Алматы (7273)495-231
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
Владимир (4922)49-43-18
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Коломна (4966)23-41-49
Кострома (4942)77-07-48
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Курган (3522)50-90-47
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Ноябрьск (3496)41-32-12
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Петрозаводск (8142)55-98-37
Псков (8112)59-10-37
Пермь (342)205-81-47
Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Санкт-Петербург (812)309-46-40
Саратов (845)249-38-78
Севастополь (8692)22-31-93
Саранск (8342)22-96-24
Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Сургут (3462)77-98-35
Сыктывкар (8212)25-95-17
Тамбов (4752)50-40-97
Тверь (4822)63-31-35
Тольятти (8482)63-91-07
Томск (3822)98-41-53
Тула (4872)33-79-87
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Улан-Удэ (3012)59-97-51
Уфа (347)229-48-12
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Чита (3022)38-34-83
Якутск (4112)23-90-97
Ярославль (4852)69-52-93

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Amiad Water Systems Ltd.

DVF - High Efficiency
Media Water Filtration System

Serial Numbers:	_____
Order number:	_____
Catalog number:	_____
Filtration degree:	_____
Year:	_____

Installation, Operation and Maintenance Instructions

Amiad Water Systems Ltd.

DVF High Efficiency Media Water Filter

Table of Contents

General Notes

IMPORTANT

Prior to installation, operation, maintenance or any other type of action carried out on the filter, carefully read the safety, installation and operation instructions.

This manual takes into account that the filter was ordered without a control system. If you have chosen to provide any of the equipment yourselves, the instructions in this manual may serve as general guidance only. Please refer to your equipment supplier for specific installation instructions.

It is the responsibility of the installer to read this manual carefully in its entirety before attempting to install / operate the equipment. If you have any doubts as to the safe installation of this equipment, please contact our technical engineer as detailed further in the manual.

Ensure you read and understand the Safety Notice supplied with this equipment and detailed in the Safety section of this manual.

If you have any doubts, contact the manufacturer for advice.

Discharging wastewater to drain – it is the responsibility of the user to determine the legal discharge route for contaminated water from the filter.

Electrical connections should be done in accordance with national standards and carried out by competent persons only.

Amiad filtration products always operate as components in a larger system. It is essential for the system designers, installers and operators to comply with all the relevant safety standards.

During installation, operation or maintenance of the filter, all conventional safety instructions should be observed in order to avoid danger to the workers, the public or to property in the vicinity.

No change or modification to the equipment is permitted without a written notification given in advance by the manufacturer or by its representative, on the manufacturer's behalf.

Always observe standard safety instructions and good engineering practices whilst working in the filter's vicinity.

Use the filter only for its intended purpose as designed by Amiad Water Systems. Any misuse of the filter may lead to undesired damage and may affect your warranty coverage. Please consult with Amiad prior to any non-regular use of this equipment.

General Safety Instructions

1. Installation

General

- Install the filter according to the detailed Installation Instructions provided with the filter by the manufacturer and according to the description given in this manual.
- Make sure to leave enough clearance to enable easy access for future treatments and safe maintenance operations.
- Make sure to have suitable lighting at the filter's location to enable good visibility and safe maintenance.
- Arrange suitable platforms, ladders and safety barriers to enable easy and safe access to the filter without needing to climb on pipes and other equipment. Verify that any platform, barrier, ladder or other such equipment is built, installed and used in accordance with the relevant local authorized standards.
- Check and re-tighten all bolts during commissioning and after the first week of operation.
- Use only appropriate standard tools and equipment operated by qualified operators when installing, operating and maintaining the filter.
- When installation is required in hazardous environment sitess, underground or high above ground, ensure that the site design and the auxiliary equipment are appropriate and that installation procedures are carried out in accordance with the relevant standards and regulations.
- Ensure walking areas about the installation are slip resistant when wet.

Shipment and Transporting

- Shipping and transporting the filter must be done in a safe and stable manner and in accordance with the relevant standards and regulations.
- For shipping, lifting and positioning the filter, use only approved lifting equipment, authorized employees and contractors.

Pneumatics

- Ensure that the compressed air supplied to the filter never exceeds the maximum designated pressure for the filter. An air-pressure reduction valve should be installed on the compressed air supply line upstream of the filter's pneumatic inlet port.

Hydraulics

- Extra safety devices should be installed on hot water applications to avoid the danger of burns.
- The user should install a manual water cut-off valve next to the filter's inlet port.
- In cases where the downstream piping network downstream of the filter is pressurized an additional manual water cut-off valve should be installed next to the filter's outlet port.
- The user should ensure that the system includes a pressure release / drainage valve to enable release of residual pressure prior to any maintenance procedure performed on the filter.
- The user should ensure that the filter is never exposed to water pressure exceeding the maximum designated pressure for this filter, if needed, a pressure reduction valve should be installed upstream of the filter's water inlet port.
- The maximum working pressure indicated on the filter's specifications table includes the pressure caused by fluid hammer and pressure surge effects.

Civil Engineering

- Ensure that the filter installation is done by the manufacturer's qualified technicians.
- Ensure that any civil engineering work at the installation site, such as construction, lifting, welding, etc. is performed by qualified workers / technicians / contractors and in accordance with relevant local standards.

- While using lifting equipment, ensure that the filter or the lifted part is attached securely and in a safe manner.
- The product should be lifted from the integral lifting lugs ONLY when filter vessel is empty, using proper lifting equipment according to local regulations.
- Do not leave lifting equipment unsupervised. Avoid working below lifting equipment.
- Wear a safety helmet while using lifting equipment.
- Ensure that the flooring is sloped for drainage and to avoid accumulation of liquids.

2. Commissioning

- Carefully read the commissioning and the first start-up operation instructions prior to operating the filter.
- Perform the startup and first operation procedures exactly as described in this manual to achieve maximum performance and smooth operation of the filter.
- Commissioning the filter should be performed by an authorized manufacturer's technician only. Do not attempt to commission the filter unaccompanied. This may lead to damage and may affect your warranty coverage.

3. Operation and Control

- Do not operate the filter before carefully reading and becoming familiar with its operation instructions.
- Observe the safety stickers on the filter and do not perform any operation other than those given in this manual.
- Do not operate or use the filter for purposes other than its original design and operational envelope.

4. Maintenance

Servicing the filter should be performed by an authorized manufacturer's technician only.

Before any maintenance or non-regular operation carefully read the following:

- Disconnect the filter from the power supply and lock the main power switch.
- Disconnect any compressed air supply, release the residual pressure and lock the pneumatics main valve.
- Disconnect the filter from the water system by closing and securing the manual inlet valve. In cases where the downstream piping network is pressurized, close and secure the manual outlet valve.
- Release the residual water pressure by opening the pressure release / drainage valve.
- Maximum water temperature: 60°C. The filter is not designed for hot water applications.
- Place warning signs around the work area as required by local standards and procedures.
- Inspect the filter's safety stickers and replace any that are damaged or faded.

Mechanical

- Use only appropriate standard tools when working on the filter.
- Always open and close valves slowly and gradually.
- Remove grease and oily material residues to avoid slipping.
- Before disconnecting the filter from the water supply, electricity and pneumatics and before releasing the filter's residual pressure DO NOT:

  Loosen or unscrew bolts

  Remove any protective cover

  Open any service port flanges
- Avoid splashing and water leakage to minimize slippage, electrification or damage to the equipment.

- While using lifting equipment, ensure that the filter or the lifted part is attached securely and in a safe manner.
- Do not leave lifted equipment unsupervised. Avoid working below lifted equipment.
- Wear a safety helmet, goggles, gloves, and any other personal safety equipment required by local standards and regulations.
- Entering a filter must be done in accordance with relevant local safety instructions, standards and regulations for working in hazardous environments.
- Manual cleaning of the filter media using high water pressure or steam should be performed in accordance with cleaning system instructions, local standards and regulations and without endangering the operator or the vicinity.

Before returning to regular operation

- Re-assemble any protective covers or protection mechanisms removed during service or maintenance operations.
- Ensure that all the tools, ladders, lifting devices, etc. used during the maintenance procedures are removed from the filter area and stored
- In order to return the filter to regular operation, follow the First Start-up Operation instructions as detailed in your user manual.
- Filters used in potable water systems must be disinfected according to local water authority standards and regulations before being returned to service.

amiad WATER SYSTEMS

DVF Technical Data

L1 – Filter, Actuated Valves, PEP ACTIVE Media, DP Switch, Controller
L2 – Filter, Actuated Valves, PEP ACTIVE Media, DP Switch, Controller + Base Plate
L3 – Filter, Actuated Valves, PEP ACTIVE Media, DP Switch, Controller, Base Plate + 1 Pump (Process or Backwash)
L4 – Filter, Actuated Valves, PEP ACTIVE Media, DP Switch, Controller, Base Plate + 2 Pumps (Process and Backwash)

				
Description	**DVF 300**	**DVF 600**	**DVF 900**	**DVF 1200**
Filtration Performance	>1 µm Nominal	>1 µm Nominal	>1 µm Nominal	>1 µm Nominal
Vessel Diameter (mm)	300	600	900	1200
Empty Vessel Volume (liter)	80	350	810	1470
Filtration Flow (m^3/h)	1.4-3	4-12	10-28	20-50
Maximum Backwash Flow (m^3/h)	1.7	6	13	22
Vessel Material of Construction	SST 304L	SST 304L	SST 304L	SST 304L
Valves	Electric Actuated 24VAC	Electric Actuated 24VAC	Electric Actuated 24VAC	Electric Actuated 24VAC
Media Type	Multi Level Graded PEP ACTIVE	Multi Level Graded PEP ACTIVE	Multi Level Graded PEP ACTIVE	Multi Level Graded PEP ACTIVE
Control Panel	PLC, IP65	PLC, IP65	PLC, IP65	PLC, IP65
Control Panel Power Supply	240VAC, 1 Phase, 24VAC Control	240VAC, 1 Phase, 24VAC Control	240VAC, 1 Phase, 24VAC Control	240VAC, 1 Phase, 24VAC Control
Process Water Inlet Connection	(1") DN 25 ISO PN10 Flanged	(1½") DN 40 ISO PN10 Flanged	(2") DN 50 ISO PN10 Flanged	(3") DN 80 ISO PN10 Flanged
Process Water Outlet Connection	(1") DN 25 ISO PN10 Flanged	(1½") DN 40 ISO PN10 Flanged	(2") DN 50 ISO PN10 Flanged	(3") DN 80 ISO PN10 Flanged
Backwash Inlet Connection	(1") DN 25 ISO PN10 Flanged	(1½") DN 40 ISO PN10 Flanged	(2") DN 50 ISO PN10 Flanged	(3") DN 80 ISO PN10 Flanged
Backwash Outlet Connection	(1") DN 25 ISO PN10 Flanged	(1½") DN 40 ISO PN10 Flanged	(2") DN 50 ISO PN10 Flanged	(3") DN 80 ISO PN10 Flanged
Minimum Operating Pressure (bar)	1	1	1	1
Maximum Operating Pressure (bar)	5	7	7	7
Design Temperature (°C)	60	60	60	60
Required Installation Space (mm)	L 700 x W 700 x H 1800 (2200 for maintenance)	L 1100 x W 800 x H 2010 (2500 for maintenance)	L 1500 x W 1100 x H 2175 (2750 for maintenance)	L 1700 x W 1450 x H 2620 (3370 for maintenance)
Approximate Filter Operational Weight (kg)	375	955	1195	3795

System Overview

The Amiad DVF High-Efficiency Water Filter is designed to remove suspended particulate from water down to 1 micron nominal in size at an efficiency of 90% (by mass) at the filter's designated flow rate.

