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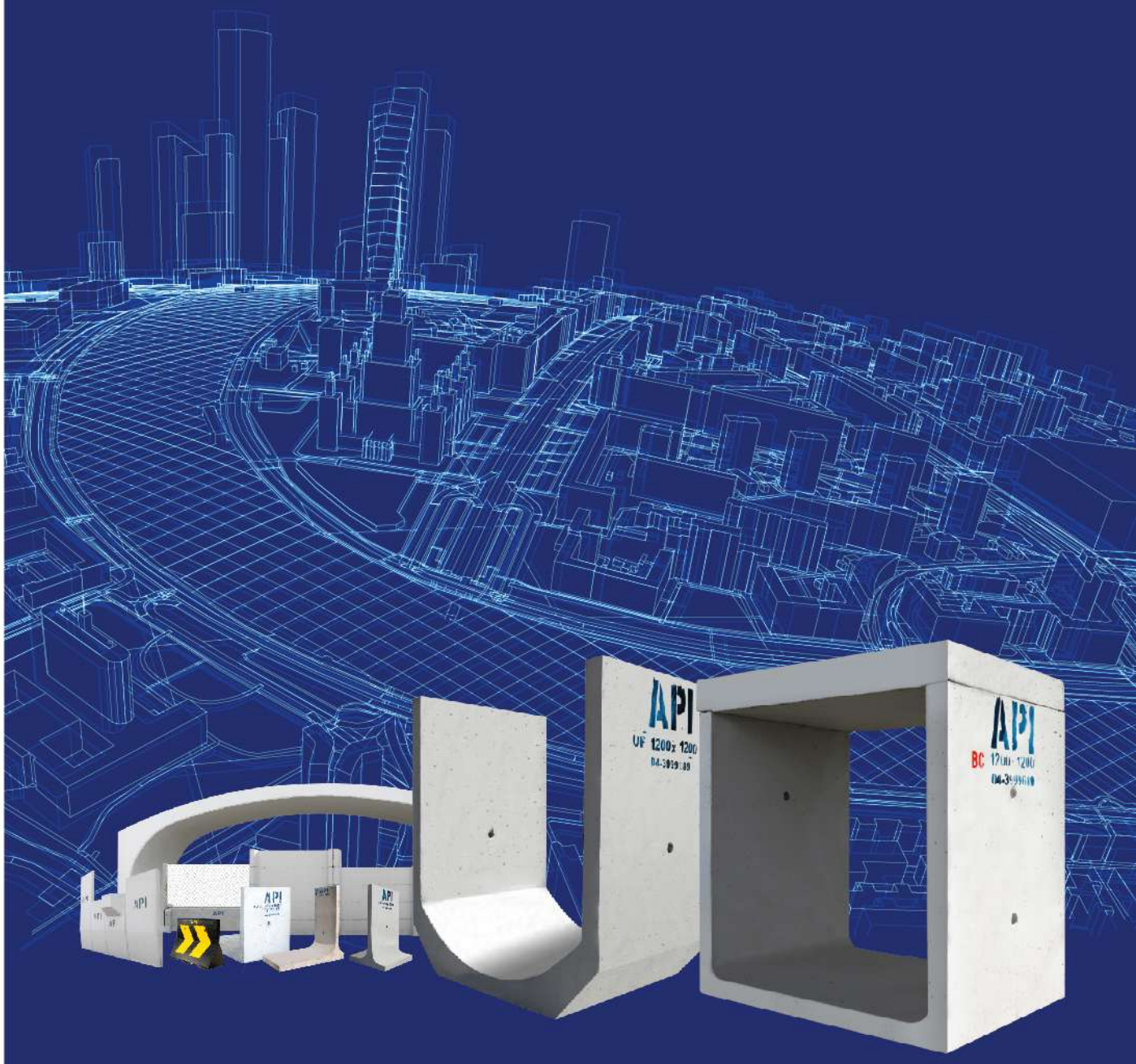


Box Culvert & U-Drain

Your Trusted GREEN Precast Manufacturer In Malaysia

REVISION 2022

PRECAST R.C. BOX CULVERT

Features of API Precast R.C. Box Culvert

API Box Culverts are available in both Standard Size (for nominal width between 600mm and 1800mm) and Super Size (for nominal width between 2100mm and 3600mm) in length of 1 metre as shown in the Table 2 and 3. API small size Box Culverts (for nominal width between 300mm and 450mm) in length of 1.2 metre also available as shown in Table 1. API Box Culverts are available in both **WITH and WITHOUT Dry Weather Flow (DWF)** channels.

