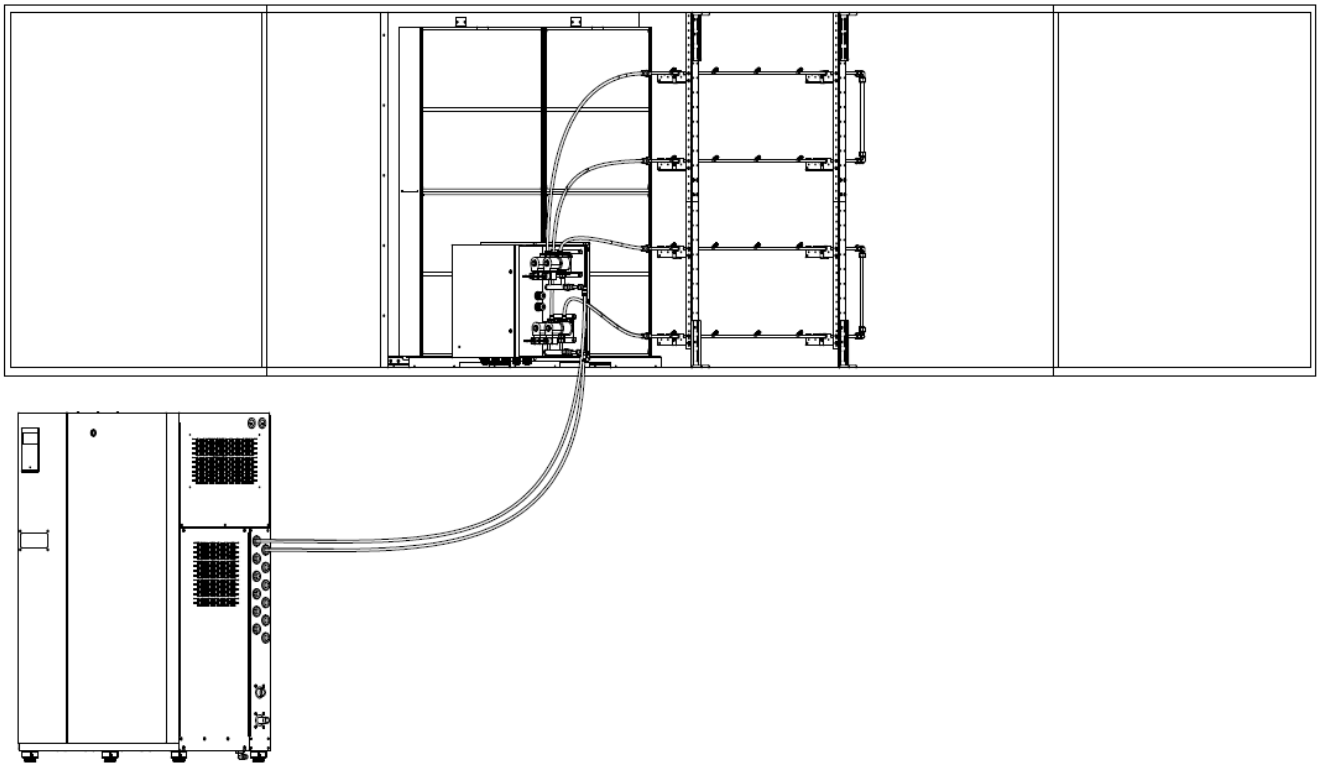
SKH4 High Pressure Atomizer

Plenum Mist Distribution



Plenum Mist Distribution Assembly Guide

The following document describes the procedure to follow to properly install a plenum mist distribution system for the SKH4. The steps and guidelines outlined in this document must be followed to avoid any anomaly resulting from inaccurate installation.

All installation work must be carried out by suitably qualified personnel and must conform to local codes and regulations.

Application

The SKH4 high pressure mist humidification generates extremely fine mist that may be directly absorbed in the ambient air. The plenum distribution of pressurized water is best suited to applications with zero tolerances for dripping in the space to humidify. Within the AHU, water droplets remain confined to the wet section; downstream of the mist eliminator, the airstream is effectively aerosol-free.

