SERVICE INSTRUCTION SHEET

DATE: 2017 **REVISION:** 01 **DOC #:** 208

TITLE: ATLAS® SOCK & 'O' RING CHANGE

1. PREAMBLE

NOTE # 1: The concept of using a "replaceable" filter sock is a time proven method used by many different industries. With other product designs, the external filter fabric is not a replaceable part. It is either sewn or heat-welded in place. In this case, when a replacement is required it needs to be for the complete subassembly. This is not the case with an Atlas® filter.

"Replaceable" filter socks are more commonly used for "backwashable" filters that operate with single-pass precoating. To gain all the operational benefits of single-pass precoating, Atlas® filter socks are manufactured from a precision "tight weave" fabric. This fabric does considerable "work". Periodic replacement of Atlas® filter socks will restore the filter back to its original "as-new" condition. Notwithstanding the wide candle spacing used in Atlas® filters they contain substantially fewer filter candles than some types of Regenerative Media Filters (RMF). All these things support the concept that periodic replacement of Atlas® filter socks is both cost effective and certain.

WARNING # 1: In recognition of all federal and state obligations (under workplace safety and Occupational Health & Safety) an accredited Service Provider is required to process the work outlined within this Procedure. The selected Service Provider is required to develop the procedures outlined herein on a project specific basis. Such work includes the preparation of a formal Check List/Risk Analysis, identifying all possible eventualities.

The scope of work outlined above shall include the preparation of a Work Method Statement and (where applicable) the supply of work platforms, fall-constraints, appropriate tools, storage/wash bins, lubricants, washing and cleaning agents and replacement spare parts. Mechanical lifting equipment (and associated rigging) is to be in place and available, prior to undertaking this (or any other similar) service work. From an insurance & OH&S perspective, the typical job specifications of a Pool/Plant Operator are unlikley to adress all tasks included within the following procedures.

NOTE # 2: This procedure is for the replacement of "used" filter socks and O Rings with "new" spare parts. This procedure can also relate to an alternative/elective procedure that "washes" and or chemically-cleans existing filter socks for re-use in their as-cleaned, rejuvenated condition. Chemical cleaning of Atlas® filter socks is not pre-requiste for effective filter operation. In some cases, it may be required according to need. Refer to Service Instruction # 209 for hose-down and chemical washing.

CAUTION # 1: Notwithstanding any legislation or legal right that may be available to you, the use of non-genuine spares will automatically void any manufacturer's warranty. If doubting the authenticity of any spare part, contact the Atlas® National Spare Parts Provider – service@fulfab.com.au

NOTE # 3: The instructions contained herein relate to substantially different filter series and different filter sizes as defined by sales outline drawings or dimensional tables. The candle composition and the number of candles will vary according to particular Filter Models. Refer to Table 1.

NOTE # 4: The need to replace (or to wash/chemically-clean) filter socks will vary according to the application, the skill, and the dedication of the Plant Operator. Based on case history, the service life of Atlas® filter socks is 5 to 7-yrs. (for swimming pools at up to 27°C); 2 to 3-yrs. for Leisure Pools (up to 32°C); and 1 to 2 yrs. (for therapy/spa pools up to say 38°C).

2. THINGS YOU ARE LIKELY TO NEED

1. A supply of replacement filter socks, O Rings, Donut Gaskets, & Pinch Seal Gaskets.Refer to Table 1.
2. A supply of M12 replacement set screws, flat washes, lock washers, and hexagonal nuts. Refer to Table 2.
3. An M12 Die Nut (preferrably an hexagonal type that can be used in a ratchet spanner).
4. A Torque Wrench (as manufactured by Warren & Brown or equal – set to a Torque of 40 Nm)
5. Nickle rated anti-seize lubricant (Devcon Stop Seize™, Locktite 771 or approved equal)
6. Contact adhesive (Kwik Grip Horizontal, Sika 4600, or approved equal)
7. Wash/Work Bin(s) – Nylex (E461) or Linpac (TA1240) or similar.
8. Consumables and tools required for specific tasks.

3. PRELIMINARIES

1. Backwash the filter you intend to service according to Standard Operating Procedures. Drain and vent the filter vessel after backwashing.
2. Disconnect the main Effluent Flange and any small bore fitments and connections (in the filter's Lid) that may be used for precoating plant.
3. Remove all fixings in the main body flange and set aside. Wash and soak these fixings in a penetrant solution. See Caution # 3 and Note # 7. Keep all fasteners clean and completely free of any dust or dirt.
4. Lift, move aside, and set-down the Filter Lid. If space permits, set the Filter Lid down onto a timber pallet and move the Lid aside using a pallet truck or similar.
5. Remove the M12 hexagonal nuts & washers that clamp the top Pressure Plate (PP) to the bottom Tube Plate (TP). See Caution # 3. If by necessity you plan to reuse these fixings, wash and soak them in a penetrant solution.It is preferrable & recommended to replace all M12 hexagonal nuts with "new".
6. Lift, move aside, and set-down the Pressure Plate. If insufficent floor space, suspend the Pressure Plate above the Filter Lid, which has already been placed on the floor.
7. Lift and remove all filter candle subassembles from the main Tube Plate and strip down each subassembly into its three sperate parts, viz., core mouldings, replaceable filter socks, and sock O rings.
8. Place candle mouldings in a suitable storage bin or stack and hose clean. Discard all "used" filter socks and O rings thoughtfully.

