take various forms (eg., periodic, predictive, corrective, preventative, etc.,) they are all designed to optimize the service life of your filter plant and to protect your rights to any “extended” warranty that may be provided.

Until such time, that is proven that the Operator’s management is adequate, regular “microbiological testing” (by an approved NATA laboratory) is strongly recommended. Your regular test kit will not necessarily provide this type of confirmation. The source of microbiological contamination may vary. It may be carried into the pool by the bathers; it may be introduced into the pool via the make-up water; or it may come from other sources.

Due to the very low water velocity in many balance tanks or suction sumps, it should be noted that solids and sludge can progressively accumulate within these structures. Given their location in the process loop, the chlorine residual (inside these water-retaining structures) will customarily be quite low. In combination with warn water temperatures, these conditions can provide an ideal environment for the growth of bacteria. Talk to your Authorized Service Agent regarding the need to periodically clean and desludge your balance tank/ suction sump.

22. APPLICATION PROBLEMS

A typical pool water treatment plant will usually include various controls and devices that will assist the Operator's management of the filter plant. Failure to obtain a full system flow is usually indicated by gauge readings or a flow meter. If the filter's pressure gauge indicates a higher than normal pressure, one possible cause of this apparent high pressure could be contained within the filter.

After ascertaining the backwash conditions are correct and that the filter is being regularly cleaned (with the correct wash water rates) it may be necessary to take the filter off-line to inspect and manually rake the filter bed. If this operation is followed by an aggressive backwash, the normal filter pressures should then be restored. However, if the condition has proceeded too far (and if biological contamination has occurred) it may be necessary to scour the filter bed with a strong chlorine solution. In severe cases, it may even be necessary to replace the filter media. This work must be undertaken by an Authorized Service Centre (ASC).

It is important to note that granular filter beds can be corrupted in several ways:

(a) Premature start-up of the filter plant. If the recommendations provided within these Instructions are not observed and the filter system is started before all construction and finishing work has been truly completed, the life and the performance of the filter media will be seriously compromised. The short answer is not to start the filter plant until all building works are fully completed and thoroughly cleaned.

(b) Calcification of the sand bed within a Chadson Granular Filter is not a common problem when the correct water balance is maintained and the backwash conditions are correct. However channeling of a filter bed can be caused by calcification or by scale that forms within a filter. In this situation, there may or may not be an indication on the pressure gauges, but there could be a noticeable by-pass of dirt through the filter. In this situation, poor water clarity would normally be symptomatic of the basic problem.

(c) Another potential problem could be the formation of mud balls within the filter bed. This accumulation of mud, hair and lint can form into spheres that build up within the sand bed. They can best be removed using a proprietary cleaner to dissolve them to a point that they can be effectively removed by backwashing. As a last resort, replacement of the filter media may be necessary. The formation of mud balls within a filter is usually a management problem. In cases where the media classification is found to be smaller than normal tolerances, it is advisable to remove the top 20mm of media after the initial backwash operation. This will remove the small/undersize grain sizes that are largely responsible for the formation of mud balls. In this instance, the classification and grading of the filter media should be thoroughly checked. Using grades of filter sand that are finer than specified will create significant filter problems.

(d) The above problems can also be related to the excessive use of chemical flocculants. Flocculants will never solve problems that are more correctly related to an over loaded or under-filtered pool; more often than not they will only exacerbate the problem. Flocculants should be used on a need only basis and then, only with a proper management reporting system. Changes to any trickle dose system should not be made without further reference to the installing Contractor.

To obviate the expensive maintenance that can be associated with the above problems, it is important to verify that backwash conditions are truly correct, and that the filter is being effectively cleaned. The best solution for the above "problems" is to make sure that they do not happen in the first place.

Whilst "filter sand" is a semi-permanent media, it is generally considered to have a service life of about five to eight years. Excessive body oils and fats (common with indoor heated pools) will radically change the granular nature of a filter media. This also has the potential to "corrupt" a filter bed and to decrease the life of the filter media. Be that as it may, regular and aggressive backwashing will ultimately change the shape and density of the sand grains to a point that the filter media needs replacement. Used filter media is deemed to be a biological waste that is subject to specific disposal conditions. Talk to your Authorized Service Centre regarding the need for filter emptying and all sand replacements.