Site considerations

There are multiple factors specific to the site that can have an impact in high pressure mist absorption. Few examples:

- Air Temperature (Before humidification):
  Higher air temperature will improve mist absorption
- Humidity level (Before humidification):
  Lower air humidity will improve mist absorption
- Control:
  - Instruments: Proper sensor(s) and sensor location(s) are critical to ensure proper humidifier operation and may be critical to ensure proper mist absorption.
  - Control: Proper control loops and parameters settings are required for optimal mist absorption.
- Air quality: Dust in air can have negative effects on mist absorption.
- Smoke detector: Can be triggered by excess humidity. Ensure that there is no smoke sensor placed in the AHU between the humidifying grid and droplet separator.

The designer shall assess all site conditions that may influence mist absorption, including but not limited to airflow patterns, temperature, humidity, obstructions, and system layout. The designer shall determine the potential impacts of these conditions on system performance and shall implement appropriate design measures to mitigate identified risks.

Where site conditions cannot be fully controlled, the designer shall provide documented justification and specify any required operational limits, monitoring provisions, or maintenance practices to ensure continued performance and safety of the system.

Designers shall always budget the time during commissioning for adjustment and tuning of in-space high pressure humidification.

Mist Distribution System

The mist distribution system comes in separate parts, to be assembled on the job site. First there's the nozzle ramps with the adaptors for the nozzles from the factory. It is held with made to order racking parts from factory. The second part is the droplet separator with a frame to hold the media pad, downstream from the nozzles.

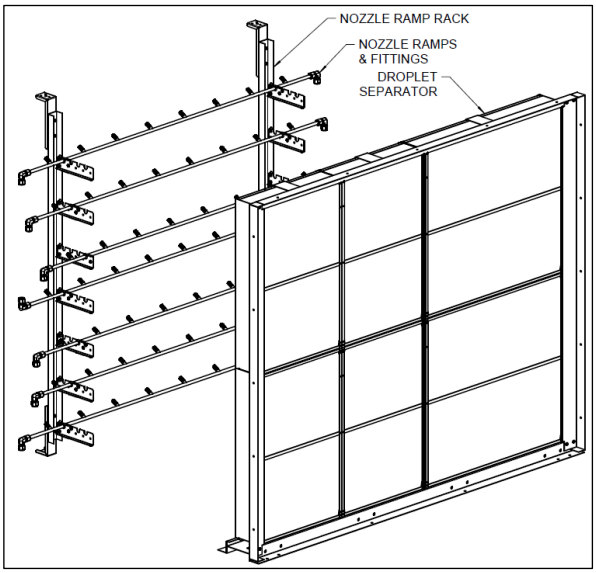


Figure 1 - Supplied Parts

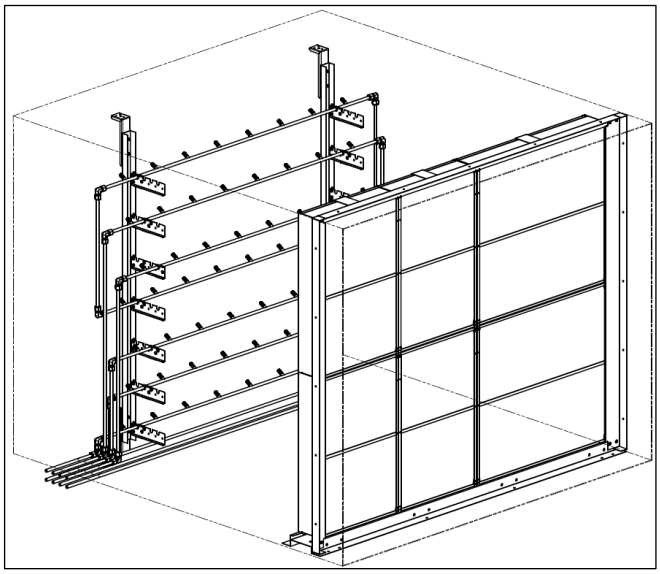


Figure 2 - Complete System

The wet section of the AHU should be watertight and made with rust free material, with a drain floor provided. The illustration below shows the clearances for the final assembled system:

⚠	The length of the wet section in front of the nozzles depends highly on the air flow of the system. Allow for some space of the wet section in front of the nozzles, as necessary with variation of air flow and pressure.
ℹ	Note that the 40in is a minimum. If it is possible to install the droplet separator farther away, it will ease the absorption.

