

## Installation – Designing for install





#### Design for Install

Planning the site - Critical requirements

- Unvented Kit
- Drainback Operation
- Roof Mount Type
- Pitch and Direction
- Collector Arrangement
- Roof Access for filling and commissioning
- Fix down collectors to prevent wind damage







**CPD** 



#### Design for Install

Planning the site - Critical requirements

- Drainback Operation
  - Relies on gravity
  - All drainback vessels must be level
  - Minimum roof pitch: 10 degrees
  - Pitched Pipework
  - Avoid the river affect in the pipework
  - No high spots at roof level
  - Low level penetrations through roof
  - Collectors must be above the top coil connection
  - Once in the building below the collectors, where the pipework is flooded, the pitch no longer matters.



# ADVECO Drain Back Operation – Static







#### Drain Back Operation -Operational





# ADVECO Drain Back Operation – Static









#### Drainback operation

• 0-1 cm pitch maximum over total length of the drainback assembly













#### Level drainback vessels







#### Level drainback vessels







### Minimum 10 degree Pitch







HOT WATER SPECIALISTS

#### Pitched pipework









NOT Preferred: Pipework pitches directly from connection level





#### Roof penetration

 Penetrate in red hatched area below drainback vessels with low swan's neck







#### Roof penetration and swan's neck

 Penetration and swan's neck below drainback vessel level







#### Roof penetration and swan's neck

 Penetration and swan's neck below drainback vessel level







#### Collectors above coil

• Beware rooftop plantrooms







Built On



Built In



Roof Mount Type





A frame on pitch



Flat roof A frame

Wall mount A frame



- Ideal face direction is South
- Ideal pitch = 36 degrees
- Drainback requires minimum 10 degrees, but better to have 15 degrees plus





• Built On, Pitch and direction is set by the building



North





• Built On, Pitch and direction is set by the building



North

East/West split MUST have two coils, the DB vessels will not be level















#### Collector Arrangement

- Built On / Built In can be 1 or 2 rows
- Flat roof can have many arrays













For commissioning and maintenance:

- Roof access is needed
- Consider 3 access points, one top corner, both ends of drainback
- Mansafe/parapet wall for safe access, or scaffolding
- 500mm around the collectors







### Ballast or Mechanical Fixing

- Flat roof collectors on A frames only (built on are bolted down)
- A frame is offered with Concrete blocks for ballast
- Drainback vessels mount below bottom of the A-frame
- Concrete blocks are a convenient way to raise the A frames up, even if they do not provide enough ballast.







Wind pressures must be increased depending on altitude, height, topography, and layout of adjacent structures. This map only relevant to 15m building height.

#### Max Wind Speed











Table for horizontal collectors including a safety factor of 50%

HORIZONTAL COLLECTOR AT 30° FRAME								
Gale Force	Wind speed (m/s)	Horizontal force (kN)	B Max pull off (kN)	C Weight extra block (kg)				
8	17.2 - 20.7	1.26	0.70	16				
9	20.8-24.4	1.87	1.03	43				
10	24.5 - 28.4	2.39	1.32	65				
11	28.5 - 32.6	3.14	1.73	97				
>11	40	3.51	1.94	113				
HORIZOWIAL COLLECTOR AT 45° FRAME								
8	17.2 - 20.7	1.34	0.87	30				
9	20.8 - 24.4	1.98	1.29	63				
10	24.5 - 28.4	2.52	1.64	90				
11	28.5 - 32.6	3.32	2.16	131				
>11	40	3.72	2.42	151				
HORIZONTAL COLLECTOR AT 60° FRAME								
8	17.2 - 20.7	1.41	1.02	41				
9	20.8 - 24.4	2.08	1.51	80				
10	24.5 - 28.4	2.65	1.92	112				
11	28.5 - 32.6	3.49	2.52	159				
>11	40	3 92	2.82	182				