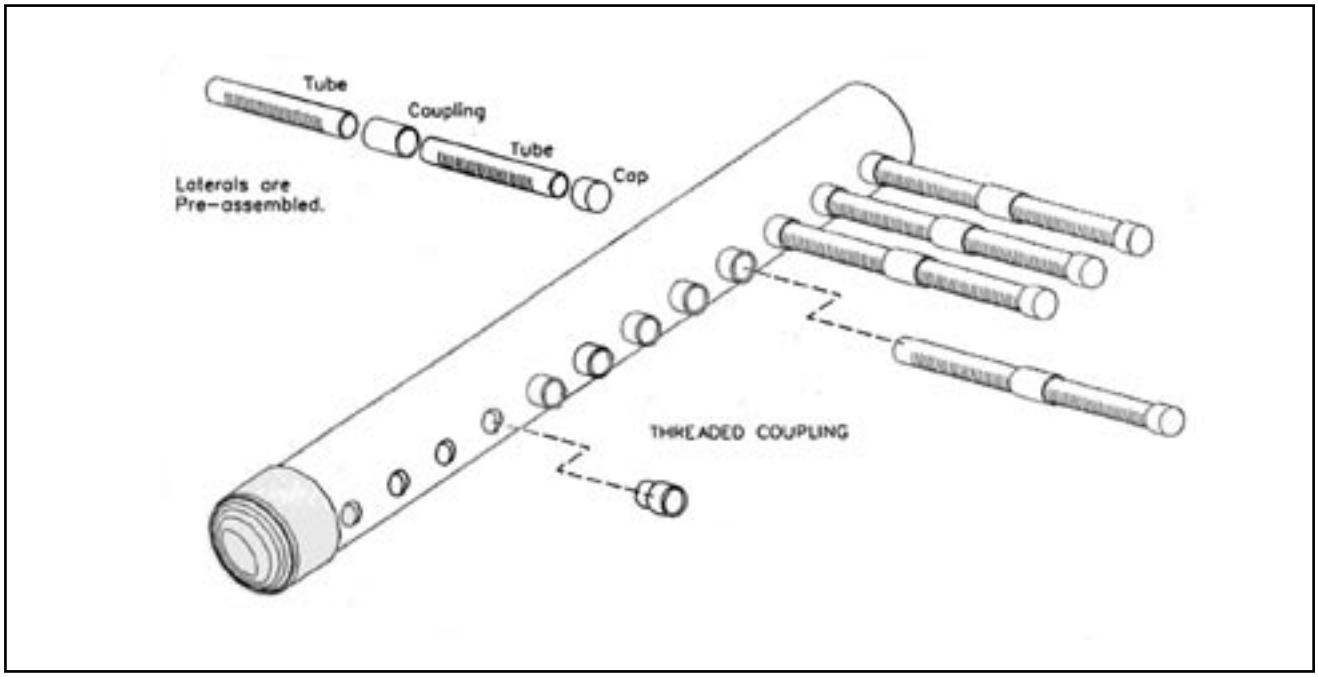
23. UNDERDRAIN DAMAGE

The filters under drain will typically comprise a central header (or headers) with a given number of slotted laterals. These injection-moulded laterals provided in most models have downward facing slots that have “v” shaped openings that are designed to retain the filter media. As noted in **Section 13**, some care is required when first loading the filter media.

At some time during the life of the filter vessel, the filter laterals will require replacement. Under the general heading of “preventative maintenance” it is strongly recommended that new filter laterals be installed when periodically replacing the filter media. As outlined within AS-2865, the filter vessel is deemed to be a “confined space” that requires service personnel to have the appropriate certification.

Replacement of filter laterals is deemed to be “major service work” that should be undertaken by an Authorised Service Centre using genuine spare parts. For reference, the general arrangement of the filter underdrain is as follows: -

Figure 9: Typical Underdrain System



Note subject to the specific filter area provided by your Chadson Granular Filter, the detail and the arrangement of the underdrain system may vary according to filter’s model number.

24. PROBLEM SOLVING CHECKLIST

If your filter does not perform to your complete satisfaction, we ask you review the circumstances associated with the problem. In many cases an apparent problem can often be resolved with simple reasoning. If other non-related products are connected into the filter circuit, it is necessary to ascertain that this equipment has been installed and operated according with that manufacturer’s instructions.