Design Considerations

Design loading requirements for API Box Culvert are in accordance with:
a) BS 5400: Part 2 modified by (b)
b) Department Standard BD 31/01 Buried Concrete Box Type Structure issued by Departmental of Transport (UK) Highway and Traffic
c) JKR LTAL (Long Term Axle Load) and SV (Special Vehicle) requirements.

The design of Precast Reinforced Concrete Box Culvert is in accordance with BS 5400 : Part 4.

API Box Culverts are made from high strength concrete with a 28 days characteristic strength of 40 N/mm².

Concrete cover to reinforcement for
Standard Size Box Culverts = 25mm
Super Size Box Culverts = 30mm

Coefficient of the earth lateral pressure at rest = 0.6 and bulk density of soil 19KN/m³.

API Standard Size Box Culverts also comply with proof load test of 112.5kN over an area of 320mm x 320mm placed at any position on the Culvert Lid in accordance with MS 1293 : Part 1.

Hydrostatic pressure is eliminated by provision of 50mm diameter weepholes placed along the centerline of the invert wall.

The prepared bedding or piled foundation by others shall be adequate which would not cause any adverse effect to the culvert.

The backfill material adjacent to wall should be granular type of soil.

Standard supply of API Standard Size Box Culverts (Not Exceeding 1800mm width and height) and Super Size Box Culverts (Exceeding 1800mm width and height) are designed to cater for backfill NOT EXCEEDING 2.0 meter plus 45 units HB vehicle primary live loads.

For Box Culverts (Standard Size and Super Size) to cater for backfill LESS than 1.0 meter or NO backfill (direct impact), kindly refer to our Technical or Marketing Department.

For other loading conditions or sizes not shown in the tables here, please contact our Technical or Marketing Department for a special design.

Stacking

All inverts should be stacked uniformly on leveled ground. Lids should be supported with timber bearers at both end.

Handling

Lifting holes (weepholes) are provided at the box culvert wall and lifting hooks are provided at both ends of lids for handling. It is recommended that a spreader beam to be used when slinging the inverts to avoid cracking at the wall base joint.

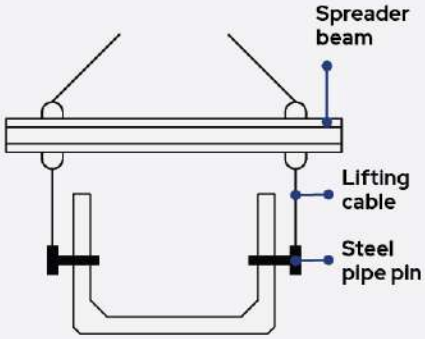
Jointing

API Box Culverts are supplied with plain butt joints. Cement mortar is normally used to fill the gap between box culverts.

Laying Procedure

API Box Culverts should be laid on the prepared bedding (preferable compacted sand bedding). However, on bad ground, it may be necessary to excavate deeper or provide with piled foundation [by others] and place a layer of hardcore before placing the sand bedding in accordance to the engineer's (or s.o] specifications and details. Backfilling around culvert units should be done after the lid of the culvert has been installed and it should be carried out in even layers on both sides simultaneously.

For direct impact condition, the backfilling work has to be carried out together with proper compaction method to prevent ground settlement. Different level between the lid and ground will cause the horizontal force during passing by vehicle, which will damage the invert of the culvert.



