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TOPWET®

FLAT ROOF
DRAINAGE SYSTEMS

HOW DOES IT WORK?

TW RETN

PROPOSAL OF RETENTION MEASURE

FOR RAINWATER DRAINAGE
FROM A FLAT ROOF

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CONTENT

1. PRINCIPLES

PHASE 1
PERMISSIBLE OUTFLOW

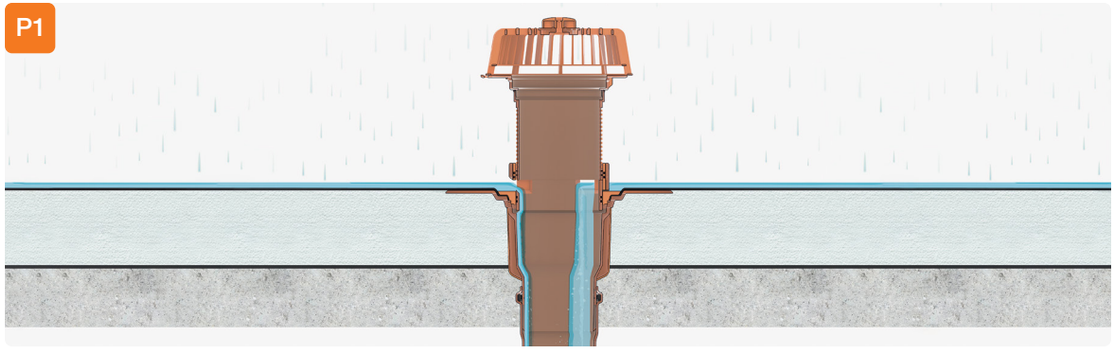
Rainfall flows freely through the lower openings in the retentio attachment and then drains through the body of the outlet into the sewer network.

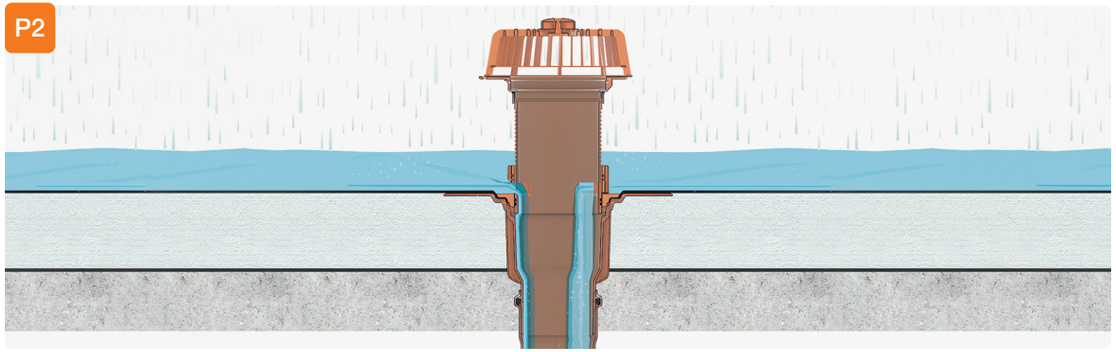
PHASE 2
EXCEEDING PERMISSIBLE OUTFLOW

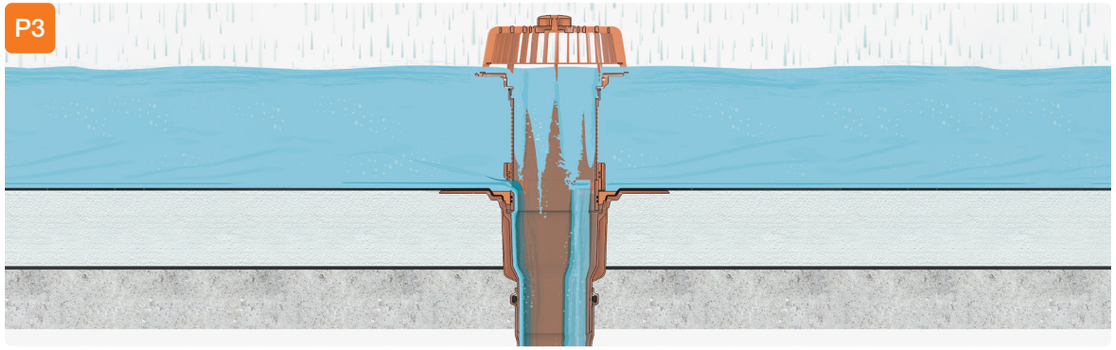
Rainfall rises to a certain height of the retention body attachment. At the same time it drains through the lower openings of the retention attachment and subsequently the precipitation drains through the body of the outlet into the sewer network.