The unit operates at the 5-7 bar (refer to technical data table on pp.8) working pressure. It operates fully automatically with its automatic backwash system. The backwash control is based on pressure differential and/or timer control. The system's backwash water flow for a single regeneration is specified in the Data Sheet.

This filter system consists of an SST 304 filter vessel rated according to BS EN13445.

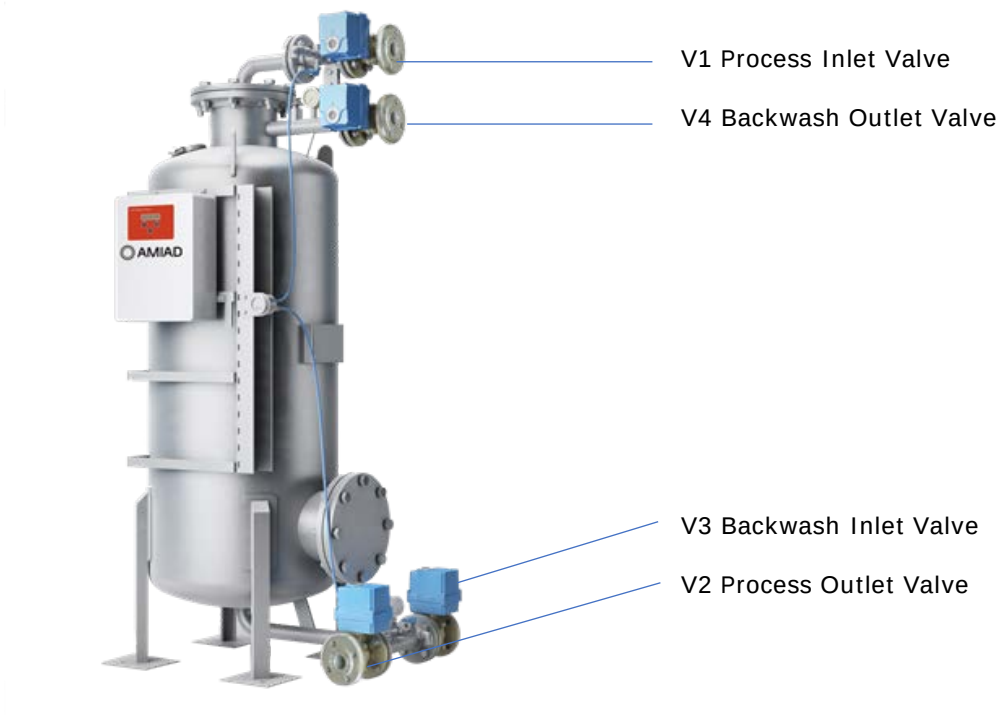
The filter vessel comes complete with an internal stainless-steel support plate, into which a set of non-metallic diffusers for media retention and the backwash distribution across the filter area are fixed.
This filter unit is supplied with multi-level graded glass.
The backwash period is adjustable depending on the nature of the contamination being removed.

Filter Configuration

The DVF is a patented filter system for water, which can remove particulate down to 1 micron nominal in size.
Each unit has a total of **four valve connections** – namely:

Process Inlet Valve V1 - This is the filter's inlet connection for the dirty process water supply. The connection is located in the upper part of the vessel with the entry point on the top lid. The water passes through the internal pipe equipped with a **Dual Vortex Generator** incorporated into the internal inlet pipework.

Process Outlet Valve V2 - This is the filter's outlet connection for the filtered (clean) water. The connection is connected to the process system. We recommend that you install a flow control valve (full bore manual gate valve) at this location to correctly set the flow for your process during commissioning. The valve can be supplied at extra cost, if required.



Backwash Inlet Valve V3 - This connection is located at the bottom of the vessel. This connection is USUALLY connected to the clean backwash water supply. Backwash water can either come from a mains water supply or from a pumped external water supply. In some cases the backwash water can be supplied via the inlet process feed pump, however this requires a special pipe-work configuration.

Backwash Outlet Valve V4 - This is the outlet connection for the dirty backwash water. This connection is connected to either a collection tank or to a suitable foul water drain. It is important that this pipe is unobscured and only has a flow control valve. We recommend that you install a flow control valve (full bore manual gate valve) at this location to control the backflow rate. The valve can be supplied at extra cost, if required.

Note: V2 and V3 can be reversed to match the plant requirements. If this is required, please consult Amiad Water Systems as sometimes the PLC program needs to be amended.

Filter Operation

When the control system is powered up, the inlet and outlet valves (V1 and V2) are open and the backwash drain and backwash inlet (V4 and V3) are closed. The process water is delivered into V1 via the system pressure. The water feed is directed through the **Dual Vortex Generator.** The water is filtered by the media and exits the system via V2 and on to the process system; The outlet gate valve (if used) controls the filter throughout.

The filter continues on-line filtration until backwash is initiated. This is usually done via a pressure differential switch (supplied as part of the control package), a timer (adjustable through the controller), or manually, by pressing the backwash button.
Once backwash is triggered by either of the above, **V1 and V2 close –** the filter will no longer be producing any process water until the backwash cycle is complete.

The media bed is allowed to settle (this is called the "*dwell time*") for about 1-1.5 minutes. This is to allow the media suspended above the bed to settle before commencing the backwash cycle.
After the media has settled the backwash sequence begins.

V4 opens, shortly followed by V3 - this allows backwash water to be applied into the filter; this water is distributed equally across the bed area and has the effect of fluidizing the glass media. The backwash water lifts the lighter contamination from the media strata and flushes contamination from the system via the backwash drain connection **V4.** This can be fed to a suitable foul drain or collected for further processing and water recovery.

The backwash gate valve (if used) will be adjusted on commissioning to ensure the bed is not over fluidised during backwash, as in this event media could be sent to drain, reducing filtration efficiency and requiring more frequent media top ups. After the backwash is complete, usually between 2-4 minutes (this is adjusted on commissioning to suit the application and can be confirmed by visually checking that the backwash water is running clear), **V3 and V4 Close.** After a dwell time of 30 seconds **V1 and V2 open** to process filtration again. This cycle is repeated as required depending on loading.

Air Scouring Process (optional add-on)

General Air Scour Benefits:

- Improve cleaning of media
- Minimize encrustation of media
- Reduce mudball formation
- Conserve backwash water
- Reduce wastewater discharge
- Reduce filter down time
- Save operator time & labor
- Extend periods between filter washes
- Increase filtration capacity

Incorporating Air Scour:

Air introduced anywhere below the steel plate floor (partition plate).
No air distribution piping is required.
An air supply pipe containing an isolation manual valve, regulator, pressure gauge and NRV allows the compressed air to enter the bottom of each DVF filter unit below the distribution plate.

Design Guidelines for Air Scouring Supply:

- Consider the blower location, i.e. the height difference between the blower and the vessel air inlet. If the airline is relatively long, calculate the dynamic head loss and take it in to account.
- An air valve MUST be installed to handle the blower air flow with the minimal hydraulic resistance (ARI D070P model is recommended).
- A vacuum breaker MUST be installed on the drain line.

Process Description:

Partial Draining

This stage is designed to enable room on the upper part of the vessel for the air about to be introduced.
Close the inlet valve, outlet valve, BW inlet valve.
Open the drain outlet valve, allowing the top amount of water in the DVF to drain up to the drain pipe level. The draining time depends on the installation.

Air Scouring

The air scouring duration is usually set for 10 minutes at the recommended velocity of ~70 m/hr per m^2 vessel area at 0.5-0.6 bars.
During this process, hold the draining valve open to ensure easy draining of the air out of the vessel.
Bear in mind that by doing so, you take the risk of carrying out some media in case of draining failure.

By the end of this cycle, ***close*** the air supply valve to the filter and run the BW cycle.

DVF Scouring Design Table:

DVF Model	Scouring Pressure (Bar)	Scouring Velocity (m/hr)	Vessel Diameter (m)	Vessel Area (m^2)	Nominal Operation Flow (m^3/h)
DVF 300	0.5-0.6	70	0.3	0.07	5
DVF 600	0.5-0.6	70	0.6	0.28	20
DVF 900	0.5-0.6	70	0.9	0.64	45
DVF 1200	0.5-0.6	70	1.2	1.13	79

Filter Installation

- Before lifting this unit we recommend a full risk assesment be conducted, taking into account the balance on the unit and potential stress and damage, which may be caused to pipework by unsupported lifting.
- Place the filter in its final position ensuring the location is stable, level and suitable for the support of the system's operational weight. Installers should ensure suitable access is available to dismantle top flange of the unit to carry out any media loading or maintenance that may be necessary. Check this by removing and refitting top flange. (Filter is pre-loaded with media prior to dispatch).
- Check for all round access allowing at least 1m in all directions for ease of access. In restricted locations please refer to factory before fixing in place in any areas that are adjacent to fixed objects. Once these criteria are satisfied, secure the filter down.
- The filter may be located inside or outside, but if an outside location is chosen, care should be taken that the filter is not subjected to ambient temperatures of below +2°C without heat tracing. If there is any risk of this, you should consult with Amiad Water Systems.
- Connect inlet/outlet process pipe-work, backwash and drain to the unit as necessary and check all filter connections for tightness, as fittings may become loose during transit. Remember not to overtighten the connections.
- If the control panel doesn't come pre-mounted, mount it adjacent to the filter unit. The control panel should be located so as not to come into direct or sustained contact with water. The panel has an IP rating of IP65.

Client Scope of Supply

- An incoming electrical supply suitable for a control panel.
- A suitable pipe-work for connecting the filter via V1, V2, V3, V4.
- Note that pipe-work interface V4 must allow a flow under gravity without any obstructions (2-10m max).
- A gate valve on the outlet pipe-work to adjust the process flow (Downstream V2).
- A gate valve on the drain pipe-work to adjust the backwash flow (Downstream V4).
- An isolation valve on the inlet & outlet process supply is recommended as good engineering practice.
- A by-pass to allow for filter maintenance offline is a good engineering practice and strongly recommended.
- All pipe-work should be fully supported to ensure no undue mechanical stress is placed on the filter.

Pipework Connections

- The waste /dirty backwash water V4 connection, should not create any back-pressure on the filter. The drain pipe-work should be kept to a minimum of 2 meters and have a minimum of bends. It should not rise above the filter outlet. The drain line should be of a minimum 2” diameter or larger and not exceed 10 meters in length. If a greater drain length is required, it should be done via a tundish arrangement breaking any back pressure build up. A suitable valve (gate type) is required to allow flow regulation.
- Backwash water V3 supply to be connected to the backwash pump outlet. It is recommended that an isolation valve be installed to facilitate valve maintenance/removal.
- Make sure that the HP (inlet) and LP (outlet) connections on the filter are connected to the differential pressure switch.