NOTES # 5: In many cases, the heavier Tube Plate (TP) can remain in place during a sock change. In this case, temporarily secure the Tube Plate using at least three loose-fitting flange bolts/nuts. Flush and hose-out any residual/remaining filter aid found within the vessel through the vacant holes in the Tube Plate. In other cases, where it is necessary to remove the Tube Plate (e.g., for the replacement of the bottom pinch seal gasket), follow the same/similar procedure used to lift and set-down the Pressure Plate. When the Tube Plate removed, flush out the filter vessel.

CAUTION # 2: When handling and or washing injection moulded candle cores, handle them with care. Banging the end of the candle on a hard surface is likely to cause damage not covered by product warranty. Based on case history, injection moulded candles will provide a nominal service life of 10-yrs. or more.

NOTE # 6: When lifting Pressure or Tube Plates, synthetic lift straps are preferred. If using steel chains or similar, minimize this use, and where possible protect stainless steel surfaces so that direct contact with "carbon steel/iron" hooks is eliminated. In other cases, make sure you hose-off and rinse all stainless steel surfaces, which may have had direct contact with any steel/iron hardware. The key objective is to protect stainless steel surfaces from any possible contamination with iron or steel.

CAUTION # 3: Stainless Steel fasteners are susceptible to "galling". The prior use of a penetrant spray (like RP-70 or similar) will help to mitigate this risk. Use socket or ring spanners, not open-ended shifters and spanners. Loosen all hexagon nuts slowly and carefully, using an even force. If a fastener tends to bind, stop immediately; back off one or two full turns and apply additional lubricating penetrant. This

will help to dissipate the heat build-up associated with “galling”. If an M12 Hexagonal Nut binds (onto a male thread), it will need to be cut-off and replaced.

NOTES # 7: Many earlier filters used “zinc-plated” High Tensile fasteners to clamp the filter lid to the filter body. Subject to their current day condition, it may be prudent to replace these earlier zinc-plated fasteners with stainless steel fixings - Refer to Table 2 for details.

4. TUBE PLATE FIXINGS

Prior to September 2015, the M12 fixings in the Tube Plate were “welded” in place. See Figure 1. If intending to re-use these “welded” studs, use a die nut and die-cutting lubricant to clean up the male thread. Do not re-use the original hexagonal nuts – replace them with “new” and make sure you lubricate the male thread as described below in Note 12. Refer to the Atlas® Filter Company for specific advice on how to best replace “welded” studs. Whilst this option is technically possible, it requires specific trade skills.

As per Change Note 007/A, the current day fixings in Tube Plates are “replaceable”. Refer to Figure 2 & Table 2 for details. The use of replaceable Tube Plate fixings addresses the potential risk relating to damaged or degraded male threads, whereby fixings can be replaced according to need.

FIGURE 1 – WELDED TUBE PLATE STUDS (Prior 2012)

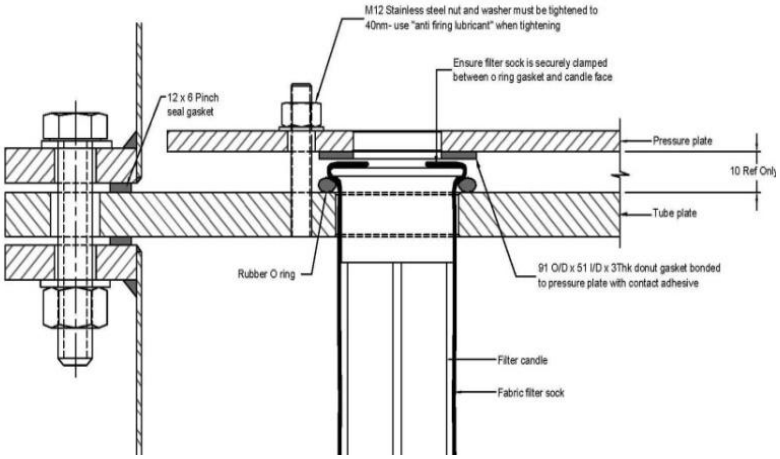
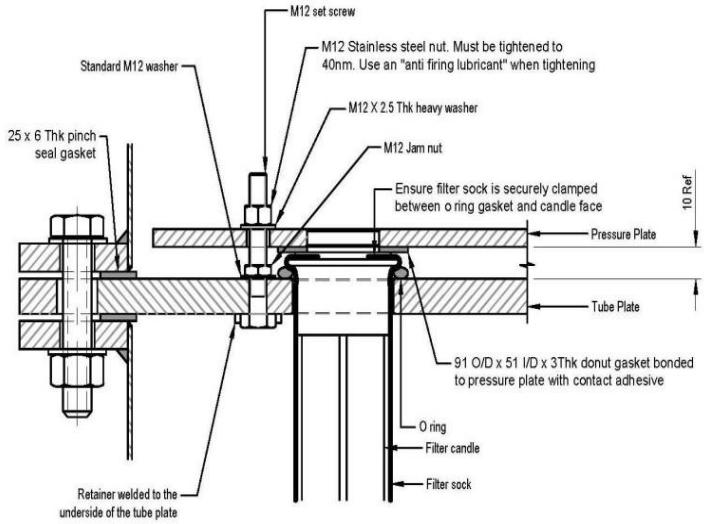


FIGURE 2 – REPLACEABLE TUBE PLATE FIXINGS (Post 2012)



CAUTION # 4: Take care when fitting new replacement set screws through the vacant holes in a Tube Plate. If you accidently drop any parts, you will need to remove the Tube Plate to remove them. With due care this risk can be avoided.