PHASE 3
EXCEEDING LIMITS

Rainfall rises to a height that is higher than the height of the retention attachment, ie. the water begins to overflow over the overflow edge of the retention attachment. Also, protective basket is fitted above the level of extension. It catches any dirt (branches, leaves, etc.) and these prevents clogging of the pipeline on the route after connection to the sewer network. At the same time, water is drained out through the lower openings of the retention attachment in this phase.





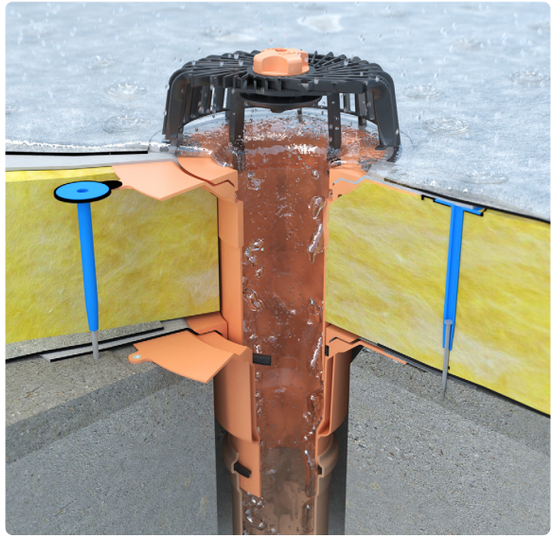


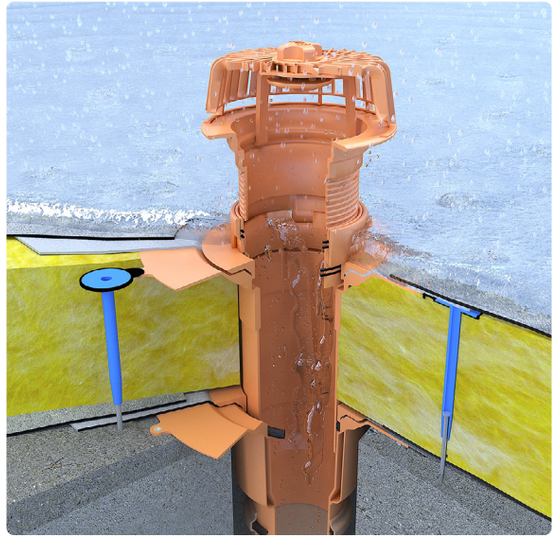
2. WHAT IS THE POINT OF THE CALCULATION

At the end of the calculation process, you should know, how to set side holes and how high should be element attached.

This information should be send to producer, who set weld position of the hole and height in production. It is not possible to adjust by customers themselves

In case of using standard outlets and rainwater runoff over the limit values then is necessary to reduce the outflow value. We reduce the amount of water outflow by adding retention extension TW RETN to the standard designed outlets. The outlets with retention extensions shall reduce the amount of water to a value determined by the local sewer operator or other administrative authority.





3. WHAT IS NECESSARY TO KNOW BEFORE CALCULATION

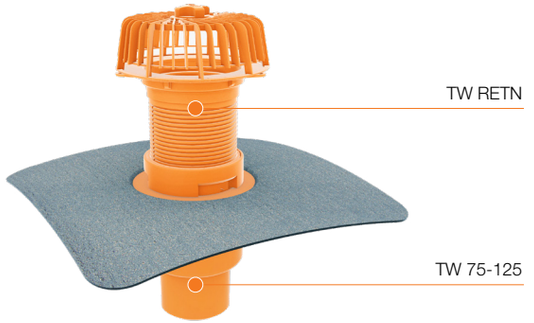
Before the calculation beginning, we recommend to know the following information:

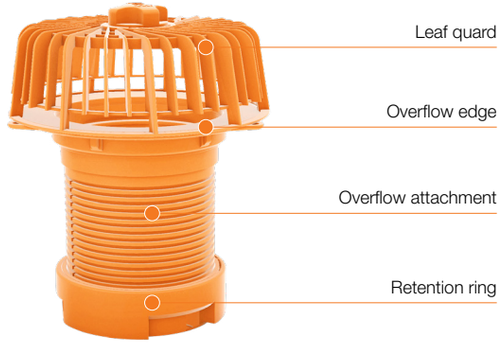
- Exact roof structure (all materials from bottom to the top, include their thickness)
- What kind of roof outlet TW or roof extension TWN is used?
- Slopes of the flat roof (each areas) with roof plan in dwg
- Project have in dwg. or dgn. format
- Location and rainfall intensity in l/(s*m^2)

4. PARTS OF THE ELEMENT

The retention assembly consists of retention attachment TW RETN, which is fitted into the standard roof outlet TW 75-125 or roof extension TWN produced by consist of TOPWET company. Recommendation is to use heated roof outlet TWE 75-125.