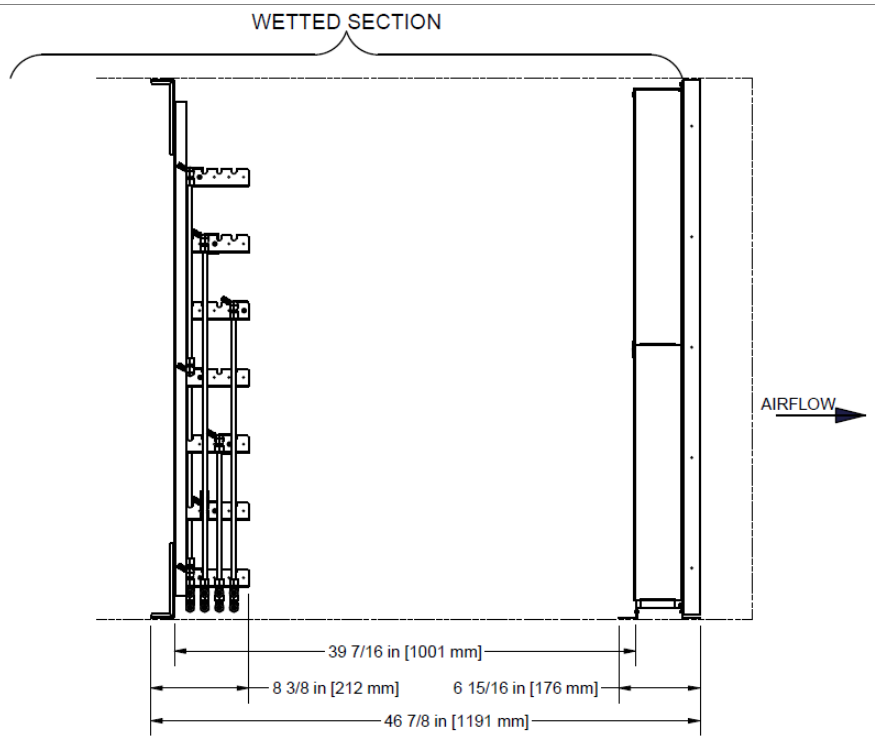


Figure 3 - Wetted Section

Plenum Rack Assembly Steps

1. **Media Support Structure**

   Install the wetted media support at the downstream limit of the wetted AHU section, within the pan.

   1.1. Fasten the base to the bottom of the duct with 1/4" self-drilling screws (not supplied).
   1.2. Fasten the side pillars at the base using #8 machine screws (supplied).
   1.3. Fasten the top bar to the side beams using #8 machine screws (supplied).
   1.4. Adjust the beam at the top and side to be against the surfaces of the plenum. The corner of the beam should fit within the corner of the plenum. Check with level the verticality of the beam. Fasten to the sides of the duct using #8 self-drilling screws (not supplied).