FIGURE 3 - EXPLODED PARTS VIEW

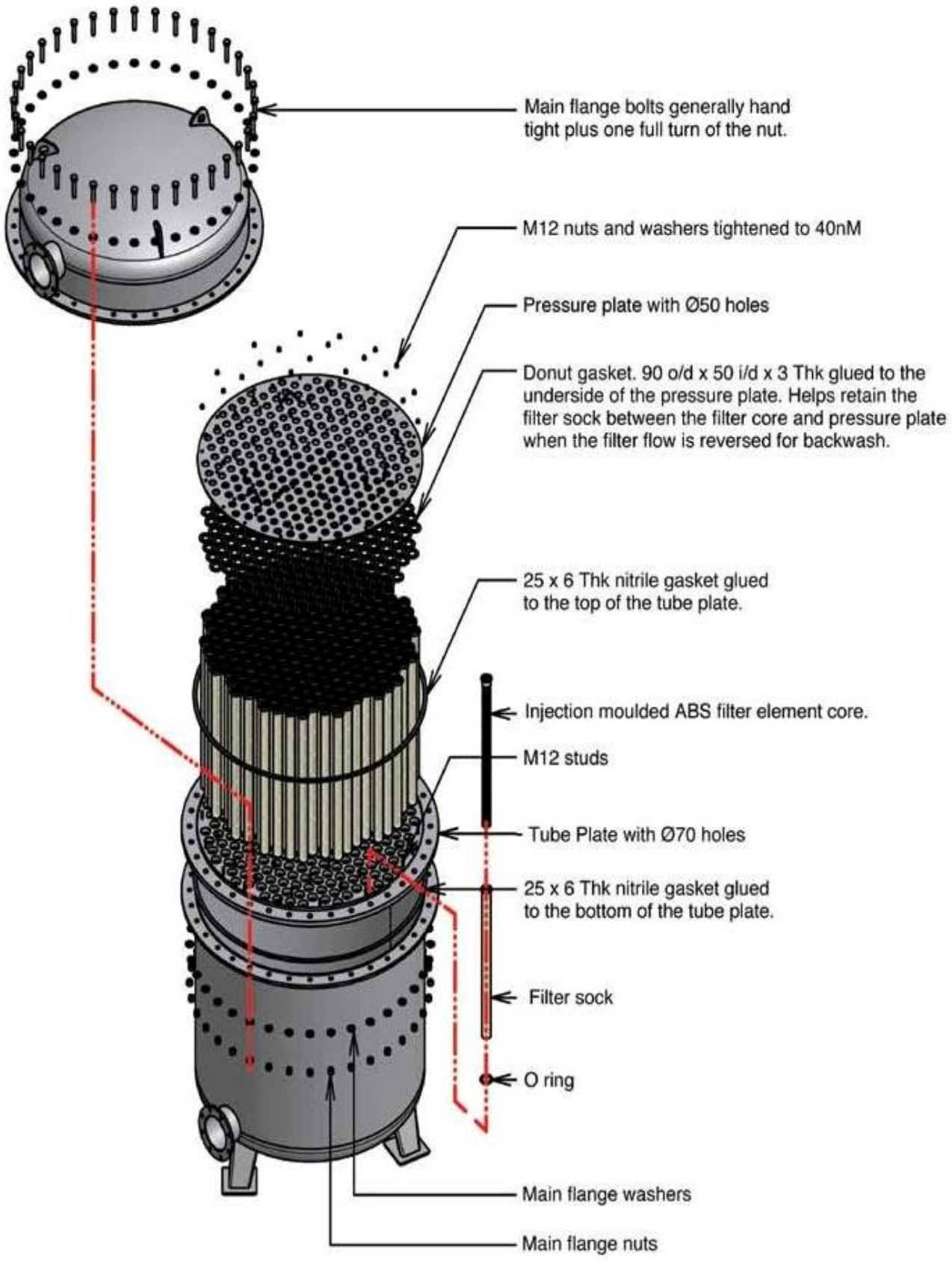


Figure 3 is representative of the PCT Series. Other filter series are similar.

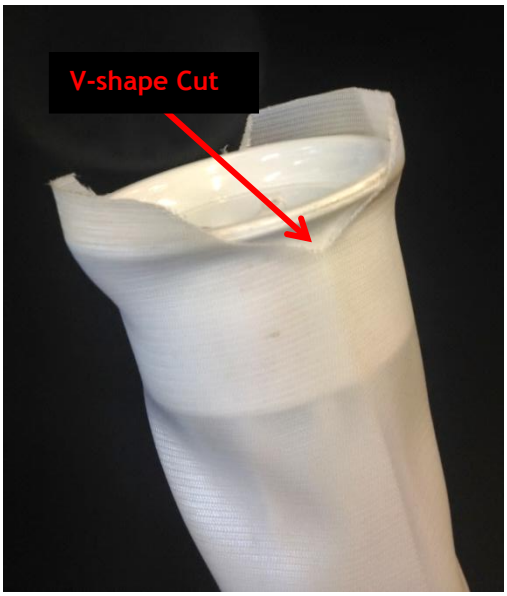
5. FITTING NEW (OR "CLEANED") FILTER SOCKS

STEP 1
Slide the new/cleaned filter sock over the injection moulded Candle/Core.