This product is made of following parts:





5. SETTING THE RETENTION ATTACHMENT

All parts of this product are connected to each other by adhesion of compressive rubber rings.

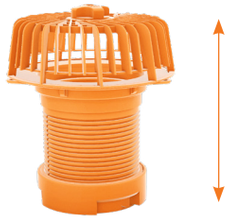
The retention attachment allows two settings:

Lenght

The first of them is the regulation of the opening length of three side holes, thanks to which the flow area is regulated. The set opening length of the openings is determined on the basis of the specific (permissible) outflow.

Height

The second setting is to adjust the height of the retention extension based on the geometry of the roof and the amount of precipitation retained over time. The height of the retention attachment is defined as the height of the water level up to the upper edge of the retention.



Length setting:

The opening length setting of the three holes is performed by two interlocking elements of the drain ring – the outer part and the inner part. By rotating both parts, the length of the three holes evently changes. There are vertical grooves on the outer part and a pin on the inner part. By inserting the pin into the groove, the length (position) of the holes is fixed.

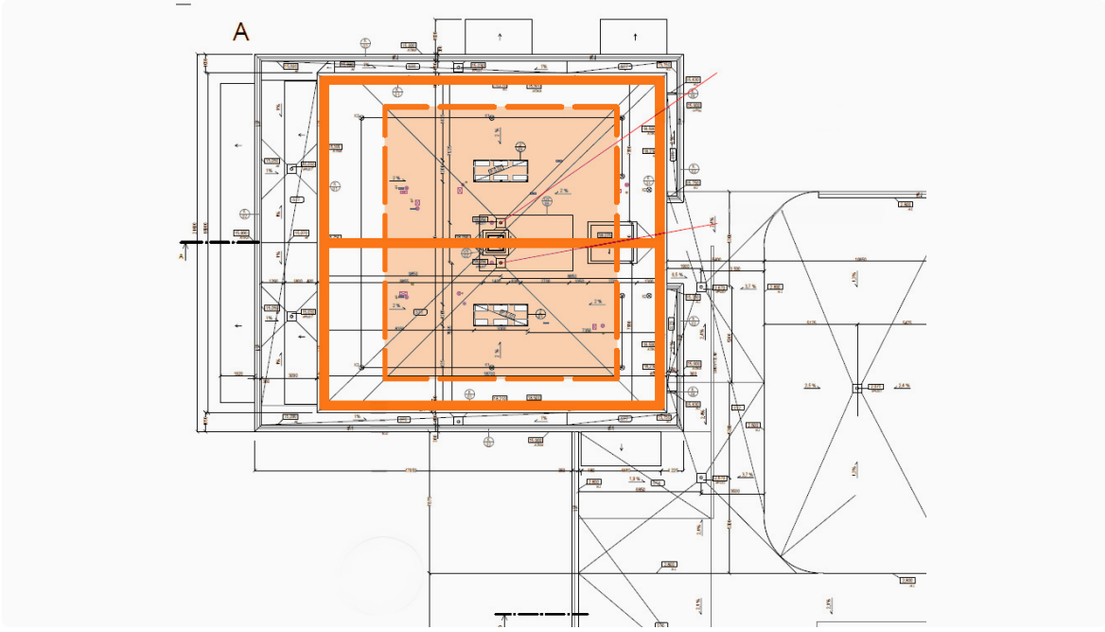
Height setting:

Adjusting the height of the overflow edge is possible by cutting (shortening) the retention attachment. The height of the overflow edge at the retention assembly is at least 86 mm from the bottom edge of the holes and at most 176 mm.