Electrical Connections

- Electric wiring must be performed by an authorized electrician only, using standardized and approved components.
- Install a lockable main power cut-off switch close to the control panel.
- If due to site constraints, the control panel is installed without a clear line of vision to the filter, an additional lockable power disconnect cut-off switch should be installed near each filter unit.
- The filter should be installed in a manner in which the electrical components and/or the control panel are protected from direct contact with water.
- Always ensure all connections to the panel are made with suitable cabling and glands. Under no circumstances should the equipment be hooked up temporarily.
- Check all panel connections are tight and that no components have become dislodged in transit.
- Connect a suitable (per specification) incoming supply to the control panel.
- Connect to ground as per the diagram and isolate any earth bonding of the filter as required.

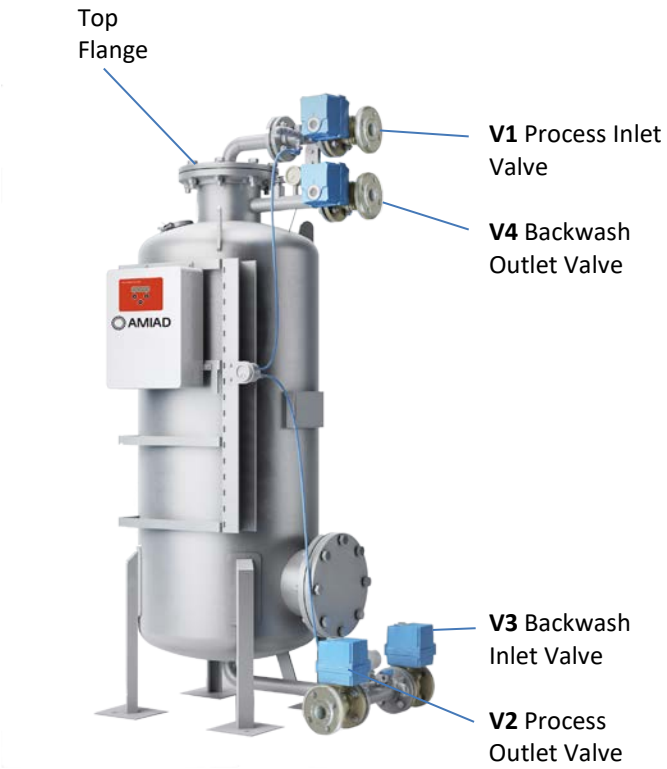
Media Filling Process

Before filling the vessel, please follow these steps:

- Visually inspect the inside of the vessel to ensure all the media retaining nozzles are present and fixed in place.
- When performing this inspection:
  - Ensure that you are wearing the correct PPE.
  - Locate the top flange – see fig. A.
  - Now carefully remove the bolts on the top flange. This will release the blind flange and gasket. Care should be taken not to damage the flange, flange gasket, or drop the bolts inside the vessel.
  - Carefully remove the flange and internal pipe-work, which has the Dual Vortex Generator attached. This will expose the nozzles for inspection. Make sure all nozzles are in place.
  - If any nozzles are missing, please contact Amiad Water Systems before proceeding further.

    DO NOT FILL THE VESSEL IF NOZZLES ARE MISSING. Make sure vessel interior is free from any debris before following the media filling procedure below.
- It is strongly recommended to use correct PPE during media installation. (See media data sheets which can be found on the bags, and further in this document).
  - First ensure that the valves on the backwash inlet V3 and process outlet V2 are closed.
  - Now, via the top flange, fill half the vessel with clean, fresh water. This is to ensure no damage occurs to the backwash nozzles located within the vessel base.
  - Load the base media in the correct order (beginning with the largest size first – i.e. Grade 3) with the applicable quantities, as shown in the Media Data table below. The depth guide is in mm and given as a guideline only.
  - Level each layer before moving on to the next layer.
  - Once the loading is complete, the media should be within approximately 20mm of the base of the vortex generator. Check this with the length of the vortex inlet pipe as you are filling the vessel to avoid overfilling.
  - Place the top flange with the gasket back onto the vessel in the same orientation as it was removed, remembering to securely screw the feed pipe via union.

Fig. A.



- The media bags are marked for the grade size.

amiad® WATER SYSTEMS

Media Data

MEDIA	DVF 300	DVF 600	DVF 900	DVF 1200
Grade 0				
Depth (mm)	319	337	296	300
Weight (kg)	30	125	250	450
# of Bags		(5 bags)	(10 bags)	(18 bags)
Grade 1				
Depth (mm)	181	212	251	212
Weight (kg)	16	75	200	300
# of Bags		(3 Bags)	(8 Bags)	(12 Bags)
Grade 2				
Depth (mm)	219	200	287	305
Weight (kg)	19	75	225	425
# of Bags		(3 Bags)	(9 Bags)	(17 Bags)
Grade 3				
Depth (mm)	232	218	161	210
Weight (kg)	20	75	125	290
# of Bags		(3 Bags)	(5 Bags)	(12 Bags)
Total Bed Weight (kg)	85	350	800	1465
Total Bed Height (mm)	951	978	996	1025

Media configurations can vary according to process.

Maintenance

1. Leakage Test

This process should be performed for each of the filter vessels, after installation onsite, prior to media loading.

1. Open the filter's upper service port and ensure that all nozzles are in place and none are missing or displaced.
2. Close the filter's service ports.
3. Ensure that all the filter valves are closed.
4. Open the inlet valve (V1) and let water flow into the filter.
5. Apply water pressure gradually up to the operation DVF filter pressure.
   Attention - maximum pressure allowed is 7 bar (5 bar for DVF 300)!
6. Check the valves' connections and manifolds for leaks and repair any leak found.

2. First Operation

1. Open the main raw water supply valve (V1) and let water flow into the system.
2. Perform a forced flush cycle. Flush the filter until the backwash outlet (V4) water is clean.
   Note: Ensure minimal backwash flowrate according to the technical data table (pp.8).
3. Switch to Auto operation mode
4. Adjust all operational setpoints in the control system (as per control philosophy).
   Recommendations: clean DP ~0.3 bar; Backwash trigger DP ~0.8 bar.

3. Periodic Inspection

1. Check for leaks from connections and fittings.
   If leaks are found, repair them and re-secure the connections if required.
2. Manually start and complete a backwash cycle.
3. When the filter will not be in use for a long period, it can be drained after disinfecting, and left dry until used again.
4. In environments where freezing conditions occur, open all filter covers and drain the water totally out of the filtration system. After the filter is drained, close the upper covers.

4. Monthly Maintenance

1. Visually inspect the outer vessel surface for early signs of corrosion.
2. Visually inspect the gasket sealing areas for signs of water leakage.

5. Yearly Maintenance

1. Inspect vessel and repair any damage immediately.
2. Inspect the media:

   If the filtering media is no longer working effectively (short service time, too much coagulation, rubbed down), replace the PEP ACTIVE media according to instructions in section Media Filling Process.

   - Open the service cover on the side of the filter and drain all the water.
   - Remove the filter media through the service hole on the side of the filter.
   - Thoroughly clean the inside of the filter with clean water.
   - Inspect the filter mushrooms and the double bottom.
   - Carefully close the service covers on the side.
   - Fill the filter media through the filling hole (top lid) and continue to follow the instructions in the section Media Filling Process.

6. Replacing the filter media

1. Replace the filter media once it is no longer effective.
2. Close the water supply to the filter and release the pressure in the filter before opening the filling hatch.
3. Follow the instructions in the section Media Filling Process.

Parts Maintenance

1. Filter Vessel

Weekly Maintenance

- None

Monthly Maintenance

- Visual inspection of outer vessel surface for early signs of corrosion.
- Visual inspection of gasket sealing areas for signs of water leakage.

Yearly Maintenance

- Removal of upper hatches for media inspection. Replace tri- clamp seal and cover gasket.
- Inspect condition of securing bolts, replace as required.

2. Filter Media – PEP ACTIVE* (Activated Filter Media)

Weekly Maintenance

- Check and log differential pressure.

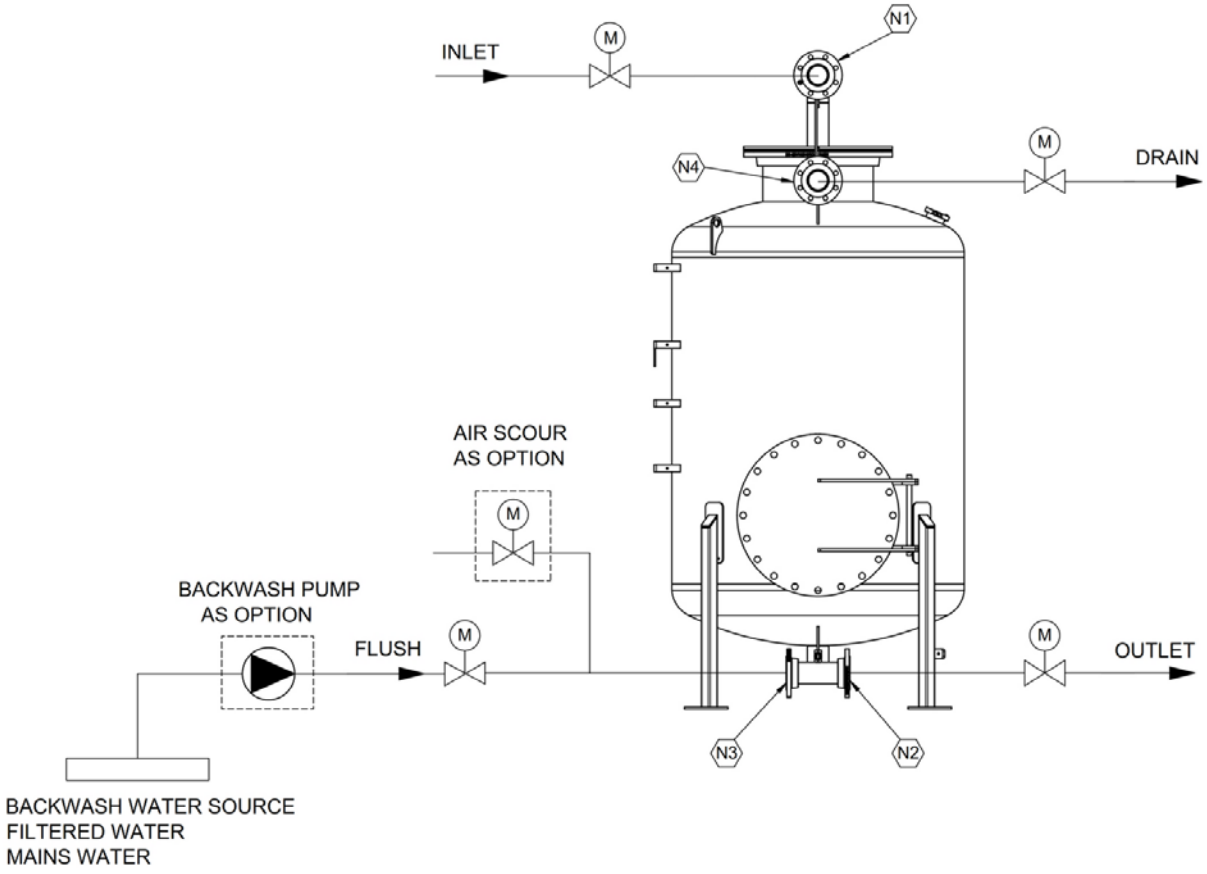
Monthly Maintenance

- Perform a manual backwash cycle and visually inspect drain for media carry.