STEP 2
Starting from the bottom, fit the new 'o'ring over the cloth covered filter candle and roll it towards the top.

STEP 3
When the 'o'ring is as far as it will go, make sure the filter sock is pulled up and the O Ring is free of any twist.

NOTE # 8:
To eliminate the risk of damage, complete Step 3 on a cardboard or soft surface.



CAUTION # 5: Pull the filter sock up so that it 8 to 12 mm longer than the filter candle. This excess fabric is for clamping under the top Pressure Plate. This clamping method will ensure the filter sock remains in place and secure during reverse flow pressure backwashing. See Figure 5 for further detail.

To highlight & confirm where the V cut should finish, the adjacent photo does not show the sock O Ring. If a need arises whereby you shorten a filter sock or modify its mitred V-cut (for a better fit), the cut edges will require heat-sealing, using a soldering iron or similar.

NOTE # 9: Atlas® filter socks are available in three standard lengths; "Short" (5-core x 800-mm long); "Standard" (7-core x 1070-mm long); and Long (8-core x 1210-mm long). See Table 1.

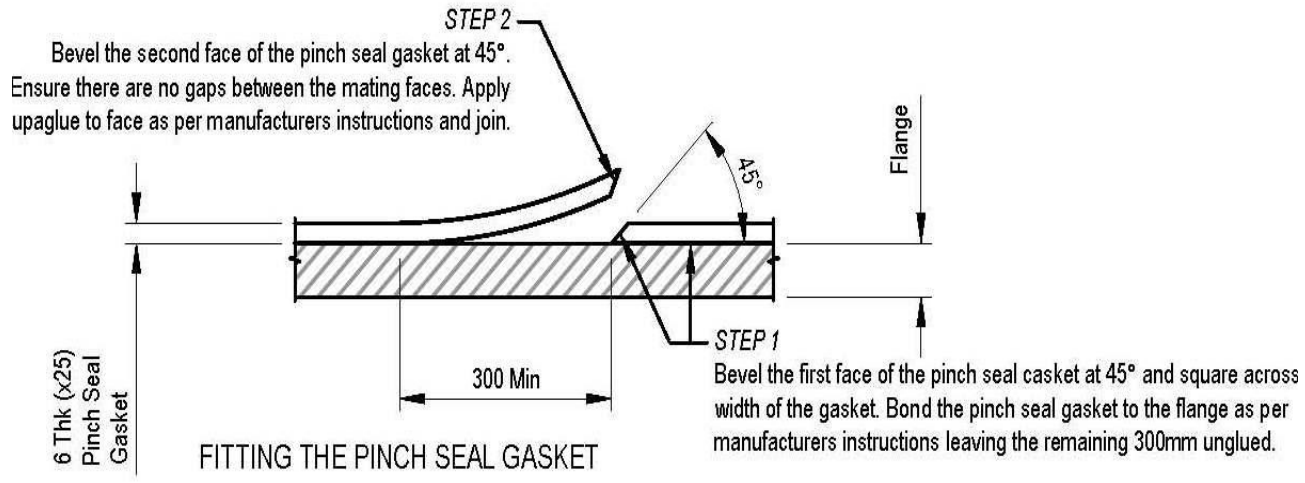
NOTE # 10: Having invested time and effort to reach this point, replace or wash ALL filter socks. Atlas® does NOT recommend selective replacement (or washing) of particular filter socks. In the interest of "certainty", do the complete set, not parts thereof.

6. REPLACEMENT OF GASKETS & SEALS

The replacement of Donut Gaskets and Pinch Seal Gaskets is commonly done according to need. Most Service Providers will capitalize on the opportunity of a sock change (or a sock clean) to replace all gaskets at the same time. This is not a mandatory requirement. Both Donut & Pinch Seal gaskets are bonded in place using contact cement (like Kwik Grip Horizontal™) or an adhesive silicon (like Sika 4600). Follow instructions printed on the supply container. As in Figure 1 & 2, Donut Gaskets are bonded to the underside of the Pressure Plate to align with the holes in Pressure Plate. The purpose of Donut gaskets is to cushion the clamping of the top Pressure Plate and to eliminate any by-pass of the filter aid.

Pinch Seal gaskets create a pressure-tight flanged "body" seal. Cut and bond Pinch Seal gasket under the flanged Filter Lid and on the top face of the main body flange. Align the inside of the pinch seal gasket flush with the inside diameters of the Lid and the Body. Avoid any overhang or pockets, which may collect dirt and solids. You will obtain best results, when the joint in the Pinch Gasket is "scarfed" as shown in Figure 4.

FIGURE 4 – PINCH SEAL REPLACEMENT



7. INTERNAL FIT-OUT

NOTE # 11: Stainless Steel can be susceptible to "crevice corrosion". This is issue is attributed to deprived Oxygen levels. Typically, crevice corrosion is localized and more common under gaskets and seals. The attack will exhibit itself as "worm-like" tracks. The rate of attack will vary according to the installed conditions (mainly water temperature, chloride levels, & TDS). As with all metal-fabricated filters, ensure that PCT filters are equipotentially bonded (earthed) according to AS -3000.