At the end of the setting, we know two numbers which displays values, hole length and height of the product. TW RETN P13/v176

6. GENERAL DESIGN PROCEDURE

a) Determine the dimension of retention outlets based on the calculation of gravity drainage.
b) Determine the partial drained areas according to the individual retention outlets.
c) Determine the specific (permissible) outflow for a specific drainage area.
d) Determine the design outflow value of individual retention inlets according to the drained roof areas and the specific (permissible) outflow based on the investor's requirements.
e) Determine the volume of retained water from the time of retention of torrential rainfall, the intensity of torrential rainfall and the design value of the runoff through the openings.
f) Determine the height of the inlet overflow extension based on the geometry of the roof and the amount of water retained.
g) Determine the calculated value of the outflow.
h) Determine the length (position) of the openings of the individual retention outlets.
i) Assessment of calculated outflow sizes of retention outlets.



DRAINAGE RING HYDRAULIC CAPACITY

Position	Length of the one-hole opening [mm]	Length of the tree-hole opening [mm]	Total roof drain flow [l/s]					
			86	92	98	104	110	116
			The height of the retention attachment above the overflow edge					
			Pp(86) [mm]	Pp(92) [mm]	Pp(98) [mm]	Pp(104) [mm]	Pp(110) [mm]	Pp(116) [mm]
We do not recommend to suggest, because small drainage capacity.								
0	0,00	0,00	0,0385	0,0399	0,0412	0,0425	0,0437	0,0449
1	2,19	6,56	0,1228	0,1272	0,1314	0,1354	0,1394	0,1432
2	4,37	13,11	0,2072	0,2145	0,2216	0,2284	0,2351	0,2415
3	6,56	19,67	0,2915	0,3018	0,3117	0,3214	0,3307	0,3398
4	8,74	26,22	0,3758	0,3891	0,4019	0,4144	0,4264	0,4382
5	10,93	32,78	0,4602	0,4764	0,4921	0,5073	0,5221	0,5365
6	6	39,33	0,5445	0,5637	0,5823	0,6003	0,6178	0,6348
7	7	45,89	0,6288	0,6510	0,6725	0,6933	0,7135	0,7331
8	8	52,44	0,7131	0,7383	0,7627	0,7862	0,8092	0,8314
9	9	59,00	0,7975	0,8256	0,8528	0,8792	0,9048	0,9297
10	10	65,56	0,8818	0,9129	0,9430	0,9722	1,0005	1,0281
11	11	72,11	0,9661	1,0002	1,0332	1,0652	1,0962	1,1264
12	12	78,67	1,0504	1,0875	1,1234	1,1581	1,1919	1,2247
13	13	85,22	1,1348	1,1748	1,2136	1,2511	1,2876	1,3230
14	14	91,78	1,2191	1,2621	1,3038	1,3441	1,3832	1,4213
15	15	98,33	1,3034	1,3494	1,3939	1,4371	1,4789	1,5196
16	16	104,89	1,3878	1,4367	1,4841	1,5300	1,5746	1,6180
17	17	111,44	1,4721	1,5240	1,5743	1,6230	1,6703	1,7163
18	18	118,00	1,5564	1,6114	1,6645	1,7160	1,7660	1,8146
19	19	124,56	1,6407	1,6987	1,7547	1,8090	1,8617	1,9129
20	20	131,11	1,7251	1,7860	1,8449	1,9019	1,9573	2,0112
21	21	137,67	1,8094	1,8733	1,9350	1,9949	2,0530	2,1095
22	22	144,22	1,8937	1,9606	2,0252	2,0879	2,1487	2,2078
23	23	150,78	1,9780	2,0479	2,1154	2,1808	2,2444	2,3062
24	24	157,33	2,0624	2,1352	2,2056	2,2738	2,3401	2,4045
25	25	163,89	2,1467	2,2225	2,2958	2,3668	2,4357	2,5028
26	26	170,44	2,2310	2,3098	2,3860	2,4598	2,5314	2,6011
27	27	177,00	2,3154	2,3971	2,4761	2,5527	2,6271	2,6994