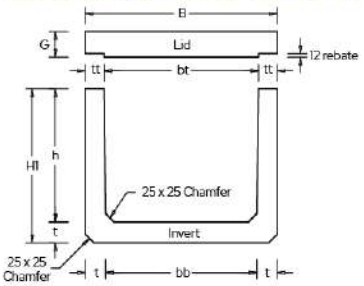
SMALL SIZE BOX CULVERT

SMALL SIZE BOX CULVERT DIMENSIONS & PROPERTIES

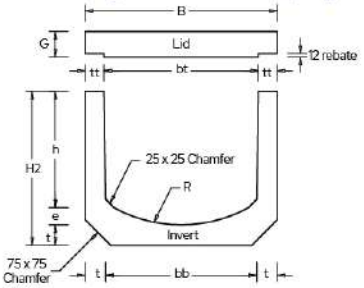
									BC		BF		LID	
Nominal Size	B	bt	bb	h	t	tt	e	R	H1	Weight	H2	Weight	G	Weight
mm x mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	tonnes	mm	tonnes	mm	tonnes
300 x 300	412	298	292	300	60	57	50	171	360	0.18	410	0.20	80	0.10
300 x 450	412	300	292	450	60	56	50	171	510	0.23	560	0.25	80	0.10
300 x 600	412	304	292	600	60	54	50	171	660	0.28	710	0.30	80	0.10
375 x 375	487	373	367	375	60	57	50	276	435	0.22	485	0.24	80	0.12
375 x 450	487	375	367	450	60	56	50	276	510	0.24	560	0.27	80	0.12
375 x 600	487	379	367	600	60	54	50	276	660	0.29	710	0.32	80	0.12
450 x 450	562	450	442	450	60	56	50	409	510	0.26	560	0.29	100	0.17
450 x 600	562	454	442	600	60	54	50	409	660	0.30	710	0.33	100	0.17

Note : Standard Length is 1.2m

Without Dry Weather Flow (BC)



With Dry Weather Flow (BF)



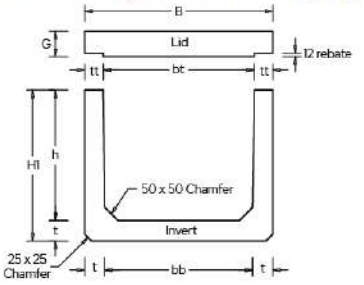
STANDARD SIZE BOX CULVERT

STANDARD SIZE BOX CULVERT DIMENSIONS & PROPERTIES

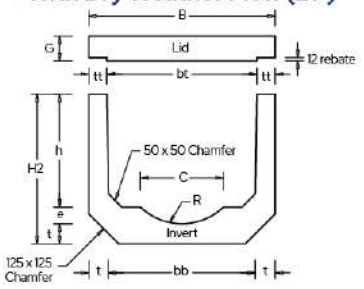
										BC		BF		LID	
Nominal Size	B	bt	bb	h	t	tt	e	R	C	H1	Weight	H2	Weight	G	Weight
mm x mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	tonnes	mm	tonnes	mm	tonnes
600 x 300	712	596	592	300	60	58	60	218	300	360	0.20	420	0.24	140	0.25
600 x 450	712	600	592	450	60	56	60	218	300	510	0.24	570	0.28	140	0.25
600 x 600	712	602	592	600	60	55	60	218	300	660	0.28	720	0.32	140	0.25
750 x 450	872	748	742	450	65	62	65	348	405	515	0.29	580	0.35	140	0.30
750 x 600	872	750	742	600	65	61	65	348	405	665	0.33	730	0.39	140	0.30
750 x 750	872	752	742	750	65	60	65	348	405	815	0.38	880	0.44	140	0.30
900 x 450	1042	906	892	450	75	68	75	454	500	525	0.36	600	0.45	140	0.36
900 x 600	1042	912	892	600	75	65	75	454	500	675	0.41	750	0.50	140	0.36
900 x 750	1042	916	892	750	75	63	75	454	500	825	0.45	900	0.55	140	0.36
900 x 900	1042	922	892	900	75	60	75	454	500	975	0.50	1050	0.59	140	0.36

Note : Standard Length is 1.0m
Nominal size 600mm is available in both length of 1.0m and 1.2m

Without Dry Weather Flow (BC)



With Dry Weather Flow (BF)

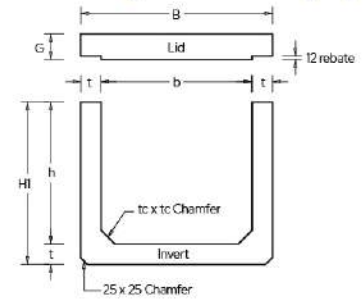


STANDARD SIZE BOX CULVERT DIMENSIONS & PROPERTIES (1200~1800)