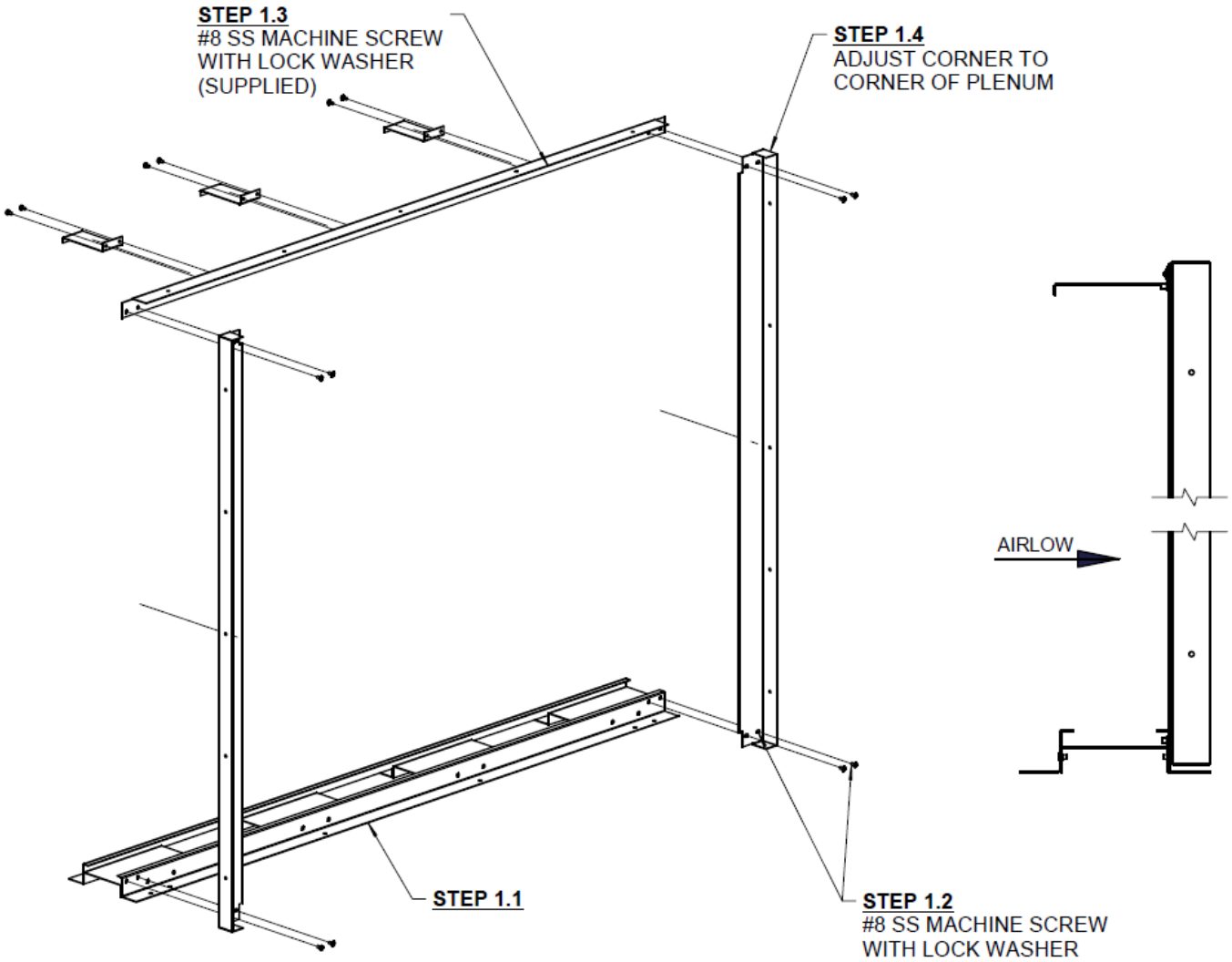


Figure 4 - Media Structure Assembly

2. Nozzle Rack

Assemble within the duct pan, respecting a 40” (1000mm) distance from the media pad assembly

The length of the wet section in front of the nozzles depends highly on the air flow of the system. Allow for some space of the wet section in front of the nozzles, as necessary with variation of air flow and pressure.

Plan space for accessibility, access inside of the plenum should be placed in between the rack and the droplet separator.

Plan for distribution tube passage through the wall of the plenum. Evaluate the placement of the nozzle rack to align with an appropriate space to go through the wall with the distribution pipe.

2.1. Fasten the first foot to the top of the plenum with #8 self-drilling screws (not supplied).
Min 40” (1000mm) from base of the media rack.
Approx 9 1/4” (250mm) from plenum wall.
Check alignment to make sure the foot is square relative the walls.
Make sure it’s facing the correct way with the airflow.