Yearly Maintenance

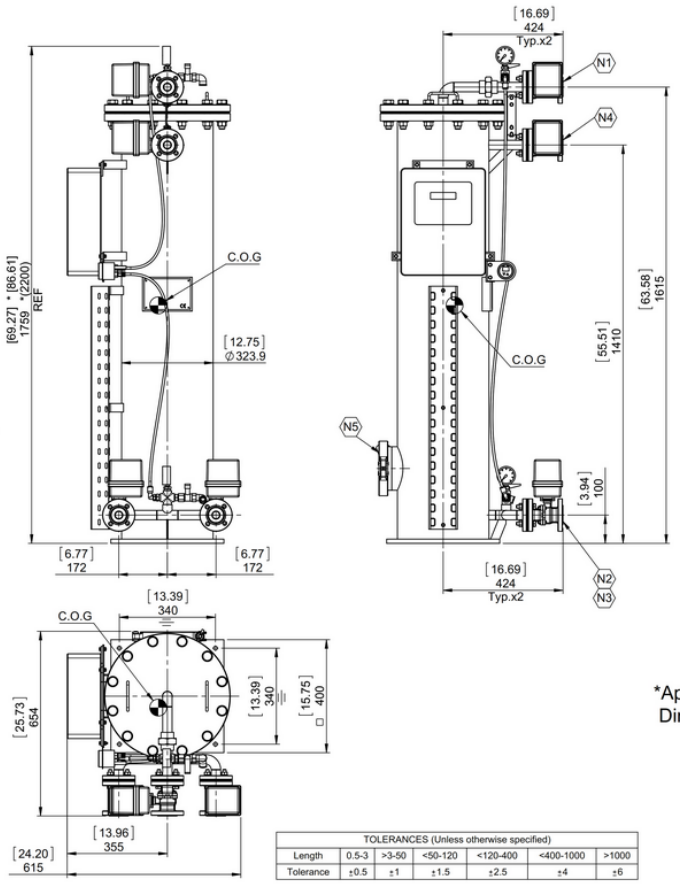
- Removal of upper hatches for media inspection.
- Perform a media sanitation / disinfection if required (solution of hypochlorite @ 5%).
- Top up the upper media grade as needed.
- Replacement of media & nozzles recommended every 5/6 years.

DVF Filter – P&ID Drawing

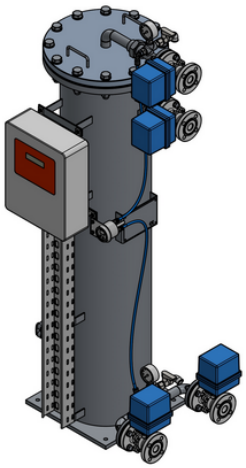


N1 - Inlet	N2 - Outlet	N3 – Flush/BW	N4 - Drain

DVF 300 Filter – GA Drawing



TOLERANCES (Unless otherwise specified)						
Length	0.5-3	>3-50	<50-120	<120-400	<400-1000	>1000
Tolerance	±0.5	±1	±1.5	±2.5	±4	±6

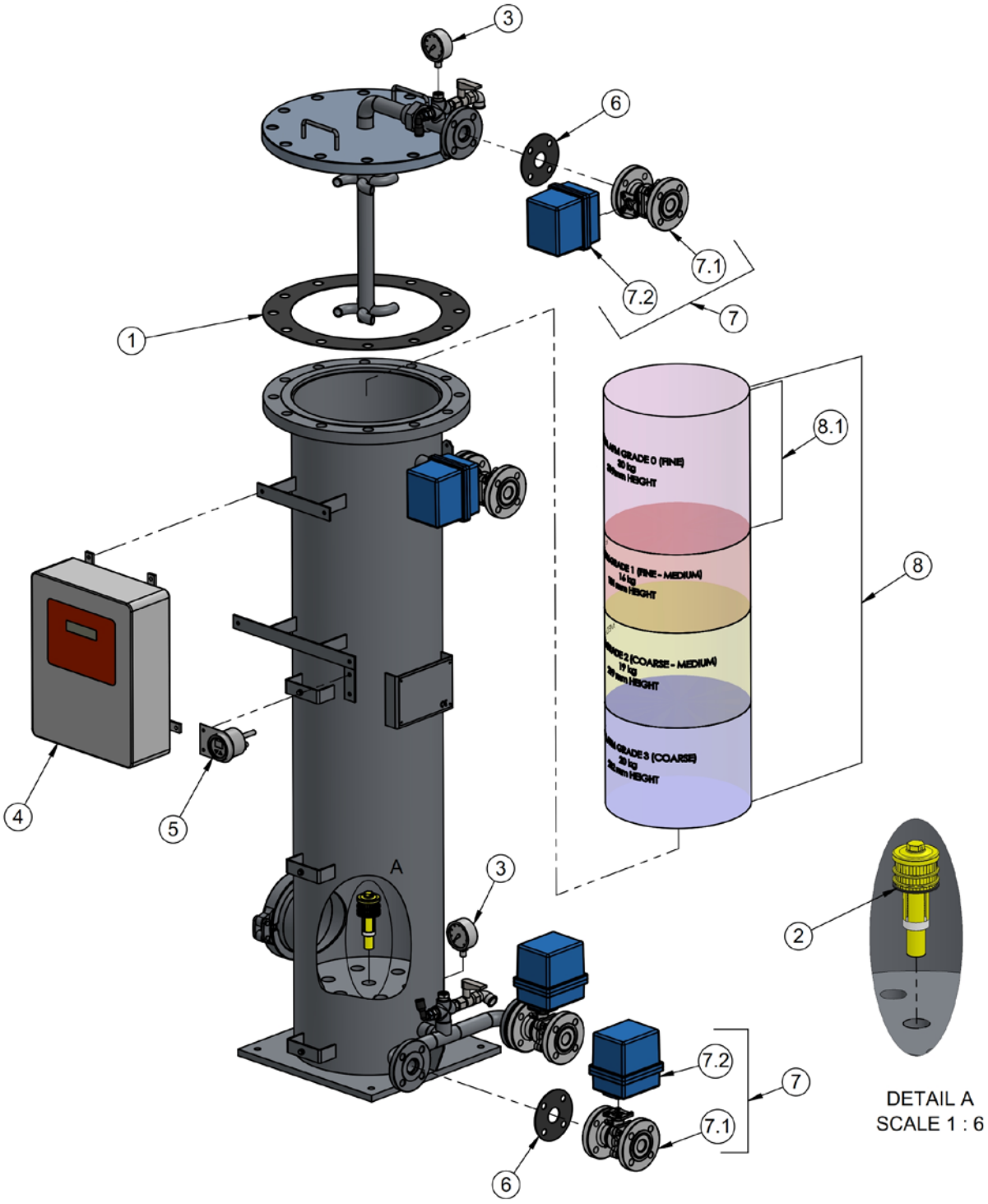


CONSTRUCTION	
Materials For Filter Vessel: S/ST 304L	
DESIGN CRITERIA	
Design Pressure	5 Bar
Test Pressure	7 Bar
Design Temperature	60˚C
Min. Flow Rate	1.4 m³/hr
Max. Flow Rate	4.3 m³/hr
TOTAL WEIGHT (kg)	
Empty	212
Media	85

NOZZLES LIST						
CODE	QTY.	SIZE	CLASS	PIPE	FLANGE TYPE	SERVICE
N1	1	1" (DN25)	ISO10	SCH40	S.O.R.F	INLET
N2	1	1" (DN25)	ISO10	SCH40	S.O.R.F	OUTLET
N3	1	1" (DN25)	ISO10	SCH40	S.O.R.F	BACKWASH INLET
N4	1	1" (DN25)	ISO10	SCH40	S.O.R.F	BACKWASH OUTLET
N5	1	6" (DN150)	TRICLOVER	2mm THK	-	INSPECTION

*Approx. height required for maintenance
Dimensions are in MM [INCH]

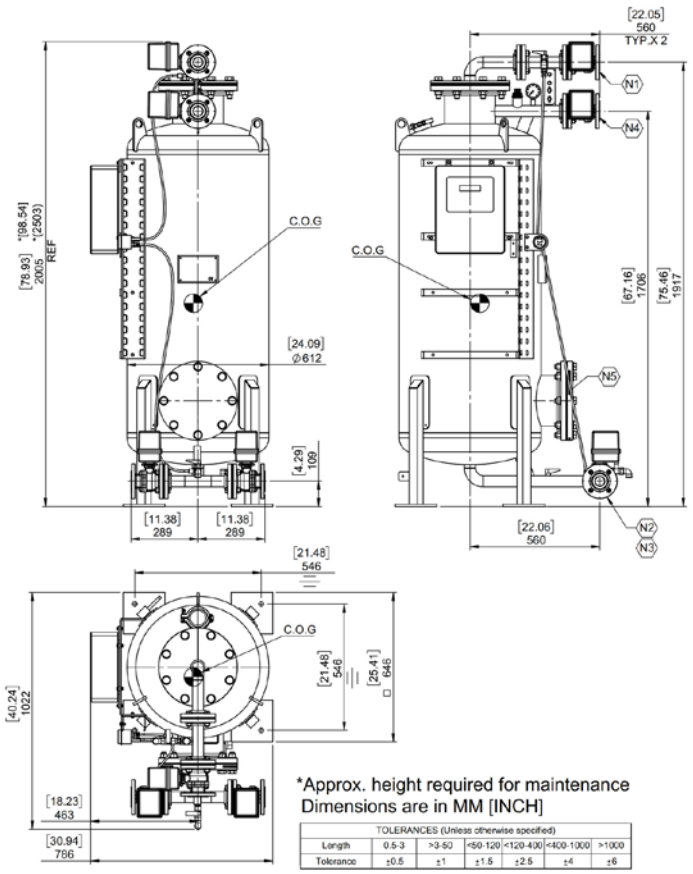
DVF 300 Filter – Parts Drawing



DVF 300 Filter – Parts List

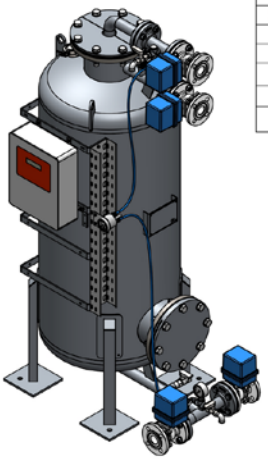
No.	CAT. No.	Description	Qty	Material
1	770103-000457	GASKET 12" ISO PN10 EPDM DN300 TH2MM FULL FACE AMIAD	1	EPDM
2	700190-005509	NOZZLE ASSEMBLY WITH SEAL FOR DVF	7	PP
3	720301-000036	PRESSURE GAUGE 0-16 BAR/PSI NUOVA FIMA S/ST316 1/4" BSP BOTTOM 2" W/GLYCERINE	2	S/ST 316
4	720101-000776	FLUSHING CONTROLLER TECNOLOGIC 5REL S240VAC AC-5 BESPOKE FOR DVF	1	Various
5	720104-000025	DP SWITCH W/BRACKET BACCARA 1/8" BSPM REAR 14BAR 0.5BAR IP66 12794121	1	Various
6	770103-000471	GASKET 1" ISO PN10 EPDM DN25 TH2MM FULL FACE	4	EPDM
7	730104-000573	2-WAY BALL VALVE 1" ISO10 2528 S/ST ELECTRIC HQ-004 DN25 GENEBRE+ACT. SOL.	4	Various
7	730104-000573	2-WAY BALL VALVE 1" ISO10 2528 S/ST ELECTRIC HQ-004 DN25 GENEBRE+ACT. SOL.	4	Various
7.1	730104-000572	2-WAY BALL VALVE 1" ISO10 2528 S/ST W/O ACTUATOR DN25 GENEBRE	4	S/ST 304
7.2	720701-000062	ACTUATOR 24VAC/DC HQ-004 ACTUATED SOLUTIONS LTD	4	Various
8	700111-000001	MEDIA AFM NO.0-NO.3 KIT FOR DVF 300	1	Green up-cycled glass
8.1	790301-000107	MEDIA AFM GRADE 0 (FINE) FOR DVF 300	30kg	Glass