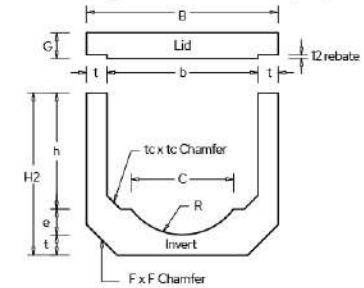
										BC		BF		LID	
Nominal Size	B	b	h	t	tc	e	R	C	F	H1	Weight	H2	Weight	G	Weight
mm x mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	tonnes	mm	tonnes	mm	tonnes
1200 x 600	1390	1200	600	95	50	150	608	800	200	695	0.61	845	0.83	150	0.51
1200 x 750	1390	1200	750	95	50	150	608	800	200	845	0.68	995	0.90	150	0.51
1200 x 900	1390	1200	900	95	50	150	608	800	200	995	0.75	1145	0.97	150	0.51
1200 x 1050	1390	1200	1050	95	50	150	608	800	200	1145	0.82	1295	1.03	150	0.51
1200 x 1200	1390	1200	1200	95	50	150	608	800	200	1295	0.89	1445	1.10	150	0.51
1500 x 750	1700	1500	750	100	100	225	755	1075	250	850	0.81	1075	1.19	175	0.73
1500 x 900	1700	1500	900	100	100	225	755	1075	250	1000	0.88	1225	1.26	175	0.73
1500 x 1050	1700	1500	1050	100	100	225	755	1075	250	1150	0.96	1375	1.33	175	0.73
1500 x 1200	1700	1500	1200	100	100	225	755	1075	250	1300	1.03	1525	1.41	175	0.73
1500 x 1350	1700	1500	1350	100	100	225	755	1075	250	1450	1.10	1675	1.48	175	0.73
1500 x 1500	1700	1500	1500	100	100	225	755	1075	250	1600	1.18	1825	1.55	175	0.73
1800 x 900	2030	1800	900	115	115	225	755	1075	250	1015	1.11	1240	1.67	175	0.87
1800 x 1050	2030	1800	1050	115	115	225	755	1075	250	1165	1.20	1390	1.76	175	0.87
1800 x 1200	2030	1800	1200	115	115	225	755	1075	250	1315	1.28	1540	1.84	175	0.87
1800 x 1350	2030	1800	1350	115	115	225	755	1075	250	1465	1.37	1690	1.92	175	0.87
1800 x 1500	2030	1800	1500	115	115	225	755	1075	250	1615	1.45	1840	2.01	175	0.87
1800 x 1650	2030	1800	1650	115	115	225	755	1075	250	1765	1.54	1990	2.09	175	0.87
1800 x 1800	2030	1800	1800	115	115	225	755	1075	250	1915	1.62	2040	2.18	175	0.87

Note : Standard Length is 1.0m

Without Dry Weather Flow (BC)

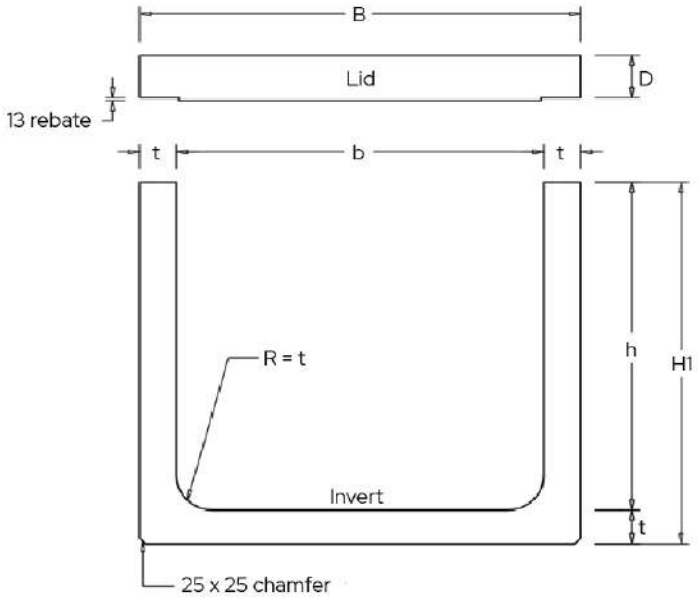


With Dry Weather Flow (BF)