Lack of Water Clarity

Incorrect pool chemistry – check and adjust chemical levels	
Soiled water has high air content – fix suction leak & ensure that air vent is operable	
Insufficient running times, insufficient backwashing – run longer, backwash more often	
Check filter bed for channelling & review possible causes – correct conditions	
High bather loads - manage bather load to suit available plant capacity	
High water temperatures – do not operate at higher than intended temperatures	
Inadequate flow/poor recirculation – check pump selection & system design	
Insufficient filter area – review filter selection	
Colloidal material passes through the filter – flock the pool & vacuum clean all sediment to waste	

Low Water Flow

Check the pump's vacuum gauge reading - ideally it should be between -20 to -40kpa	
Check the pre-pump strainer for collected debris - clean the filter basket	
Check for restriction of blockage in both the suction or the return lines	
Filter is blocked – review backwash procedures & backwash conditions.	
Pool water level too low - inadequate supply water, pump not fully primed	
Pump requires service; check rotation, internal blockage, worn parts, etc.,	
Pump operating under speed – check for low voltage etc.,	
Pump not performing to specifications - review pump gauge readings	

Short Filter Cycles

Check chlorine content & adjust as required	
Poor water chemistry - check pH and total alkalinity	
Excessive pump flow - check performance and pump selection	
Filter not being regularly backwashed	
Ineffective backwashing - check conditions & ensure adequate backwash flow	
Excessive use of chemical flocculants	

High Pressure on Start-Up

Poorly planned or undersized return piping	
Insufficient return nozzles or adjustable nozzles excessively restricted	
Partially closed valve on the filtered water return line - review valve status	
Faulty pressure gauge - replace and review pressures	
Check correct installation & operation all equipment installed downstream of the filter	
Over-sized pump - check pump selection, review gauge & flow readings	
Filter is dirty - needs effective backwashing	

Filter Media Returning To Pool

Check that it is “filter sand”, not dirt from another unknown source	
Inspect filter bed for local depression (indicating a broken lateral) – refer Service Agent	
Broken Lateral (upon start-up) – Possible transport damage or broken during the placement of filter media	
Broken Lateral (after use) – Possible application problems (mud ball problem). Review conditions	

25. AIR RELEASE, VACUUM BREAKER – TROUBLE SHOOTING

The operation of the Air Release & Vacuum Breaker Assembly should be checked on a daily basis.

PROBLEM	CAUSE	REMEDY
Air is constantly visible in barrel of the kinetic valve assembly	Air ingress from the plant’s suction lines	Check Suction lines, Hair & Lint Strainer seals and pump shaft gland for air ingress. Seal any leak found using manufacturers approved methods
Water is leaking from the Kinetic Valve	Dirt Entrapment in valve seal	Shut down filter for about 30 seconds and re-start. Dirt should be washed out and seal achieved. If this fails, order a replacement kinetic valve from your Authorized Service Agent
No Pressure on Pressure Gauge	Blocked Gauge orifice	Shut down filter, remove gauge and clean our orifice
Ditto	Pressure Gauge Failed	Shut down filter, remove gauge and replace
Pressure Gauge giving incorrect reading	Ditto	Ditto

WARNING
On no account should a filter be operated without any effective kinetic air valve or an effective pressure gauge.

26. WATER CHEMISTRY GUIDE LINES

Whilst relevant State Health Authorities have specific requirements (that must be maintained) the following table is provided as simple over-view of the basic water quality requirements necessary for successful pool operation.

PARAMETER	RANGE	TO RAISE	TO LOWER
pH	7.2 to 7.6	Add soda ash	Add muriatic acid or equal
Total Alkalinity	80 to 100 ppm	Add sodium bicarb	Add muriatic acid
Chlorine (unstablised)	0.6 to 1.0ppm	Add chlorine	No action - will dissipate
Chlorine (stabilized)	1.0 to 1.5ppm	Add chlorine	No action - will dissipate
Stabilizer (cyanuric acid)	25 to 75ppm	Add stabilizer	Dilute – partially drain & refill
TDS (max 1500ppm)	(max 1500ppm)	Not applicable	Dilute – partially drain & refill

27. ADDENDA

Use this section for the addition of related information such as CGF Data Sheet, Variations to the Supply Contract, MDR (Certified Test Sheets), Change Notes, project specific engineering drawings, etc.,

CHADSON GRANULAR FILTERS

Perth: 15 Cressall Road, Balcatta, WA 6021. Phone (08) 9344-3611
Sydney: 162 Beaconsfield Street, Milperra NSW 2214. Phone (02) 9772-2477
www.chadsonfilters.com.au