Crevice corrosion is unlikely to diminish the strength of the base material. However, it can complicate and impede any subsequent resealing requirements. You treat crevice corrosion by "passivating" affected areas and rinsing thoroughly with clean tap water. When clean and dry, fill any "tracks" using Plasti-Bond™ or approved equal. Follow instruction on the supply container and make sure to use a plastic spatula to smooth out. Where necessary, any excess filler is "sanded" flush & smooth with the adjacent surfaces. This repair procedure will commonly provide a permanent solution. Crevice corrosion should be attended to, when first noted.

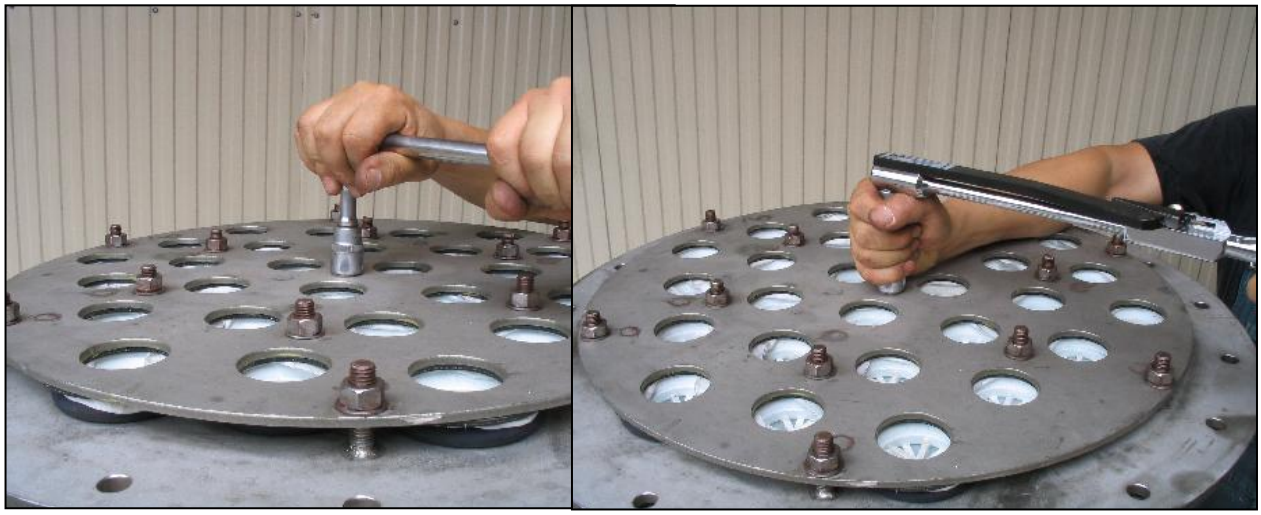
STEP 1: Lower the sock covered filter candles into the Tube Plate holes. Do not drop the filter candles in place. This could damage the filter sock and or the candle. Check that ALL candles are in place. Ensure the open end of the sock is pulled-up and the O rings are sitting square on the Tube Plate. Refer to Figure 5.

NOTE # 12: Using a small brush or similar apply a high quality Nickel-rated Anti-Seize (like Loctite 771 or Devcon Stop Seize™) to all M12 male threated studs/set screws. Before refitting the top Pressure Plate, double check that Donut Gaskets (bonded to the underside of the top Pressure Plate) remain in sound condition. If in any doubt, replace all Donut Gaskets as outlined within these Instructions.

STEP 2: To avoid damage to the M12 male fixings, carefully lower the top Pressure Plate into place. To ensure proper alignment most filter models have a locating pin on the Tube Plate. Alternatively look for match marks to validate the correct alignment of the two plates.

NOTE # 12: Note the clamping of excess sock fabric under the donut gaskets.
In the adjacent photo, the Tube Plate features the earlier "welded" studs used prior to 2012.

STEP 3: Starting from the centre, tighten the hexagonal nuts using a torque wrench set at **40 nM**. Work towards the outside of the plate using the relevant tightening sequences shown on Figure 6 or 7.



CAUTION # 6: This tightening procedure is critical. Systematically repeat the process until all nuts have a uniform torque of 40 nM. Failure to tighten all nuts correctly may allow filter aid to bypass the filter and blow-back into the pool. When tightened properly, the gap between the tube and pressure plates will be approximately 10 mm. This gap should be even and consistent.

NOTE # 13: Systematic tightening of the top pressure plate may take some time. Be patient, correct tightening of the pressure plate is essential. If not done correctly, re-work is highly likely.