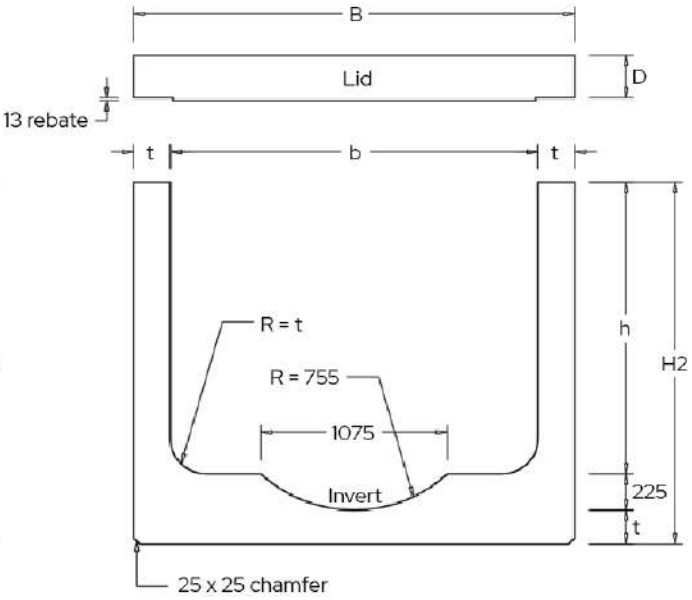


SUPER SIZE BOX CULVERT

Without Dry Weather Flow (BC)



With Dry Weather Flow (BF)



SUPER SIZE BOX CULVERT DIMENSIONS & PROPERTIES

Nominal Size (mm x mm)	Dimension (mm)							Weight (tonnes)		
	b	h	B	D	t	H1	H2	Lid	Invert	
									BC	BF
2100 x 1200	2100	1200	2400	255	150	1350	1575	1.58	1.79	2.70
2100 x 1500	2100	1500	2400	255	150	1650	1875	1.58	2.01	2.92
2100 x 1800	2100	1800	2400	255	150	1950	2175	1.58	2.23	3.14
2100 x 2100	2100	2100	2400	255	150	2250	2475	1.58	2.45	3.36
2400 x 1200	2400	1200	2700	255	150	1350	1575	1.78	1.90	2.98
2400 x 1500	2400	1500	2700	255	150	1650	1875	1.78	2.12	3.20
2400 x 1800	2400	1800	2700	255	150	1950	2175	1.78	2.34	3.42
2400 x 2100	2400	2100	2700	255	150	2250	2475	1.78	2.56	3.64
2400 x 2400	2400	2400	2700	255	150	2550	2775	1.78	2.78	3.86
2700 x 1500	2700	1500	3060	255	180	1680	1905	2.01	2.71	3.98
2700 x 1800	2700	1800	3060	255	180	1980	2205	2.01	2.97	4.25
2700 x 2100	2700	2100	3060	255	180	2280	2505	2.01	3.24	4.51
2700 x 2400	2700	2400	3060	255	180	2580	2805	2.01	3.50	4.78
2700 x 2700	2700	2700	3060	255	180	2880	3105	2.01	3.76	5.04
3000 x 1500	3000	1500	3400	255	200	1700	1925	2.23	3.18	4.64
3000 x 1800	3000	1800	3400	255	200	2000	2225	2.23	3.47	4.94
3000 x 2100	3000	2100	3400	255	200	2300	2525	2.23	3.77	5.23
3000 x 2400	3000	2400	3400	255	200	2600	2825	2.23	4.06	5.52
3000 x 2700	3000	2700	3400	255	200	2900	3125	2.23	4.35	5.82
3000 x 3000	3000	3000	3400	255	200	3200	3425	2.23	4.65	6.11
3300 x 1500	3300	1500	3700	255	200	1700	1925	2.43	3.33	4.95
3300 x 1800	3300	1800	3700	255	200	2000	2225	2.43	3.62	5.25
3300 x 2100	3300	2100	3700	255	200	2300	2525	2.43	3.91	5.54
3300 x 2400	3300	2400	3700	255	200	2600	2825	2.43	4.21	5.83
3300 x 2700	3300	2700	3700	255	200	2900	3125	2.43	4.50	6.13
3300 x 3000	3300	3000	3700	255	200	3200	3425	2.43	4.79	6.42
3600 x 1800	3600	1800	4000	255	200	2000	2225	2.63	3.77	5.80
3600 x 2100	3600	2100	4000	255	200	2300	2525	2.63	4.06	6.10
3600 x 2400	3600	2400	4000	255	200	2600	2825	2.63	4.35	6.15
3600 x 2700	3600	2700	4000	255	200	2900	3125	2.63	4.65	6.44
3600 x 3000	3600	3000	4000	255	200	3200	3425	2.63	4.94	6.73

PRECAST R.C. U-SHAPE DRAIN

Features of API Precast R.C. U-Shape Drain

API U-Drain is available in both Standard Size (for nominal width between 600mm and 1800mm) and Super Size (for nominal width between 2100mm and 3600mm) in length of 1 metre as shown in the tables. API Small Size U-Drain is available (for nominal width between 300mm and 450mm) in length of 1.2 metre.