Total roof drain flow [l/s]										
122	128	134	140	146	152	158	164	170	176
The height of the retention attachment above the overflow edge									
Pp(122) [mm]	Pp(128) [mm]	Pp(134) [mm]	Pp(140) [mm]	Pp(146) [mm]	Pp(152) [mm]	Pp(158) [mm]	Pp(164) [mm]	Pp(170) [mm]	Pp(176) [mm]
We do not recommend to suggest, because small drainage capacity.									
0,0461	0,0472	0,0483	0,0494	0,0505	0,0515	0,0526	0,0536	0,0545	0,0555
0,1470	0,1506	0,1542	0,1576	0,1610	0,1644	0,1676	0,1708	0,1740	0,1771
0,2478	0,2540	0,2600	0,2658	0,2716	0,2772	0,2827	0,2881	0,2934	0,2986
0,3487	0,3574	0,3658	0,3741	0,3821	0,3900	0,3978	0,4054	0,4129	0,4202
0,4496	0,4607	0,4716	0,4823	0,4927	0,5029	0,5129	0,5227	0,5323	0,5417
0,5505	0,5641	0,5775	0,5905	0,6032	0,6157	0,6279	0,6399	0,6517	0,6633
0,6514	0,6675	0,6833	0,6987	0,7138	0,7285	0,7430	0,7572	0,7712	0,7848
0,7522	0,7709	0,7891	0,8069	0,8243	0,8414	0,8581	0,8745	0,8906	0,9064
0,8531	0,8743	0,8949	0,9151	0,9349	0,9542	0,9732	0,9918	1,0100	1,0280
0,9540	0,9777	1,0008	1,0233	1,0454	1,0671	1,0883	1,1091	1,1295	1,1495
1,0549	1,0810	1,1066	1,1315	1,1560	1,1799	1,2033	1,2263	1,2489	1,2711
1,1558	1,1844	1,2124	1,2398	1,2665	1,2927	1,3184	1,3436	1,3683	1,3926
1,2566	1,2878	1,3182	1,3480	1,3771	1,4056	1,4335	1,4609	1,4878	1,5142
1,3575	1,3912	1,4241	1,4562	1,4876	1,5184	1,5486	1,5782	1,6072	1,6357
1,4584	1,4946	1,5299	1,5644	1,5982	1,6312	1,6636	1,6954	1,7266	1,7573
1,5593	1,5980	1,6357	1,6726	1,7087	1,7441	1,7787	1,8127	1,8461	1,8788
1,6602	1,7013	1,7415	1,7808	1,8193	1,8569	1,8938	1,9300	1,9655	2,0004
1,7610	1,8047	1,8474	1,8890	1,9298	1,9697	2,0089	2,0473	2,0849	2,1220
1,8619	1,9081	1,9532	1,9972	2,0404	2,0826	2,1240	2,1645	2,2044	2,2435
1,9628	2,0115	2,0590	2,1055	2,1509	2,1954	2,2390	2,2818	2,3238	2,3651
2,0637	2,1149	2,1648	2,2137	2,2614	2,3082	2,3541	2,3991	2,4433	2,4866
2,1646	2,2182	2,2707	2,3219	2,3720	2,4211	2,4692	2,5164	2,5627	2,6082
2,2655	2,3216	2,3765	2,4301	2,4825	2,5339	2,5843	2,6336	2,6821	2,7297
2,3663	2,4250	2,4823	2,5383	2,5931	2,6467	2,6993	2,7509	2,8016	2,8513
2,4672	2,5284	2,5881	2,6465	2,7036	2,7596	2,8144	2,8682	2,9210	2,9728
2,5681	2,6318	2,6940	2,7547	2,8142	2,8724	2,9295	2,9855	3,0404	3,0944
2,6690	2,7352	2,7998	2,8629	2,9247	2,9853	3,0446	3,1028	3,1599	3,2160
2,7699	2,8385	2,9056	2,9712	3,0353	3,0981	3,1596	3,2200	3,2793	3,3375

7. IMPORTANT

Safety overflows

In the case of emergency drainage design, the lower edge of the emergency drainage is min. 20 mm higher than the overflow edge of the retention attachment.

Static load

When designing the retention extension, it is necessary to verify the load-bearing capacity of the roof structure from the resulting load, which occurs due to the accumulated water on the roof. The flood height of 105 mm corresponds to approx. 105 kg · m-2 at the roof outlet. The height of the flooding of 200 mm corresponds to approx. 200 kg · m-2 (at this height, however, water is already drained over the overflow edge of the retention attachment, or by safety drainage).

Maintenance

Inspection and maintenance, due to the nature of roofs with a retention outlet, is recommended to be performed 4 times a year. However, at least twice a year on the basis of national standard.

9. OTHER EMERGENCY DRAINAGE SOLUTIONS

- Round safety overflow of 600 mm length.
- Made of UV stabile PVC Integrated sleeve of waterproofing membrane.
- Produced at DN 50, 70, 100 and 125.
- Possibility to extend up to 1500 mm.
- Recommended overlap over the facade is at least 100 mm.

- Squared safety overflow of 500 mm length.
- Five basic variants in stock.
- Possibility of any size to order.
- Made of UV stable, hardened PVC.
- Integrated sleeve of waterproofing membrane.
- Recommended overlap over the facade is at least 100 mm.

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