2.2. Fasten the main beam on the installed foot, using #8 machine screws (supplied).

2.3. Fasten bottom foot on the main beam, using 4x #8 machine screws (supplied), leave screws untighten for adjustment.

2.4. Check with level the verticality of the beam. Fasten in place the foot on the bottom of the plenum #8 self-drilling screws (not supplied).

2.5. Finalize with tightening the machine screws on the bottom foot.

2.6. Repeat with last foot, 9 1/4” from the opposite wall.

2.7. Complete the assembly of vertical supports depending on the dimensions and parts provided in the kit.
Vertical supports shall not be more than 79” (2000mm) apart.
Place vertical support so they do not interfere with nozzles’ spray cones, typically in front of the tube unions. Laying the nozzles’ distribution tubes in the plenum can be useful to plan the position of the middle vertical supports.

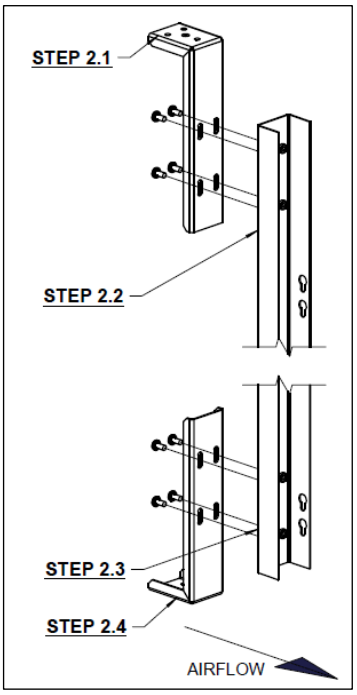


Figure 5 - Leg Assembly

2.8. Prepare the tube supports by inserting halfway #8 machine screws (supplied) on both pressed inserts. Install them on the key holes on all beams and fasten the screws completely.

2.9. Install tubes on the support in the correct stage indentation level. (Check next page for indication on where each tube should go.) Angle nozzles at 30° up, against airflow.
Note *: If tubes are longer than 2m, use supplied unions to join. Refer to assembly drawing for count of nozzle per stage.*

2.10. Cut grommets and install them in each slot around the tube.

2.11. Add a clip for each connection to secure the pipe in the slot, with the provided clip and using #8 machine screws (supplied).

2.12. Screw nozzles in each adaptor along the tubes.

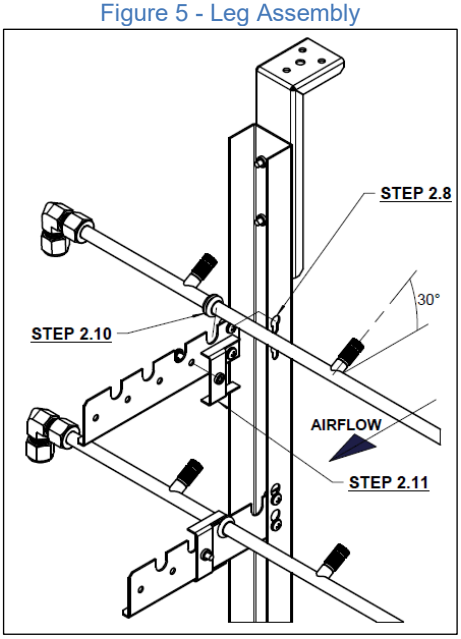


Figure 6 - Branch Holder Assembly

Info for Tube Positioning:

Tubes need to be placed in series between the stage valve and drain valves.
One or multiple tubes can be placed in series or parallel, if all tubes can be purged to the drain.

Each stage is a division of the grid with one or more tubes looped together, meant to control the total output.
In the example Figure 7, seven tubes are spread in 4 stages.

Stages are determined by Neptronic and indicated in the drawing coming with the parts. Pay attention to the number of nozzles on each branch.