API U-Drain is available in both **WITH and WITHOUT Dry Weather Flow (DWF)** Channels.

Easy in handling and laying. API U-Drain allows for fast construction of waterways/ open drains in using high quality factory cast units with a minimum of wet concrete works.

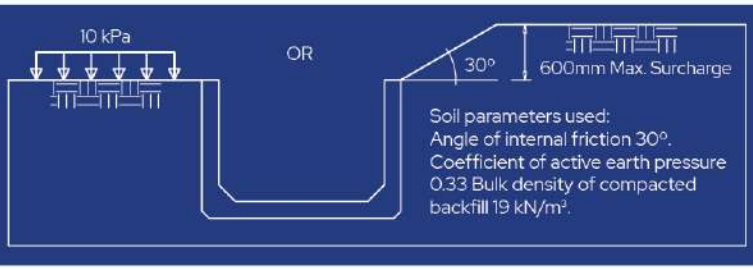
Design Considerations

API U-Drain is designed in accordance with the requirement of BS 8110 with the following concrete cover to reinforcement:

a) Small Size U-Drain : 25mm
b) Standard Size U-Drain : 25mm.
c) Super Size U-Drain : 30mm

API U-Drain is made from high strength concrete with a 28 days characteristic strength of 40 N/mm2.

API U-Drain is designed for the standard loading conditions as shown on right side:



50mm diameter weepholes are provided for drainage of the retained soil which, when combined with the butt jointed units, prevent the build up of hydrostatic pressures. As such, the design does not take into consideration of hydrostatic pressures. The backfill material adjacent to wall should be granular type of soil.

For the other loading conditions or U-Drain sizes not shown in the tables here, please contact our Technical or Marketing for a special design.

Our standard design is catered for a maximum height of 150mm in-situ capping.

Stacking

All units should be stacked uniformly on leveled ground.

Handling

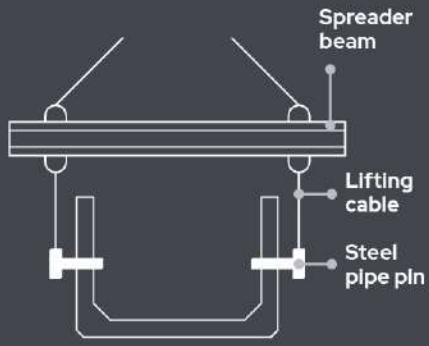
The weepholes provided in the U-Drain units double up as lifting holes for handling. A spreader beam should be used when slinging the units to avoid crack in the legs. (See figure on below)

Jointing

API U-Drain is supplied with plain butt joints in standard length.
Cement mortar is normally used to fill gap between U-Drain units.

Laying Procedure

API U-Drain should be laid on the prepared bedding (preferable compacted sand bedding). However, in bad ground condition, it may be necessary to excavate deeper and place with a layer of hardcore before placing the sand bedding or provide with piled foundation (by others) as according to the engineer's (or s.o) specification and details.