#### Wind loadings



Table for vertical collectors including a safety factor of 50%

VERTICAL COLLECTOR AT 30° FRAME							
Gale Force	Wind speed (m/s)	A Horizontal force (kN)	Max pull off (kN)	Weight extra			
8	17.2 - 20.7	1.27	1.27	61			
9	20.8 - 24.4	1.88	1.88	100			
10	24.5 - 28.4	2.39	2.39	149			
11	28.5 - 32.6	3.15	3.15	208			
>11	40	3.52	3.52	237			
VERTICAL COLLECTOR AT 45° FRAME							
0	17.2 - 20.7	1.30	1.58	145			
9	20.8-24.4	2.01	2.34	140			
11	24.5 - 28.4	2.30	2.98	268			
511	40	3.77	4 39	305			
VERTICAL COLLECTOR AT 60° FRAME							
8	17.2 - 20.7	1.42	1.82	104			
9	20.8 - 24.4	2.11	2.70	173			
10	24.5 - 28.4	2.69	3.44	231			
11	28.5 - 32.6	3.53	4.52	315			
>11	40	3.95	5.06	358			



#### Mechanical Fixing

- Gale Force 9 may or may not be enough. It is advised to provide mechanical fixing.
  - Guy wires fixed to something behind
  - Unistrut through the A frame
  - Connected arrays





#### Mechanical Fixing

• Guy wires fixed to eyebolt in parapet/wall/etc behind







#### Mechanical Fixing

• Unistrut through the legs with weathered in post to fix Unistrut to








## Mechanical Fixing







# Mechanical Fixing

• Connect the front and back arrays together







# Installation for Installers





#### Installation

• Solar Installation is not difficult. It is a 22mm or 28mm plumbing job combined with an Ikea flatpack job. You do not need a specialist, just the right information before you begin.





# Installation for Installers

- Piping and jointing
- Connecting Collectors
- Collector Connections
- Built On Kit
- Flat Roof Kit
- Other roof kits
- Drainback Installation
- Testing and Commissioning





- Copper or solarflex
  - Preference for Cu on all horizontal runs
  - Table X ok for drainback, but not sealed system (Kuterlon)
- Solar too hot for soft solder
- Joint via compression (brass olive,) solar press fit, silver solder or braze





Piping and jointing







Flow

- Collectors are serpentine type, so in on one side and out on the other is naturally balancing
- Collector is the boiler, so refer to flow and return in relation to the collector

Return





Flow

- Flow from collectors enters top of drainback vessel
- Bottom of drainback vessel is flow to coil top connection

Return





 Ideally the flow and return will be opposite ends







 However, up to 6 collectors will be fine with same side connections





- Pitched roof double row
- Can be same side connections (up to 6 collectors per row) or opposite sides.







#### Multiple arrays

- Flat or Pitched
- Reverse/return

• Level







- Flat roof
- Three arrays
- Reverse/return
- Flow has easier path











Air elimination connection for assembly at collector without extension Smart Lock System



Collector connection 3/4" for thread fittings Smart Lock System



Collector connection 22 mm for soldered fittings or clamping ring joints Smart Lock System



Collector connection hydraulical (compensator) connects two collectors and compensates thermal dilations Smart Lock System



Clamp collector connection and O-Ring - Clamp for connection of the above mentioned hydraulic devices with the flange at the collector



Cap Smart Lock System





















































- All 22mm compression, fittings same diameter as 22mm copper
- Use Brass olives





Direction and pitch are set by roof, but must have 10 degree pitch minimum









• Comes with extruded Aluminium rail that uses square headed bolts











• Connect sections together to create one long rail

Built On



 Fit End stops to the bottom rail to prevent collector from slipping down









• Top rail location not critical

• Bottom rail is edge of collector







• Fix collectors to the rails













- Rail is assembled, Collector is fixed to rail
- Now fix rail to roof







• We provide J Brackets that are suitable for some installations























• 2 sets brackets for collector 1, and 1 set for each additional. Then fit the rail to the brackets





#### • Mount Rails then fix collectors



Ends of profile set aluminium lie flush against each other.