DVF 600 Filter – GA Drawing



*Approx. height required for maintenance
Dimensions are in MM [INCH]

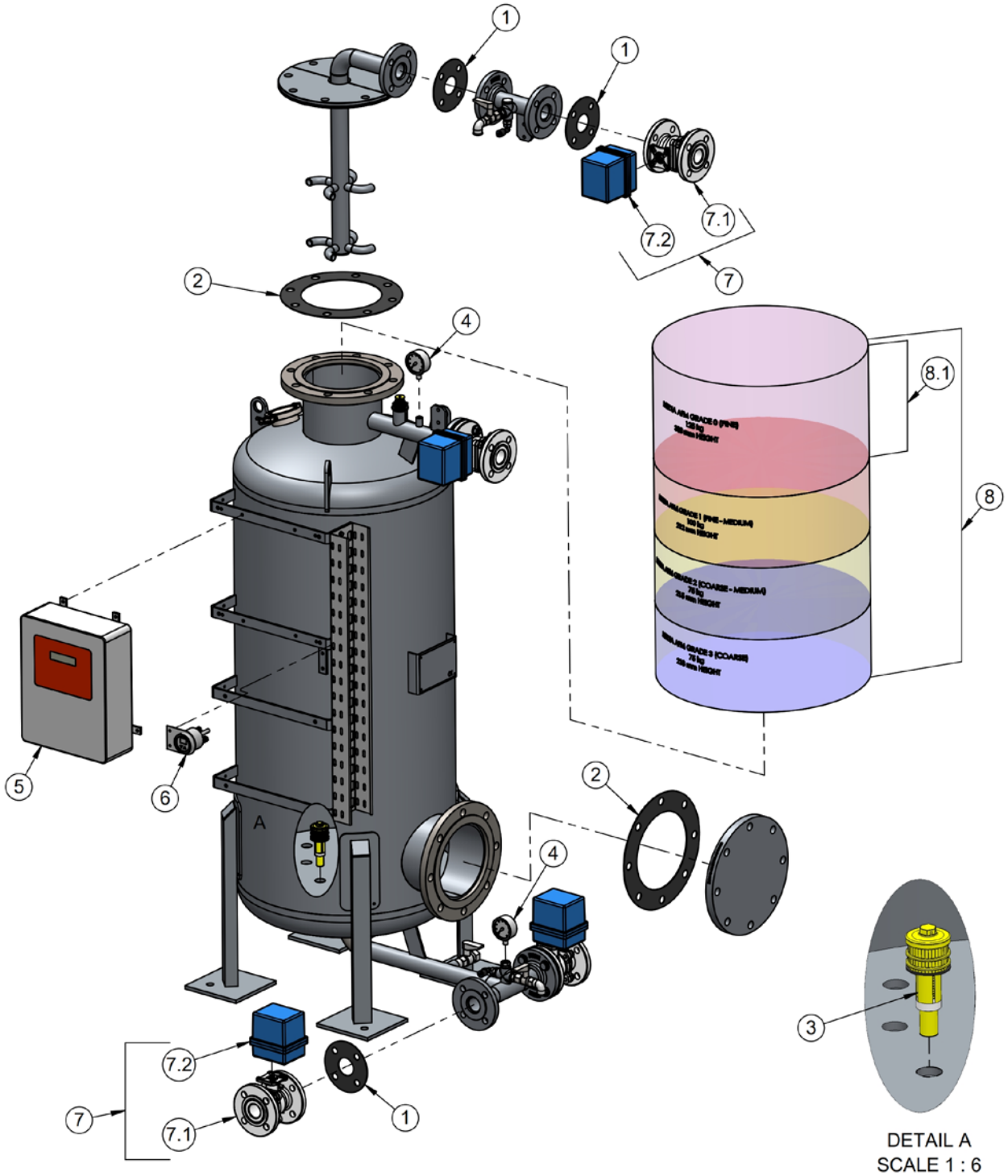
TOLERANCES (Unless otherwise specified)						
Length	0.5-3	>3-50	<50-120	<120-400	<400-1000	>1000
Tolerance	±0.5	±1	±1.5	±2.5	±4	±6



CONSTRUCTION	
Materials For Filter Vessel: S/ST 304L	
DESIGN CRITERIA	
Design Pressure	7 Bar
Test Pressure	10 Bar
Design Temperature	60 °C
Min. Flow Rate	5.5 m³/hr
Max. Flow Rate	17 m³/hr
TOTAL WEIGHT (kg)	
Empty	336
Media	375

NOZZLES LIST						
CODE	QTY.	SIZE	CLASS	PIPE	FLANGE TYPE	SERVICE
N1	1	1 1/2" (DN40)	ISO10	SCH40	S.O.R.F	INLET
N2	1	1 1/2" (DN40)	ISO10	SCH40	S.O.R.F	OUTLET
N3	1	1 1/2" (DN40)	ISO10	SCH40	S.O.R.F	BACKWASH INLET
N4	1	1 1/2" (DN40)	ISO10	SCH40	S.O.R.F	BACKWASH OUTLET
N5	1	8" (DN200)	ISO10	6mm THK	S.O.R.F	INSPECTION

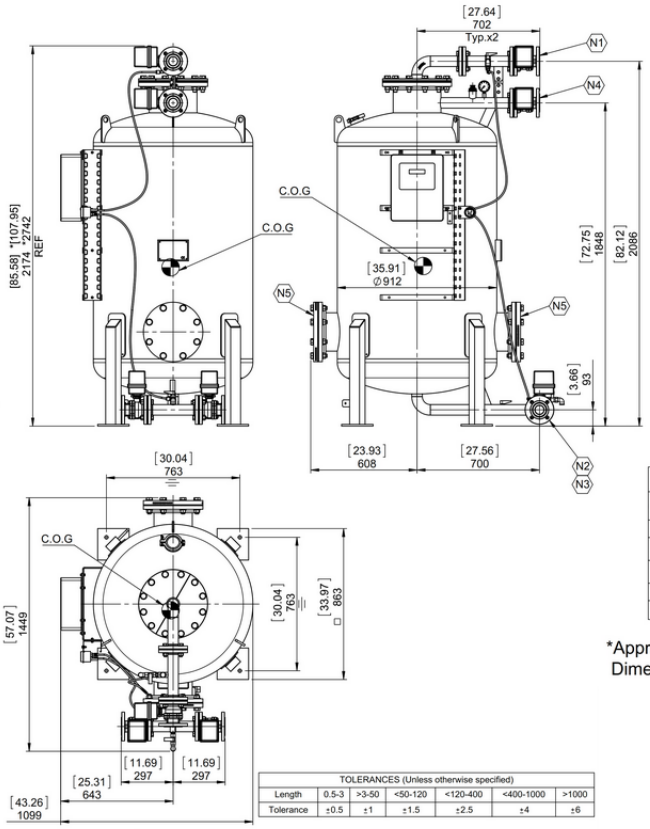
DVF 600 Filter - Parts Drawing



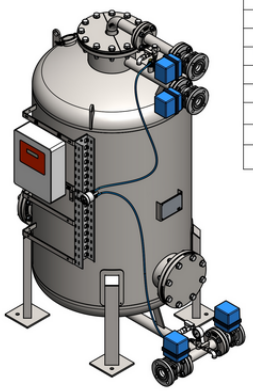
DVF 600 Filter - Parts List

No.	CAT. No.	Description	Qty	Material
1	770103-000472	GASKET 1 1/2" ISO PN10 EPDM DN40 TH2MM FULL FACE AMIAD	5	EPDM
2	770103-000459	GASKET 8" ISO PN10 EPDM DN200 TH2MM FULL FACE AMIAD	2	EPDM
3	700190-005509	NOZZLE ASSEMBLY WITH SEAL FOR DVF	16	PP
4	720301-000036	PRESSURE GAUGE 0-16 BAR/PSI NUOVA FIMA S/ST316 1/4" BSP BOTTOM 2" W/GLYCERINE	2	S/ST 316
5	720101-000776	FLUSHING CONTROLLER TECNOLOGIC 5REL S240VAC AC-5 BESPOKE FOR DVF	1	Various
6	720104-000025	DP SWITCH W/BRACKET BACCARA 1/8" BSPM REAR 14BAR 0.5BAR IP66 12794121	1	Various
7	730104-000574	2-WAY BALL VALVE 1 1/2" ISO10 2528 S/ST ELECTRIC HQ-004 DN40 GENEBRE+ACT. SOL.	4	VARIOUS
7.1	730104-000575	2-WAY BALL VALVE 1 1/2" ISO10 2528 S/ST W/O ACTUATOR DN40 GENEBRE	4	S/ST 304
7.2	720701-000062	ACTUATOR 24VAC/DC HQ-004 ACTUATED SOLUTIONS LTD	4	Various
8	700111-000002	MEDIA AFM NO.0-NO.3 KIT FOR DVF 600	1	Green up-cycled glass
8.1	790301-000107	MEDIA AFM GRADE 0 (FINE) FOR DVF 600	125kg	Glass

DVF 900 Filter – GA Drawing



TOLERANCES (Unless otherwise specified)						
Length	0.5-3	>3-50	<50-120	<120-400	<400-1000	>1000
Tolerance	±0.5	±1	±1.5	±2.5	±4	±6