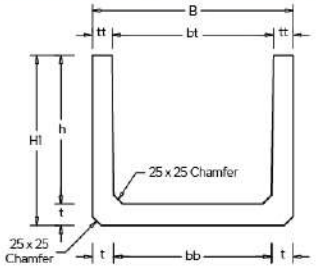
SMALL SIZE U-DRAIN

SMALL SIZE U-DRAIN DIMENSIONS & PROPERTIES

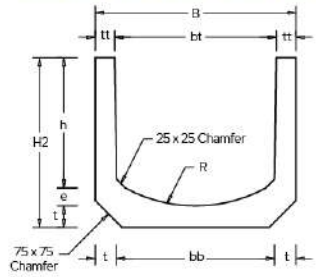
									UD		UF	
Nominal Size mm x mm	B mm	bt mm	bb mm	h mm	t mm	tt mm	e mm	R mm	H1 mm	Weight tonnes	H2 mm	Weight tonnes
300 x 300	412	298	292	300	60	57	50	171	360	0.18	410	0.20
300 x 450	412	300	292	450	60	56	50	171	510	0.23	560	0.25
300 x 600	412	304	292	600	60	54	50	171	660	0.28	710	0.30
375 x 375	487	373	367	375	60	57	50	276	435	0.22	485	0.24
375 x 450	487	375	367	450	60	56	50	276	510	0.24	560	0.27
375 x 600	487	379	367	600	60	54	50	276	660	0.29	710	0.32
450 x 450	562	450	442	450	60	56	50	409	510	0.26	560	0.29
450 x 600	562	454	442	600	60	54	50	409	660	0.30	710	0.33

Note : Standard Length is 1.2m

Without Dry Weather Flow (UD)



With Dry Weather Flow (UF)



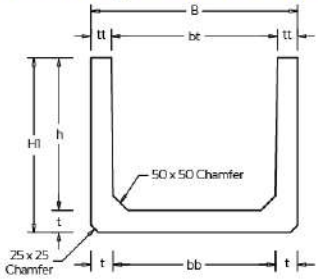
STANDARD SIZE U-DRAIN

STANDARD SIZE U-DRAIN DIMENSIONS & PROPERTIES

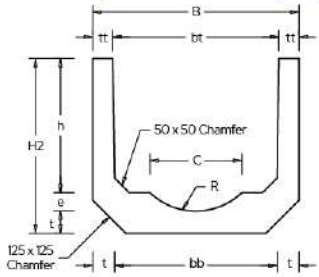
										UD		UF	
Nominal Size mm x mm	B mm	bt mm	bb mm	h mm	t mm	tt mm	e mm	R mm	C mm	H1 mm	Weight tonnes	H2 mm	Weight tonnes
600 x 300	712	596	592	300	60	58	60	218	300	360	0.20	420	0.24
600 x 450	712	600	592	450	60	56	60	218	300	510	0.24	570	0.28
600 x 600	712	602	592	600	60	55	60	218	300	660	0.28	720	0.32
750 x 450	872	748	742	450	65	62	65	348	405	515	0.29	580	0.35
750 x 600	872	750	742	600	65	61	65	348	405	665	0.33	730	0.39
750 x 750	872	752	742	750	65	60	65	348	405	815	0.38	880	0.44
900 x 450	1042	906	892	450	75	68	75	454	500	525	0.36	600	0.45
900 x 600	1042	912	892	600	75	65	75	454	500	675	0.41	750	0.50
900 x 750	1042	916	892	750	75	63	75	454	500	825	0.45	900	0.55
900 x 900	1042	922	892	900	75	60	75	454	500	975	0.50	1050	0.59

Note : Standard Length is 1.0m
Nominal size 600mm is available in both length of 1.0m and 1.2m

Without Dry Weather Flow (UD)



With Dry Weather Flow (UF)

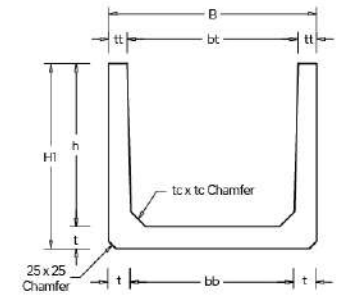


STANDARD SIZE U-DRAIN DIMENSIONS & PROPERTIES (1200~1800)