28. RECORD THIS IMPORTANT INFORMATION

Original Equipment Purchaser (OEP)	
Purchase Date	
Filters Installed By (Name)	
Installers Contact Details	
Project Consultant (if applicable)	
Owners Name (or Project Name)	
Handover Given To (Operators Name)	
Handover Date	
Filter Models Supplied	
Filter Serial Numbers	
Certified Plant Capacity (m3/hr)	
Required BW Flow/Filter (l/sec)	
Replacement Media Required/Filter (kgs)	
Nearest Authorized Service Centre (ASC)	
ASC Contact Details	

CHADSON GRANULAR FILTERS STANDARD WARRANTY

Chadson Granular Filters (CGF) are manufactured from quality materials in accordance with specific engineering standards and References. This warranty takes effect from January 2004. Subject to the Terms & Conditions stated below, Chadson Granular Filters are warranted to be free from (design and or manufactured) defects for a period of TWELVE MONTHS calculated from the plant start-up date.

Warranty Terms & Conditions

(a) This Warranty is extended to ORIGINAL EQUIPMENT PURCHASERS and it is not transferable. The Warranty shall only apply when the Terms of Payment contained within the original Supply Contract have been fully satisfied.

(b) Subject to specific terms & conditions, products or components that fail (or become defective) during the stated Twelve Months Warranty period shall be repaired or replaced at our option, without charge.

(c) Warranty repairs may be provided on-site or alternatively at the point of manufacture. In the former case, all travel (to and from the site) shall be borne by Fulham Engineering Services/Chadson Granular Filters. In the latter case, the cost of standard road freight (to and from the point of manufacture) shall be borne by Fulham Engineering Services/Chadson Granular Filters. In all instances, the timing, the location, and the repair method shall be at the discretion of Fulham Engineering Services/Chadson Granular Filters.

(d) The undertakings provided within Clause (c) only apply to PRE-APPROVED Warranty claims. Warranty should not be assumed. Given all of the possible/non-related reasons for an apparent defect/product failure, all Claims for Warranty must be submitted in writing complete with photographic Damage Report and Log Book evidence (Refer to Clause h). “Verbal” claims for warranty will not be accepted.

(e) In all cases, the cost of disconnection, removal of filter media, dis-assembly, consignment and the re-connection of the product or component are not part of our warranty commitment. This Warranty DOES NOT include (or allow for) any consequential damages or any associated costs or delays that may be incurred in obtaining warranty replacements.

(f) This Warranty DOES NOT include “fair wear and tear”, or any damage due to failure to install, operate, and or maintain the equipment in accordance with recommendations and or information that is available within technical data sheets and or Instructions. Warranty does not include problems arising from “design by others”, pump oversizing, undersized piping, failure to provide adequate service/maintenance, water hammer, incorrect valve operation, and problems arising from a lack of adequate backwash conditions, abuse, mis-use, water damage/flooding, negligence or accident.

(g) CGF filters are designed for pool water (fresh or seawater) that is balanced in accordance with the Langelier Saturation Index with chemical concentrations as recommended by the relevant State Authority. This Warranty is conditional upon the product being used for its stated/intended purpose.

(h) As stated in Clause (d), any claim for warranty must be supported with Log Book evidence confirming that the pool water chemistry has been properly maintained (on daily basis) and that the filters have been operated at the required pressures by a trained Pool Operator with regular “backwashing” at the correct wash water rate.

(i) The type of filter media selected by the Client & used with the filter is not part of the CGF Warranty Statement.

(j) Warranty is conditional upon all major service and maintenance work being undertaken by an Authorized Service Centre using genuine replacement parts.

The foregoing Warranties are given in lieu of all other conditions and warranties, expressed or implied, which might otherwise be binding on the Company and no further responsibility for any consequential damages or any other incurred expenses will be accepted by the Company.

Alternative “Pro Rata” and “Extended” Warranties are available by formal Quotation. Warranties with an extended term or period are transferable (to the Owner/Operators) BUT they are conditional upon the fact that the Owner/Operator having established a formal SERVICE & MAINTENANCE AGREEMENT with an Authorized Service Centre (ASC) or similar Agent approved by Fulham Engineering Services/Chadson Granular Filters. Refer to CGF for details on the available warranty options.

How to Obtain Warranty

As soon as a potential problem is identified, the end users first reference must be to the Installer of the plant. If other non-related products are connected within the same circuit, it may be necessary to ascertain that these products have been correctly installed and operated in accordance with that manufacturer’s Instructions. In order to assess the nature and the probable cause of a warranty claim, free access to the filter installation and all installation and operational records must be provided. Refer to Clause (d) and (h) for the requirements.