## Built On







- Standing seam roof
- Not suitable for J brackets
- Need fixings from roof manufacturer or third party







• Euroclad for raised seam roof









• Hole provide to use with square headed bolts









- Profile roof
- Not suitable for J brackets
- Need fixings from roof manufacturer or third party
- If putting a hole in roof check warranty with roof manufacturer




#### • EJOT fasteners for Profile roof









 Provide a male thread so need to use additional bracketry to use with square headed bolts

















• Built On Profile roof less than 10 degrees







- Must build up the top to increase the angle, 10 deg min, 15-20 preferred
- Unistrut is usually the answer to this situation







• Increase angle example







- Built On summary
- Must have 10 degree minimum angle
- Must be level along array
- Must engineer fixing to roof





- A frame comes in 3 pieces
- Adjustable for 20 or 30 degrees
- Can be cut down for different angles









• Mount collectors to A-frame











#### • Mount collectors to A-frame







 Drainback is blow 'ground' level so A frames must be mounted on something







- We can provide concrete blocks that are predrilled
- Provides some, but maybe not enough ballast







- Additional heel weight: extra 45kg
- Prefer to us mechanical fixing and not the extra block. Main block has advantage of lifting the collector for the drainback vessel







- Or installer can build a frame
- Fixes the collectors down







- Remember: 0-1 cm pitch maximum over total length of the drainback assembly
- So if 'flat' roof is not flat, you need to make the array level so framework under A-frame may be preferred







- 2 considerations for multiple arrays
  - Shading of back array from front array
  - Levelness if same system









- 30 degree landscape collectors:
  3.1m toe to toe
- 30 degree portrait collectors:
  5.2m toe to toe



Row distance of solar collectors				
Collector type	Distance A			
	20°	30°	45°	60°
horizontal collector	270cm	310cm	320cm	330cm

Assembly height of collectors				
Collector type	Height H			
	20°	30°	45°	60°
horizontal collector	53 cm	71 cm	93 cm	110 cm

Distance of consoles			
Height balu- strade B	Distance C		
30 cm	20 cm		
40 cm	40 cm		
50 cm	70 cm		
60 cm	100 cm		
70 cm	125 cm		
80 cm	150 cm		
90 cm	180 cm		
100 cm	205 cm		
110 cm	230 cm		

Position crossbar		
Angle	Position	
short traverse		
20°	P1-P2	
30°	P3-P4	
long traverse		
45°	P1-P2	
60°	P3-P4	



• Multiple arrays must be level







- Multiple arrays must be level
- Even if the roof has a pitch



Roof with slight pitch for rainwater runoff





• 1cm pitch max







## Pitch Roof A frames

• A frames can be used on profile roofs to increase angle, or offset direction of face





 A frame cut down to give 15 degree angle on standing seam roof

## Pitch Roof A frames







## Pitch Roof A frames

 Unistrut frame on standing seam roof to face collectors south at 30 degree angle on west facing roof







#### Pitch Roof A frames











A frames summary

- Must be level
- Must be fixed down
- Can be attached to any type of roof





#### Built In









#### Built In







#### Built In







#### Façade Mount







#### Wall Frames







#### Wall Frames







- Flow In to red (top)
- Flow Out from Blue (slightly cooler coming out than in)

## Drainback Installation







 Master Drainback has red/flue connection and is always first with the flow in/out connected to it.

#### Drainback Installation



 Secondary drainbacks are marked black/black and are empty tanks to be connected to the back of the master







## Drainback Installation

• Drainback connections must be vertical. The drainback vessel will rotate once installed.







#### • Built On

• Bracket fits under extruded aluminium rail

## Drainback Installation





#### Drainback Installation

• Built On








## Drainback Installation

- A frames
- Bracket fits to channel section











## Plantroom installation

- No additional valves other than the pump station included valve
  - Must be careful not to isolate the pressure relief
- 3A supply to the controller, everything else wired to controller (pump and sensors)
- Collector sensor has 2m of cable, use IP connection box and 2 core cable
- Flow goes into the top of the coil, out the bottom, pump station on the cooler pipe (return.)
- Expansion vessel and discharge vessel local to pump station
- Overheat stat stops solar pump





## Testing and Commissioning

- We commission all drainback systems
  - Check system is installed correctly
  - Fill the system, circulate to get air out, set fluid level
  - Set the controller
- Before we arrive please test system
  - Pressure test with AIR





## Any Questions