Note how each stage is at a different indentation level in U slots on the tube supports. This helps also separate plumbing routes for each stage.
Tubes from a single stage need to be placed at the same level of indentation and connected together (see below)

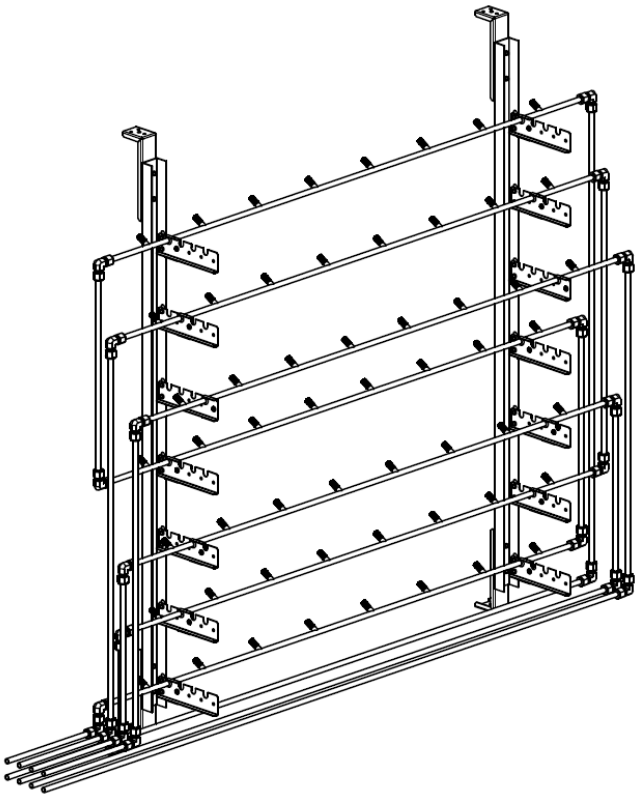
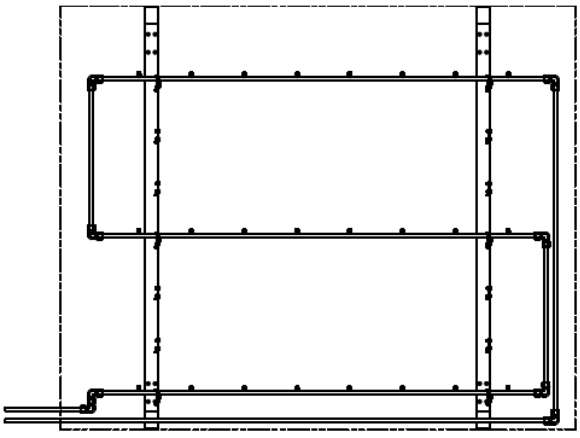
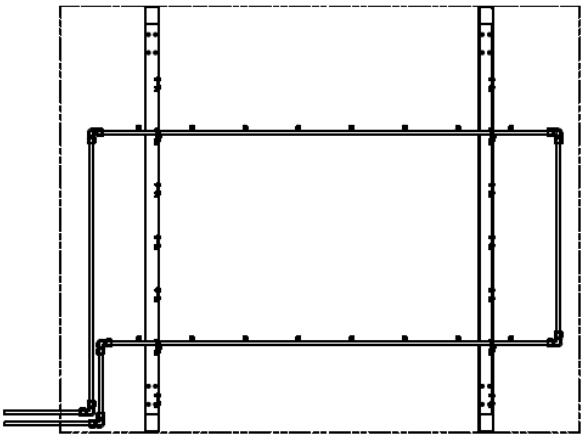


Figure 7 - Complete Tube Rack



1st Stage – 3 tubes
Odd number of tubes assembled in one stage.
***Note** : Could have been Tees (by others) instead of elbows (supplied).*



2nd Stage – 2 tubes
Even number of tubes assemble in one stage.

Finally, note how the 1st stage in the example above is spread out evenly across the section of the plenum, same for stage 2. Within reason, stages shall be spaced out in between each other to spread evenly humidity across the surface of the plenum.
Ideally, smallest stage should be centered in the plenum.

3. **Stage Plumbing (By Others)**
   3.1. Connect all tubes of a stage together. (As per recommendation in the previous page.) Complete the same for all stages.
   3.2. Complete the plumbing from the plenum up to the SKH4 pump unit or RVP.