FIGURE 5 – CLAMPING OF THE FILTER SOCK

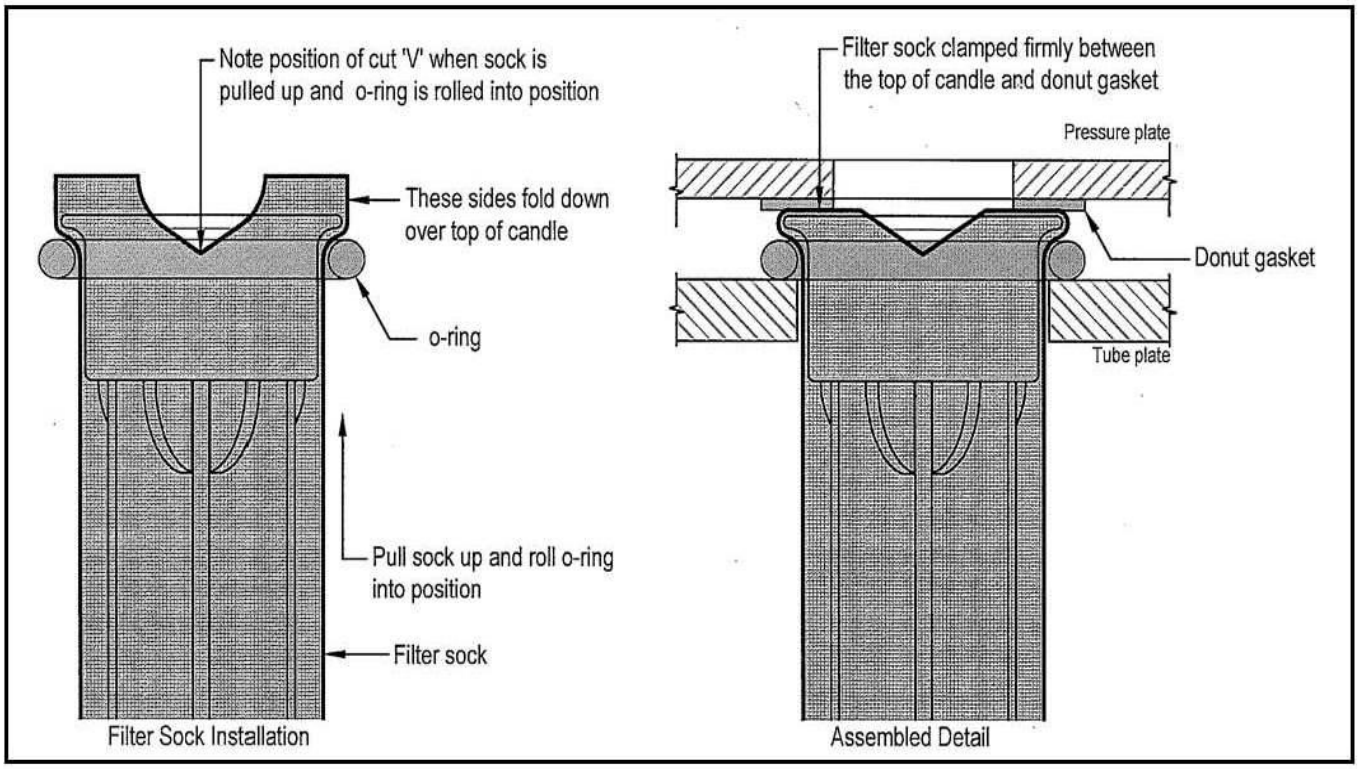


FIGURE 6 – RADIAL HOLE DISTRIBUTION

As with PCT 200 (before 2010) and smaller

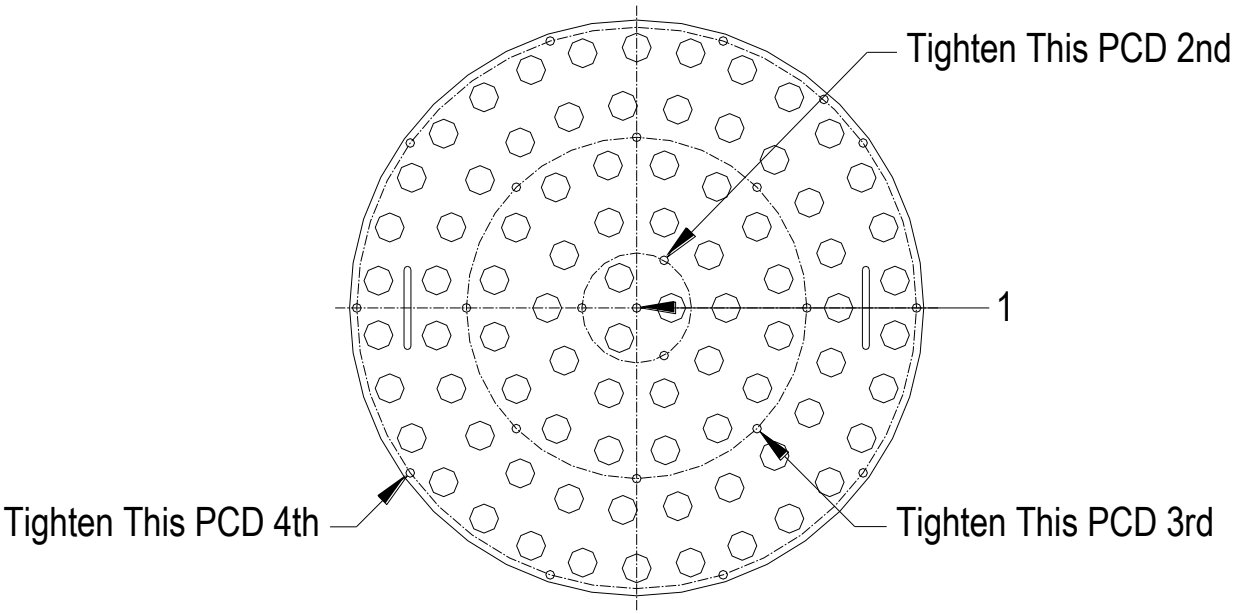
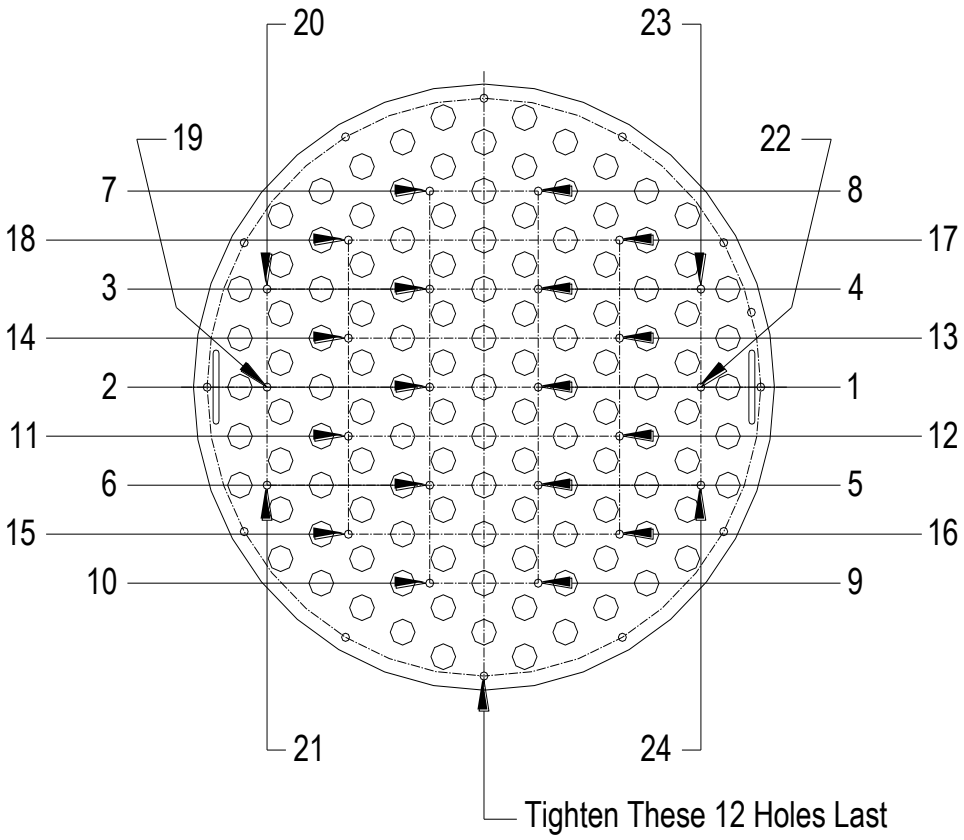


FIGURE 7 – TRIANGULAR HOLE DISTRIBUTION

As with PCT200 (after 2010) and larger



8. FILTER RE-ASSEMBLY

Safely lift and carefully lower the Filter Lid back to its original position. The orientation of the flanged Effluent Nozzle (and the precoat connections – if fitted) will provide a visual confirmation that the Filter Lid is correctly orientated. In many cases, match-marks are also provide on the edge of the Lid & Body flanges.

Loosely re-fit all main body flange fixings. Loosely reconnect the Effluent Flange and any small bore connections in the Filter Lid that may be used for precoating. Commence the tightening of all body flange fixings using a progressive ''star pattern'' sequence, as follow:-

i. Using a standard sized ring spanner, tighten the first bolt "hand-tight" plus one ½ full turn. Move 180° around the filter, to the furthest bolt on the opposite side of the filter and tighten it to the same/similar tension as the first bolt.

ii. Move 90° around the filter and tighten the next bolt. Move 180° around the filter to the bolt on the same centreline, on the opposite side and tighten the bolt to the same/similar tension as the first bolt.

iii. Continue this same tightening pattern (and method) until all bolts have been tightened.

The above procedure will loosen some of the earlier fixings. This will require a further re-tightening. Complete this procedure so that all fixings reach the same degree of tension with an even gap of about 3 to 4-mm between the Lid/Body flanges and the Tube Plate. After the final tightening, revert to the Effluent Flange and any other connections requiring final tightening.

CAUTION # 7: Do not over-tighten or use power tools when securing a PCT Filter Lid. This has the potential to distort the filter flanges and reduce the effectiveness of the pinch seal gasket. Any minor initial leakage will commonly dry-up as the gaskets respond to the applied bolt tension. Some minor adjustment (1/4 of a turn) may be required if leaks become apparent at higher pressure differentials.

10. BRINGING THE FILTER BACK ON-LINE

1. Work you way through a formal "Pre-Start" Check List.
2. Follow all Standard Operating Procedures for "Initial Start-up" and "Precoating".
3. Review plant settings and where necessary optimize the plant's performance by providing a complete re-commissioning service. Pay particular attention to operating pressures and plant flows – refer Note 14.
4. Record all details and full extent of the services provided within the plant's Operating Log – refer Note 15.