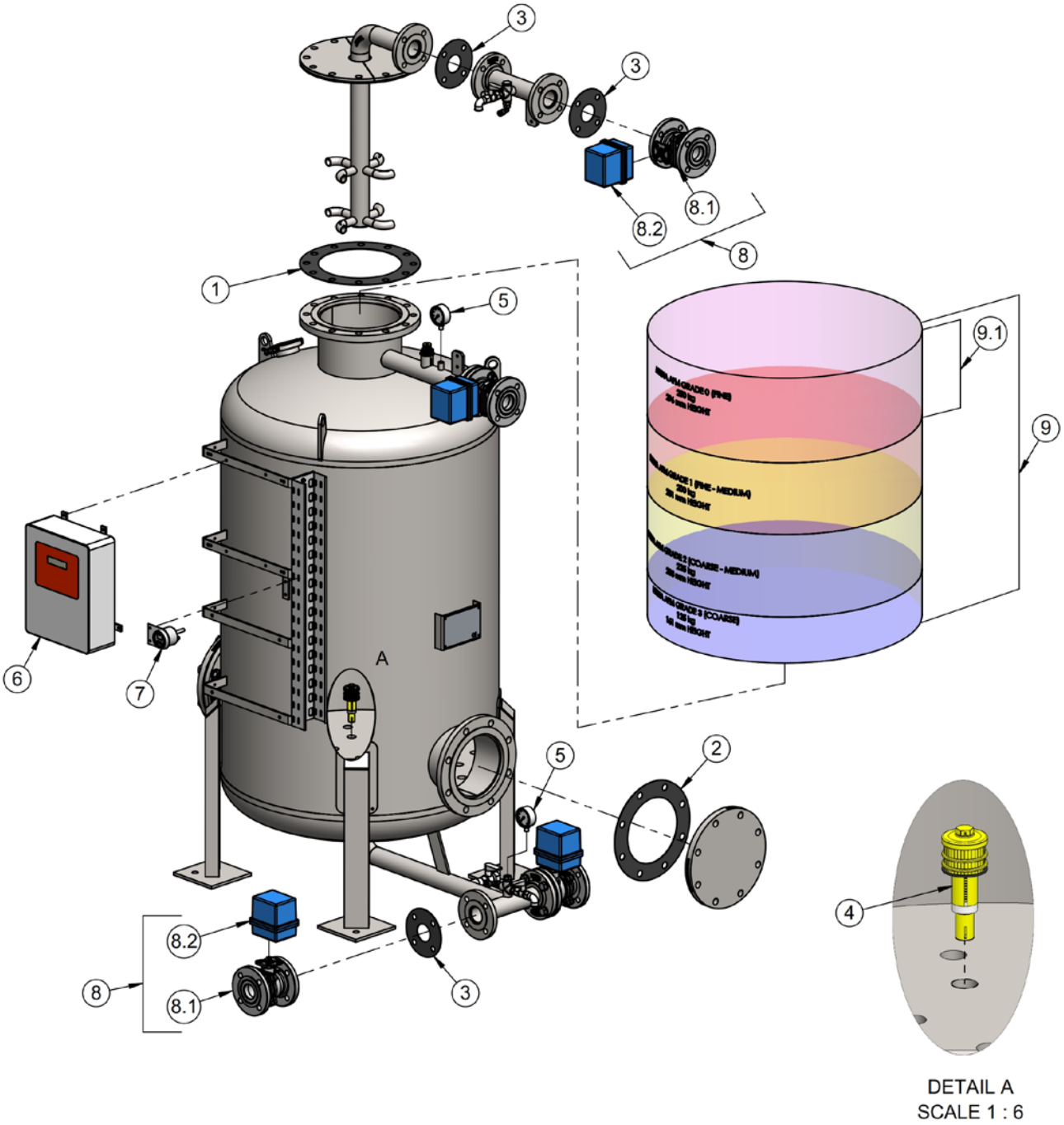


CONSTRUCTION	
Materials For Filter Vessel: S/ST 304L	
DESIGN CRITERIA	
Design Pressure	7 Bar
Test Pressure	10 Bar
Design Temperature	60˚C
Min. Flow Rate	13 m³/hr
Max. Flow Rate	40 m³/hr
TOTAL WEIGHT (kg)	
Empty	612
Media	800

NOZZLES LIST						
CODE	QTY.	SIZE	CLASS	PIPE	FLANGE TYPE	SERVICE
N1	1	2" (DN50)	ISO10	SCH40	S.O.R.F	INLET
N2	1	2" (DN50)	ISO10	SCH40	S.O.R.F	OUTLET
N3	1	2" (DN50)	ISO10	SCH40	S.O.R.F	BACKWASH INLET
N4	1	2" (DN50)	ISO10	SCH40	S.O.R.F	BACKWASH OUTLET
N5	2	8" (DN200)	ISO10	6mm THK	S.O.R.F	INSPECTION

*Approx. height required for maintenance
Dimensions are in MM [INCH]

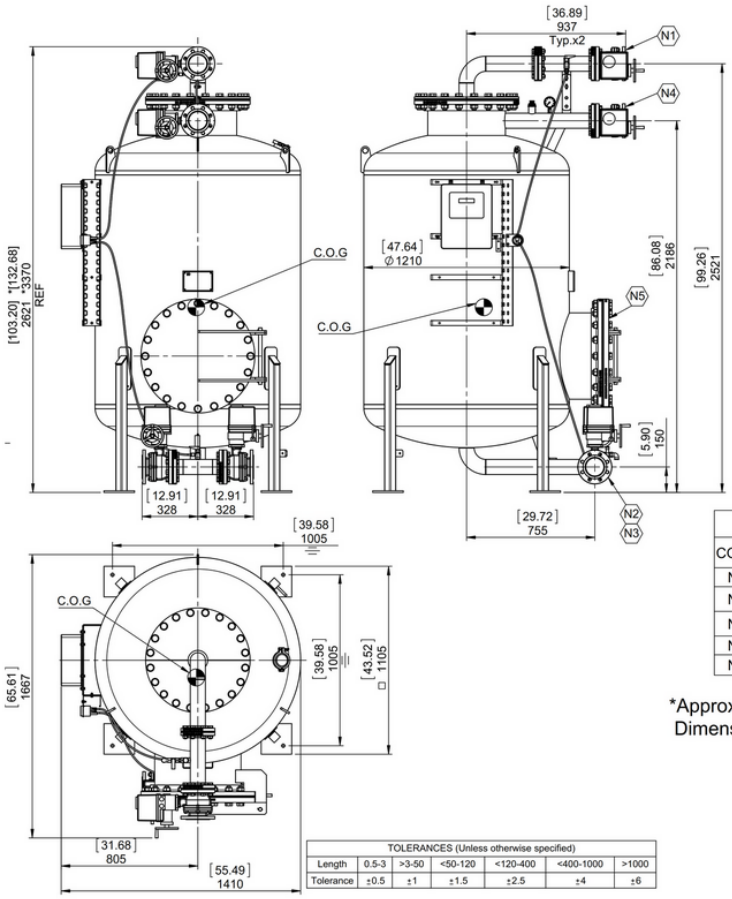
DVF 900 Filter – Parts Drawing

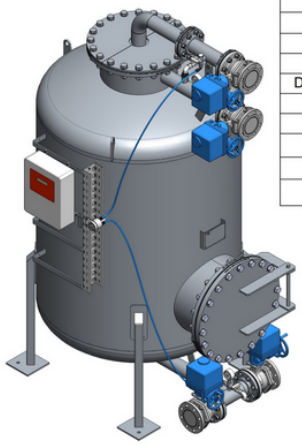


DVF 900 Filter – Parts List

No.	CAT. No.	Description	Qty	Material
1	770103-000460	GASKET 10" ISO PN10 EPDM DN250 TH2MM FULL FACE AMIAD	1	EPDM
2	770103-000459	GASKET 8" ISO PN10 EPDM DN200 TH2MM FULL FACE AMIAD	2	EPDM
3	770103-000473	GASKET 2" ISO PN10 EPDM DN50 TH2MM FULL FACE AMIAD	5	EPDM
4	700190-005509	NOZZLE ASSEMBLY WITH SEAL FOR DVF	36	PP
5	720301-000036	PRESSURE GAUGE 0-16 BAR/PSI NUOVA FIMA S/ST316 1/4" BSP BOTTOM 2" W/GLYCERINE	2	S/ST 316
6	720101-000776	FLUSHING CONTROLLER TECNOLOGIC 5REL S240VAC AC-5 BESPOKE FOR DVF	1	Various
7	720104-000025	DP SWITCH W/BRACKET BACCARA 1/8" BSPM REAR 14BAR 0.5BAR IP66 12794121	1	Various
8	730104-000577	2-WAY BALL VALVE 2" ISO10 2528 S/ST ELECTRIC HQ-004 DN50 GENEBRE+ACT. SOL.	4	VARIOUS
8.1	730104-000576	2-WAY BALL VALVE 2" ISO10 2528 S/ST W/O ACTUATOR DN50 GENEBRE	4	S/ST 304
8.2	720701-000062	ACTUATOR 24VAC/DC HQ-004 ACTUATED SOLUTIONS LTD	4	Various
9	700111-000003	MEDIA AFM NO.0-NO.3 KIT FOR DVF 900	1	Green up-cycled glass
9.1	790301-000107	MEDIA AFM GRADE 0 (FINE) FOR DVF 900	250kg	Glass

DVF 1200 Filter – GA Drawing





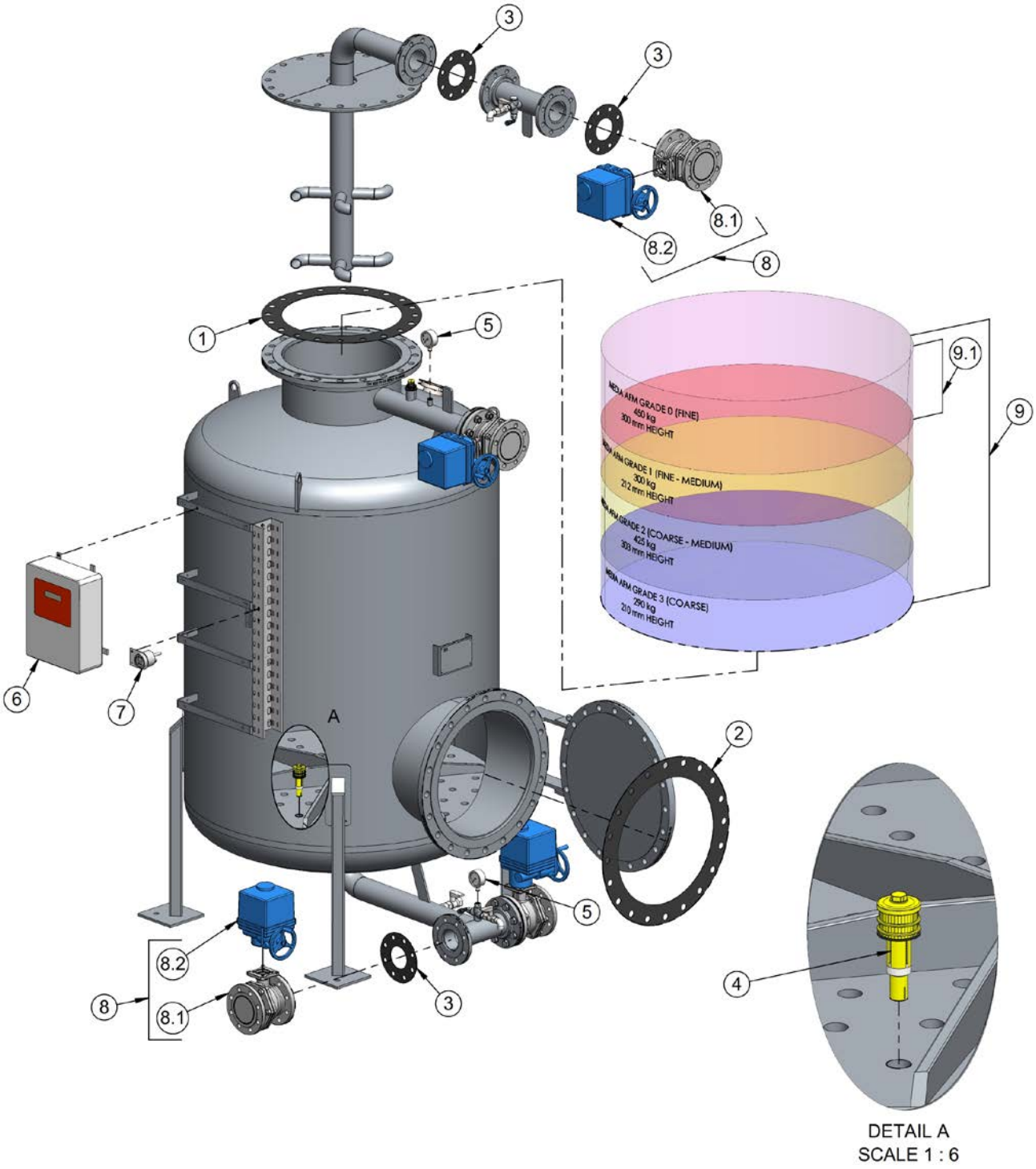
CONSTRUCTION	
Materials For Filter Vessel: S/ST 304L	
DESIGN CRITERIA	
Design Pressure	7 Bar
Test Pressure	10 Bar
Design Temperature	60°C
Min. Flow Rate	22 m³/hr
Max. Flow Rate	68 m³/hr
TOTAL WEIGHT (kg)	
Empty	1028
Media	1465