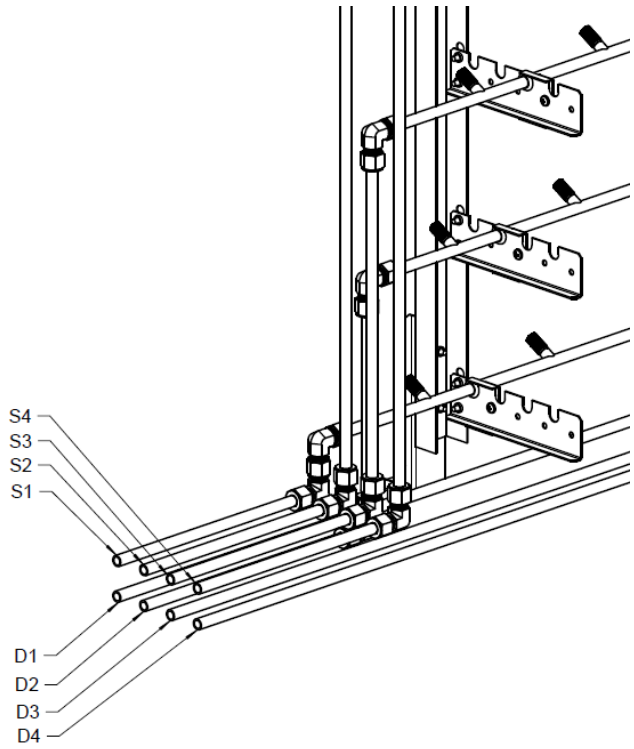


Figure 8 - Stage & Drain

4. **Media Cassettes**
   4.1. Insert the media cassettes and lock them into place with the supplied brackets and #10 screws, at the corners of media cassettes. Media cassettes are labelled, follow the assembly order in figure below.