NOTE # 14: Validate the "clean filter flow" to ensure that it does not exceed the filter's maximum flux rate of 5 $m^3/hr/m^2$. Also, validate the mandatory backwash rate (5 $m^3/hr/m^2$). These validations can be done volumetrically or with a clamp-on Flowmeter.

NOTE # 15: The maintenance of an effective Operating Log (recording daily pressure rises, frequency of regeneration and reverse flow backwashing etc.,) is a valuable management tool, which will help to develop an accurate filter run profile. This Operating Log can also help with the early identification of potential abnormalities requiring review and or corrective action.

TABLE 1 – SPARE PART REQUIREMENT & COMPONENT WEIGHTS

2017 Model No	Nominal Tank OD (mm)	Total No. Candles & Donut Gaskets	No. 5-Core	No. 7-core	No. 8-Core	Pinch Seal Gasket (m)	Lid Weight (Kgs)	Pressure Plate (kgs)	Tube Plate (kgs)
PCT 75	686	37	37	0	0	4.5	20	13	27
PCT 100	686	37	7	30	0	4.5	20	13	27
PCT 150	850	55	7	48	0	6	32	36	57
PCT 200	1026	85	85	0	0	7	65	58	95
PCT 250	1026	85	7	78	0	7	65	58	95
PCT 300	1208	121	33	88	0	8	135	76	175
PCT 350	1208	121	7	114	0	8	135	76	135
PCT 450	1408	163	0	7	156	9.5	165	102	295
PCT 550	1470	187	0	7	180	10	185	125	325
PCT 650	1662	241	0	241	0	11	245	143	515
PCT 750	1662	241	0	0	241	11	245	143	515
PCT 900	1810	299	0	0	299	12	320	170	600

NOTES: Contact the National Distributor for Atlas® spare parts for candle distribution in other filter models
Email: service@fulfab.com.au.

TABLE 2 – STAINLESS STEEL FIXINGS BY MODEL NUMBER

2017 Model No	Nominal Tank OD (mm)	Main Body Flange Fixings	Tube Plate Fixings
PCT 75	686	12 x M12 Hex Head Bolts x 60 Long 24 x M12 Flat Washers 12 x M12 Lock Washers & Hex Nuts	9 x M12 x 50 Long SS Set Screws, 18 x flat washers, Lock Washers & Hex Nuts
PCT100	686	12 x M12 Hex Head Bolts x 60 Long 24 x M12 Flat Washers 12 x M12 Lock Washers & Hex Nuts	9 x M12 x 50 Long SS Set Screws, 18 x flat washers, Lock Washers & Hex Nuts
PCT150	850	24 x M12 Hex Head Bolts x 60 Long 48 x M12 Flat Washers 24 x M12 Lock Washers & Hex Nuts	19 x M12 x 65 Long SS Set Screws, 38 x flat washers, Lock Washers & Hex Nuts
PCT200	1026	24 x M12 Hex Head Bolts x 60 Long 48 x M12 Flat Washers 24 x M12 Lock Washers & Hex Nuts	30 x M12 x 70 Long SS Set Screws, 60 x flat washers, Lock Washers & Hex Nuts
PCT 250	1026	24 x M12 Hex Head Bolts x 60 Long 48 x M12 Flat Washers 24 x M12 Lock Washers & Hex Nuts	30 x M12 x 70 Long SS Set Screws, 60 x flat washers, Lock Washers & Hex Nuts
PCT 300	1208	36 x M20 Hex Head Bolts x 100 Long 72 x M20 Flat Washers 36 x M20 Lock Washers & Hex Nuts	37 x M12 x 75 Long SS Set Screws, 74 x flat washers, Lock Washers & Hex Nuts
PCT 350	1208	36 x M20 Hex Head Bolts x 100 Long 72 x M20 Flat Washers 36 x M20 Lock Washers & Hex Nuts	37 x M12 x 75 Long SS Set Screws, 74 x flat washers, Lock Washers & Hex Nuts
PCT 450	1408	32 x M24 Hex Head Bolts x 110 Long 64 x M24 Flat Washers 32 x M24 Lock Washers & Hex Nuts	55 x M12 x 80 Long SS Set Screws, 110 x flat washers, Lock Washers & Hex Nuts
PCT 550	1470	36 x M24 Hex Head Bolts x 110 Long 72 x M24 Flat Washers 36 x M24 Lock Washers & Hex Nuts	47 x M12 x 80 Long SS Set Screws, 94 x flat washers, Lock Washers & Hex Nuts
PCT 650	1662	36 x M24 Hex Head Bolts x 120 Long 72 x M24 Flat Washers 36 x M24 Lock Washers & Hex Nuts	55 x M12 x 90 Long SS Set Screws, 110 x flat washers, Lock Washers & Hex Nuts
PCT 750	1662	36 x M24 Hex Head Bolts x 120 Long 72 x M24 Flat Washers 36 x M24 Lock Washers & Hex Nuts	55 x M12 x 90 Long SS Set Screws, 110 x flat washers, Lock Washers & Hex Nuts
PCT 900	1810	36 x M24 Hex Head Bolts x 120 Long 72 x M24 Flat Washers 36 x M24 Lock Washers & Hex Nuts	46 x M12 x 90 Long SS Set Screws, 92 x flat washers, Lock Washers & Hex Nuts