NOZZLES LIST						
CODE	QTY.	SIZE	CLASS	PIPE	FLANGE TYPE	SERVICE
N1	1	3" (DN80)	ISO10	SCH40	S.O.R.F	INLET
N2	1	3" (DN80)	ISO10	SCH40	S.O.R.F	OUTLET
N3	1	3" (DN80)	ISO10	SCH40	S.O.R.F	BACKWASH INLET
N4	1	3" (DN80)	ISO10	SCH40	S.O.R.F	BACKWASH OUTLET
N5	1	20" (DN500)	ISO10	5mm THK	S.O.R.F	INSPECTION

*Approx. height required for maintenance
Dimensions are in MM [INCH]

TOLERANCES (Unless otherwise specified)						
Length	0.5-3	>3-50	<50-120	<120-400	<400-1000	>1000
Tolerance	±0.5	±1	±1.5	±2.5	±4	±6

DVF 1200 Filter – Parts Drawing

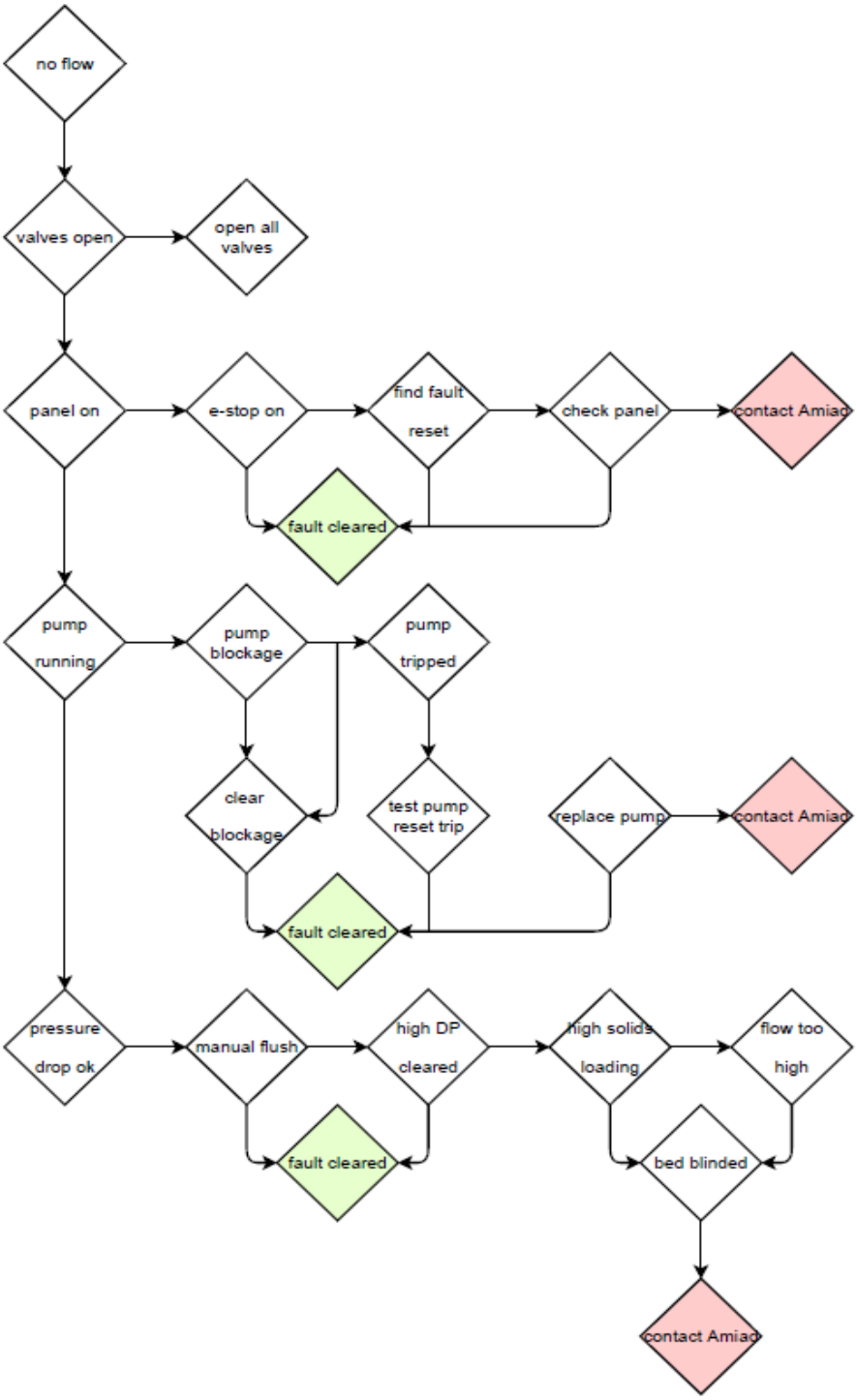


DVF 1200 Filter – Parts List

No.	CAT. No.	Description	Qty	Material
1	770103-000462	GASKET 18" ISO PN10 EPDM DN450 TH2MM FULL FACE AMIAD	1	EPDM
2	770103-000461	GASKET 20" ISO PN10 EPDM DN500 TH2MM FULL FACE AMIAD	1	EPDM
3	770103-000474	GASKET 3" ISO PN10 EPDM DN80 TH2MM FULL FACE AMIAD	5	EPDM
4	700190-005509	NOZZLE ASSEMBLY WITH SEAL FOR DVF	72	B PP
5	720301-000036	PRESSURE GAUGE 0-16 BAR/PSI NUOVA FIMA S/ST316 1/4" BSP BOTTOM 2" W/GLYCERINE	2	S/ST 316
6	720101-000776	FLUSHING CONTROLLER TECNOLOGIC 5REL S240VAC AC-5 BESPOKE FOR DVF	1	Various
7	720104-000025	DP SWITCH W/BRACKET BACCARA 1/8" BSPM REAR 14BAR 0.5BAR IP66 12794121	1	Various
8	730104-000579	2-WAY BALL VALVE 3" ISO10 2528 S/ST ELECTRIC HQ-008 DN80 GENEBRE+ACT. SOL.	4	VARIOUS
8.1	730104-000578	2-WAY BALL VALVE 3" ISO10 2528 S/ST W/O ACTUATOR DN80 GENEBRE	4	S/ST 304
8.2	720701-000063	ACTUATOR 24VAC/DC HQ-008 ACTUATED SOLUTIONS LTD	4	Various
9	700111-000004	MEDIA AFM NO.0-NO.3 KIT FOR DVF 1200	1	Green up-cycled glass
9.1	790301-000107	MEDIA AFM GRADE 0 (FINE) FOR DVF 1200	450kg	Glass

Basic Troubleshooting Flowchart

The majority of faults and problems are associated with the installation rather than the filter system itself.
Here is a flow chart of the most common faults in order that you may check them before calling our service technicians.



Amiad Limited Warranty

1. This certificate applies to Amiad Water Systems Ltd. ("**Amiad**") products purchased by you (the "**Buyer**") from Amiad unless specifically agreed otherwise in writing by Amiad. This Warranty extends only to the original purchaser, and is not transferable to anyone who subsequently purchases, leases, or otherwise obtains the product from the original purchaser.
2. Amiad hereby warrants that the products are and will be free from defects in material and workmanship under normal use and service. Amiad warrants that it will correct manufacturing defects in the products, in accordance with the conditions set out in this Warranty.
3. This Warranty is enforceable for a period of 12 months after the date upon which the products were delivered (the "**Warranty Period**").
4. In the event that during the Warranty Period the Buyer discovers a defect in material and/or workmanship in any product or part (the "**Defective Product**"), it shall submit a written complaint to Amiad using Amiad's standard Buyer Complaint Form. For the receipt of the Buyer Complaint Form, the submission of the complaint or any questions please contact your service representative.
5. Upon written demand by Amiad the Buyer shall return the Defective Product - or a sample thereof - to Amiad, at Amiad's cost. If the Buyer ships any such Defective Product, Amiad suggests the Buyer package it securely and insure it for value, as Amiad assumes no liability for any loss or damage occurring during shipment. Provided however that in the event Amiad determines that this Warranty does not apply to such product, Buyer shall promptly reimburse Amiad for such cost (including freight and customs). Any returned product or part must be accompanied by the Warranty certificate and the purchase invoice. It is clarified that the Buyer may not return the Defective Product unless such return was coordinated and approved by Amiad in advance.
6. Amiad's obligation under this Warranty shall be limited to, at Amiad's option, the repair or exchange, free of charge, of the product or any part which may prove defective under normal use and service during the Warranty Period. The provision of a repair or replacement of a product during the Warranty Period will result in an extension of the Warranty Period by an additional period of 12 months, provided that the total accumulated Warranty Period shall in any event be no more than 18 months from the date upon which the products were delivered.
7. This Warranty is valid on the condition that the products are installed according to Amiad's instructions as expressed in Amiad's instruction manuals and according to the technical limitations as stipulated in Amiad's literature or as stated by a representative of Amiad.
8. This Warranty will not apply to damaged or defective products resulting from or related to:
   (i) Fire, flood, power surges or failures or any other catastrophe and/or unforeseen occurrence, such as but not limited to those for which the Buyer is customarily insured for, or any force majeure events;
   (ii) Fault, abuse or negligence of the Buyer;
   (iii) Intake water not meeting the agreed standards, as set forth in a written document, approved by Amiad, or improper storage;
   (iv) Improper or unauthorized use of the product or related parts by the Buyer, including Buyer's failure to operate the product in conformity with the recommendations and instructions of Amiad, as set forth in Amiad's manuals and other written materials, the operation of the product other than by a trained and qualified operator, or improper installation of the product by a third party not authorized by Amiad;
   (v) Performance by the Buyer of maintenance or operation other than in conformity with the recommendations and instructions of Amiad, or other than in accordance with procedures defined in the literature supplied for products (including the timely replacement of requisite parts), and for services provided other than by a trained and qualified advanced operator; or
   (vi) Any alteration, modification, foreign attachment to or repair of the products, other than by Amiad or its authorized technical representatives.
9. In no event shall Amiad be liable to the Buyer or any third party for any damages to property, or for any intangible or economic loss, including loss of profits, loss of customers or damage to reputation, for any damages, including indirect, special, consequential damages, or punitive damage arising out of or in connection with this Warranty, or arising out of or in connection with the product's performance or failure to perform, even if it has been advised of the possibility of such damages.
10. Amiad will be excused for failure to perform or for delay in performance hereunder if such failure or delay is due to causes beyond its reasonable control or force majeure preventing or hindering performance.
11. This Warranty set forth herein is the only contractual warranty given by Amiad and is provided in lieu of any other warranties created by any documentation, packaging or otherwise.
12. Amiad makes no warranty whatsoever in respect to accessories or parts not supplied by Amiad. In the event that Amiad is required to correct a Defective Product or product not covered by this Warranty, it will do so solely in consideration for additional fees.
13. The parties will actively endeavor to amicably settle any dispute arising between them. In the event that the parties are unable to reach an equitable settlement of such dispute, any claim or lawsuit related to the Warranty, its validity execution, its performance be brought before only the courts of Tel-Aviv, Israel. Israeli law will govern the Warranty, to the exclusion of any conflict of law rules

Annex A – Media Safety Data Sheet (7 pages)

Dryden Aqua Ltd
SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Name of the substance	AFM Filter Media
Identification number	-
Registration number	-
Synonyms	Activated amophous aluminosilicate. Grades 0, 1, 2, 3
Product code	5.1.00.00, 5.1.00.10, 5.1.00.20, 5.1.00.30
Issue date	03-October-2014
Version number	04
Revision date	09-September-2016
Supersedes date	28-November-2014

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Filtration
Uses advised against	No other uses are advised.