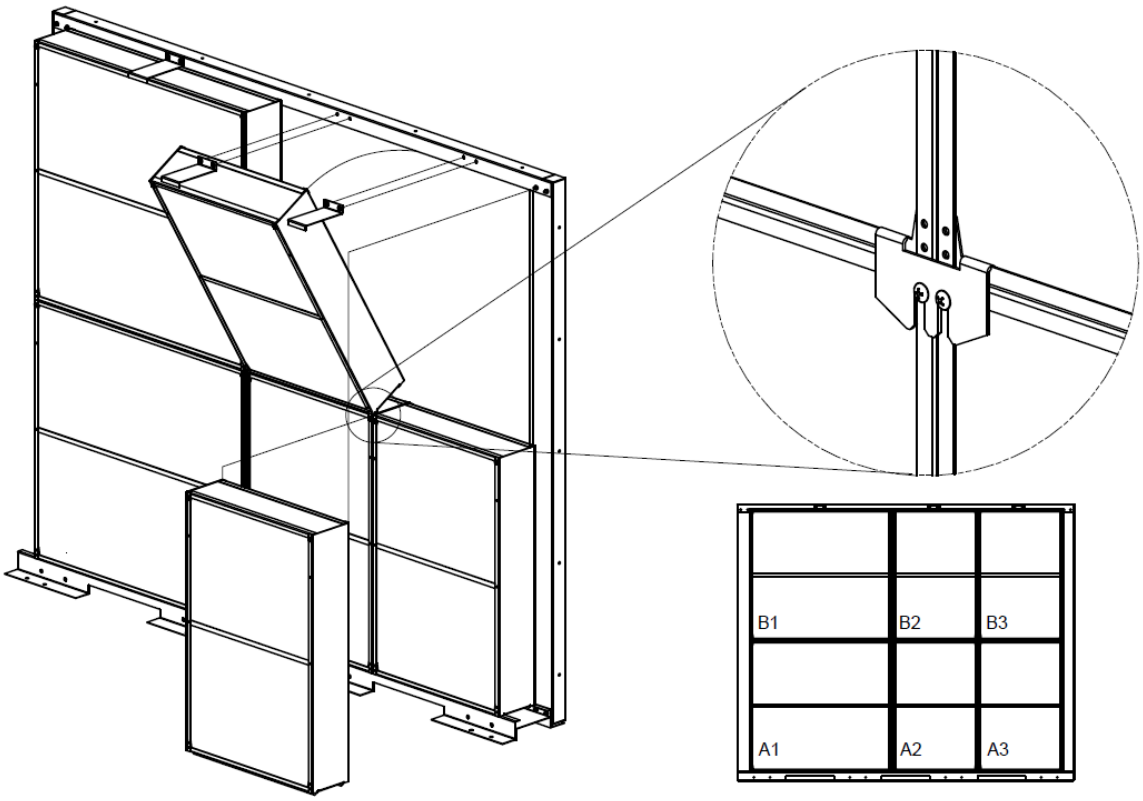
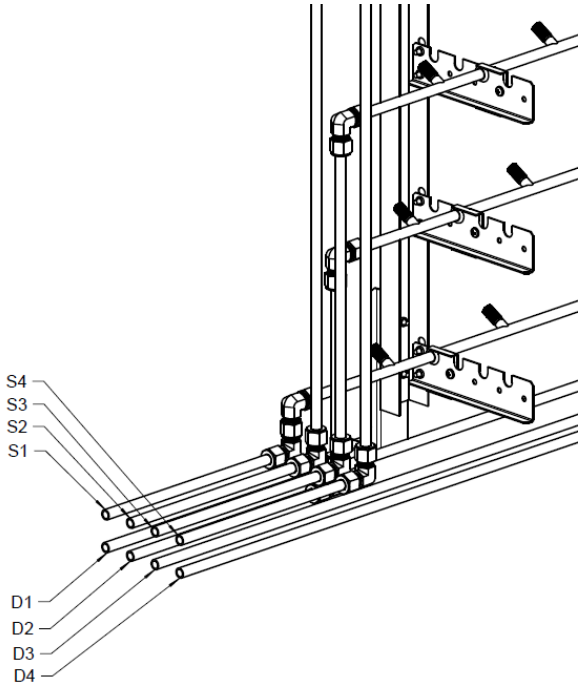


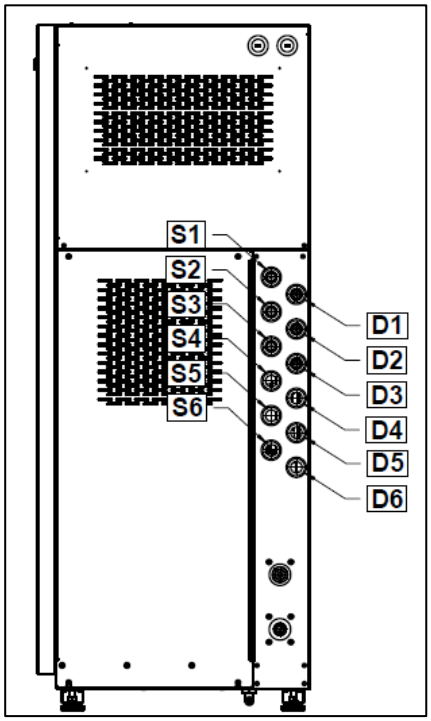
Figure 9 - Media Pad Assembly

5. Control Assignation

5.1. Using the controller, in the Installation menu, assign the appropriate capacity to each stage, **in Liter(s)/hour**, based on the number of nozzles multiplied by the capacity per nozzle.
Menu :Installation/Quick Config/Stages(1 to 4).

All stages of the same rack must be assigned to the same zone in order to work together properly.





6. Control function (Optional)

Ramp up: Accessing the menu: Installation / Quick Config / Zone[ ] / StgOpenDelay, this parameter allows the user to add a delay between the opening of the stages, for each zone separately. When that time value is higher than zero, the smallest stage will activate, followed by the second smallest after the delay parameterized.

The output increases progressively, which results in less intense variations in the system, allowing the control to be more precise and reduces the risk of overshooting during the startup process.