1.3. Details of the supplier of the safety data sheet

Supplier

Company name	Dryden Aqua Ltd
Address	Butlerfield Industrial Estate Bonnyrigg Edinburgh EH19 3JQ GB
Telephone	+44 (0) 18758 22222 Fax: +44 (0) 18758 22229
e-mail	aqua@drydenaqua.com
Contact person	Graeme McQuarrie

1.4. Emergency telephone number +44 (0) 18758 22222

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

The substance has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

Classification according to Regulation (EC) No 1272/2008 as amended

This substance does not meet the criteria for classification according to Regulation (EC) 1272/2008 as amended.

Hazard summary Exposure to powder or dusts may be irritating to eyes, nose and throat.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Hazard pictograms	None.
Signal word	None.
Hazard statements	The substance does not meet the criteria for classification.

Precautionary statements

Prevention	Observe good industrial hygiene practices.
Response	Wash hands after handling.
Storage	Store away from incompatible materials.
Disposal	Dispose of waste and residues in accordance with local authority requirements.

Supplemental label information None.

2.3. Other hazards None known.

SECTION 3: Composition/information on ingredients

3.1. Substances

General information

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	INDEX No.	Notes
Activated amorphous aluminosilicate	100	65997-17-3 266-046-0	-	-	
Classification: -					

List of abbreviations and symbols that may be used above

#: This substance has been assigned Community workplace exposure limit(s).
PBT: persistent, bioaccumulative and toxic substance.
vPvB: very persistent and very bioaccumulative substance.
M: M-factor

SECTION 4: First aid measures

General information Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

4.1. Description of first aid measures

Inhalation If dust from the material is inhaled, remove the affected person immediately to fresh air. Call a physician if symptoms develop or persist.

Skin contact Get medical attention if irritation develops and persists.

Eye contact Do not rub eyes. Rinse with water. Get medical attention if irritation develops and persists.

Ingestion Rinse mouth. Get medical attention if symptoms occur.

4.2. Most important symptoms and effects, both acute and delayed Dusts may irritate the respiratory tract, skin and eyes.

4.3. Indication of any immediate medical attention and special treatment needed Treat symptomatically.

SECTION 5: Firefighting measures

General fire hazards No unusual fire or explosion hazards noted.

5.1. Extinguishing media

Suitable extinguishing media Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media Do not use water jet as an extinguisher, as this will spread the fire.

5.2. Special hazards arising from the substance or mixture During fire, gases hazardous to health may be formed.

5.3. Advice for firefighters

Special protective equipment for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Special fire fighting procedures Move containers from fire area if you can do so without risk.

Specific methods Use standard firefighting procedures and consider the hazards of other involved materials.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel Wear appropriate protective equipment and clothing during clean-up. Keep unnecessary personnel away. Avoid inhalation of dust from the spilled material. Wear a dust mask if dust is generated above exposure limits. For personal protection, see section 8.

For emergency responders Use personal protection recommended in Section 8 of the SDS. Keep unnecessary personnel away.

6.2. Environmental precautions Avoid release to the environment.

6.3. Methods and material for containment and cleaning up	Stop the flow of material, if this is without risk. Avoid the generation of dusts during clean-up. If sweeping of a contaminated area is necessary use a dust suppressant agent which does not react with the product. Collect dust using a vacuum cleaner equipped with HEPA filter. Large Spills: Wet down with water and dike for later disposal. Shovel the material into waste container. Small Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal.
6.4. Reference to other sections	For personal protection, see section 8. For waste disposal, see section 13 of the SDS.

SECTION 7: Handling and storage

7.1. Precautions for safe handling	Provide appropriate exhaust ventilation at places where dust is formed. Do not breathe dust from this material. Avoid contact with skin and eyes. Avoid prolonged exposure. In case of insufficient ventilation, wear suitable respiratory equipment. Practice good housekeeping.
7.2. Conditions for safe storage, including any incompatibilities	Avoid dust formation. Store in original tightly closed container. Store in a well-ventilated place. Keep container tightly closed. Guard against dust accumulation of this material. Store away from incompatible materials (see Section 10 of the SDS).
7.3. Specific end use(s)	Not available.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

UK. EH40 Workplace Exposure Limits (WELs)

Additional components	Type	Value	Form
General dust	TWA	4 mg/m3	Respirable dust.
		10 mg/m3	Inhalable dust.

Biological limit values	No biological exposure limits noted for the ingredient(s).
Recommended monitoring procedures	Follow standard monitoring procedures.
Derived no-effect level (DNEL)	Not available.
Predicted no effect concentrations (PNECs)	Not available.

8.2. Exposure controls

Appropriate engineering controls	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Ventilation should be sufficient to effectively remove and prevent buildup of any dusts or fumes that may be generated during handling or thermal processing. If engineering measures are not sufficient to maintain concentrations of dust particulates below the OEL (occupational exposure limit), suitable respiratory protection must be worn.

Individual protection measures, such as personal protective equipment

General information	Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.
Eye/face protection	Wear safety glasses with side shields (or goggles). Use tight fitting goggles if dust is generated.
Skin protection	
- Hand protection	Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.
- Other	Wear suitable protective clothing. Normal work clothing (long sleeved shirts and long pants) is recommended.

Respiratory protection	If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.
Thermal hazards	Not available.
Hygiene measures	Do not breathe dust. Avoid contact with eyes. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.
Environmental exposure controls	Environmental manager must be informed of all major releases. Avoid release to the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	Powder.
Physical state	Solid.
Form	amorphous
Colour	Green.
Odour	Odourless.
Odour threshold	Not applicable
pH	Not applicable
Melting point/freezing point	730 °C (1346 °F) estimated / Not applicable
Initial boiling point and boiling range	Not applicable
Flash point	Not applicable
Evaporation rate	Not applicable
Flammability (solid, gas)	Not available.
Vapour pressure	Not applicable
Vapour density	Not applicable
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Insoluble
Solubility (other)	Not available.
Auto-ignition temperature	Not applicable
Decomposition temperature	Not available.
Viscosity	Not applicable
Explosive properties	Not explosive.
Oxidising properties	Not oxidising.

9.2. Other information

Density	2.50 g/cm³ estimated
Flammability	Not applicable

SECTION 10: Stability and reactivity

10.1. Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
10.2. Chemical stability	Material is stable under normal conditions.
10.3. Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
10.4. Conditions to avoid	Avoid spread of dust. Contact with incompatible materials. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air).
10.5. Incompatible materials	None known.
10.6. Hazardous decomposition products	No hazardous decomposition products are known.

SECTION 11: Toxicological information

General information	Occupational exposure to the substance or mixture may cause adverse effects. Incomplete toxicological data are available for this product.

Information on likely routes of exposure

Inhalation	Dust may irritate respiratory system. Prolonged inhalation may be harmful.
Skin contact	Dust or powder may irritate the skin.
Eye contact	Dust in the eyes will cause irritation.
Ingestion	May cause discomfort if swallowed. However, ingestion is not likely to be a primary route of occupational exposure.
Symptoms	Dusts may irritate the respiratory tract, skin and eyes. Exposure may cause temporary irritation, redness, or discomfort.

11.1. Information on toxicological effects

Acute toxicity	No data available.
Skin corrosion/irritation	Due to partial or complete lack of data the classification is not possible.
Serious eye damage/eye irritation	Due to partial or complete lack of data the classification is not possible.
Respiratory sensitisation	Due to partial or complete lack of data the classification is not possible.
Skin sensitisation	Due to partial or complete lack of data the classification is not possible.
Germ cell mutagenicity	Due to partial or complete lack of data the classification is not possible.
Carcinogenicity	Due to partial or complete lack of data the classification is not possible.
Reproductive toxicity	Due to partial or complete lack of data the classification is not possible.
Specific target organ toxicity - single exposure	Due to partial or complete lack of data the classification is not possible.
Specific target organ toxicity - repeated exposure	Due to partial or complete lack of data the classification is not possible.
Aspiration hazard	Due to partial or complete lack of data the classification is not possible.
Mixture versus substance information	No information available.
Other information	Not available.

SECTION 12: Ecological information

12.1. Toxicity	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
12.2. Persistence and degradability	The product solely consists of inorganic compounds which are not biodegradable.
12.3. Bioaccumulative potential	Does not bioaccumulate.
Partition coefficient n-octanol/water (log Kow)	Not applicable.
Bioconcentration factor (BCF)	Not available.
12.4. Mobility in soil	Insoluble and thus presents a low mobility in most soils
12.5. Results of PBT and vPvB assessment	Not a PBT or vPvB substance or mixture.
12.6. Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Residual waste	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.
EU waste code	The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Disposal methods/information	Collect and reclaim or dispose in sealed containers at licensed waste disposal site.
Special precautions	Dispose in accordance with all applicable regulations.

SECTION 14: Transport information

ADR

Not regulated as dangerous goods.

RID

Not regulated as dangerous goods.

ADN

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended

Not listed.

Regulation (EC) No. 850/2004 on persistent organic pollutants, Annex I

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorization, as amended

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006 Annex XVII Substances subject to restriction on marketing and use

Not regulated.

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Not listed.

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work

Not listed.

Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens and mutagens at work

Not regulated.

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breastfeeding.

Not regulated.

Other EU regulations

Directive 2012/18/EU on major accident hazards involving dangerous substances

Not listed.

Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

Always applicable.

Directive 94/33/EC on the protection of young people at work

Not listed.

Other regulations The product is classified and labelled in accordance with EC directives or respective national laws. This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006, as amended.

National regulations Follow national regulation for work with chemical agents.

15.2. Chemical safety assessment No Chemical Safety Assessment has been carried out.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of New and Existing Chemicals (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

SECTION 16: Other information

List of abbreviations Not available.

References Not available.

Information on evaluation method leading to the classification of mixture Not applicable.

Full text of any H-statements not written out in full under Sections 2 to 15 None.

Revision information This document has undergone significant changes and should be reviewed in its entirety.

Training information Follow training instructions when handling this material.

Disclaimer The information in the sheet was written based on the best knowledge and experience currently available.

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