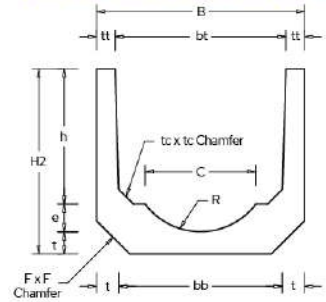
												UD		UF	
Nominal Size mm x mm	B mm	bb mm	bt mm	h mm	t mm	tt mm	tc mm	e mm	R mm	C mm	F mm	H1 mm	Weight tonnes	H2 mm	Weight tonnes
1200 x 300	1360	1200	1208	300	80	76	50	150	608	800	200	380	0.39	530	0.59
1200 x 450	1360	1200	1214	450	80	73	50	150	608	800	200	530	0.45	680	0.65
1200 x 600	1360	1200	1220	600	80	70	50	150	608	800	200	680	0.50	830	0.70
1200 x 750	1360	1200	1224	750	80	68	50	150	608	800	200	830	0.55	980	0.75
1200 x 900	1360	1200	1230	900	80	65	50	150	608	800	200	980	0.60	1130	0.80
1200 x 1050	1360	1200	1234	1050	80	63	50	150	608	800	200	1130	0.64	1280	0.85
1200 x 1200	1360	1200	1240	1200	80	60	50	150	608	800	200	1280	0.69	1430	0.89
1500 x 600	1700	1500	1528	600	100	86	100	225	755	1075	250	700	0.72	925	1.09
1500 x 900	1700	1500	1546	900	100	77	100	225	755	1075	250	1000	0.83	1225	1.21
1500 x 1200	1700	1500	1562	1200	100	69	100	225	755	1075	250	1300	0.94	1525	1.32
1500 x 1500	1700	1500	1580	1500	100	60	100	225	755	1075	250	1600	1.03	1825	1.41
1800 x 600	2030	1800	1832	600	115	99	115	225	755	1075	250	715	0.92	940	1.48
1800 x 900	2030	1800	1852	900	115	89	115	225	755	1075	250	1015	1.06	1240	1.61
1800 x 1200	2030	1800	1870	1200	115	80	115	225	755	1075	250	1315	1.18	1540	1.74
1800 x 1500	2030	1800	1890	1500	115	70	115	225	755	1075	250	1615	1.29	1840	1.84
1800 x 1800	2030	1800	1910	1800	115	60	115	225	755	1075	250	1915	1.38	2140	1.94

Note : Standard Length is 1.0m

Without Dry Weather Flow (UD)

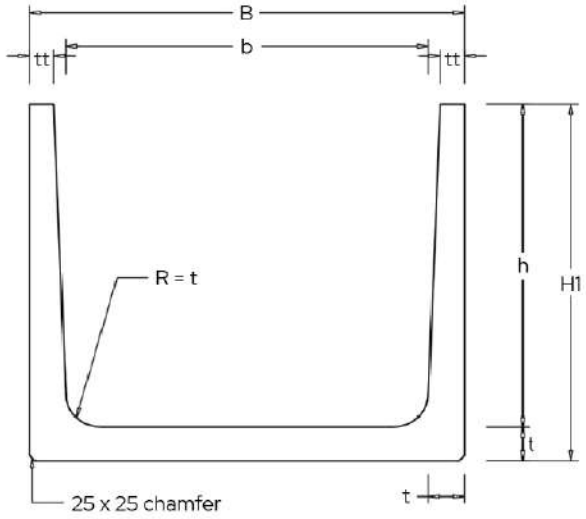


With Dry Weather Flow (UF)

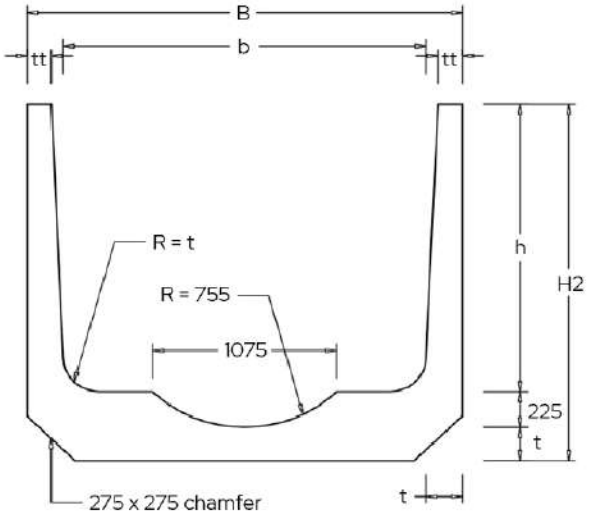


SUPER SIZE U-DRAIN

Without Dry Weather Flow (UD)



With Dry Weather Flow (UF)



SUPER SIZE U-DRAIN DIMENSIONS & PROPERTIES

						UD		UF	
Nominal Size mm x mm	B mm	b mm	h mm	t mm	tt mm	H1 mm	Weight tonnes	H2 mm	Weight tonnes
2100 x 1200	2400	2100	1200	150	122	1350	1.71	1575	2.44
2100 x 1500	2400	2100	1500	150	114	1650	1.88	1875	2.61
2100 x 1800	2400	2100	1800	150	106	1950	2.04	2175	2.77
2100 x 2100	2400	2100	2100	150	98	2250	2.18	2475	2.91
2400 x 1200	2700	2400	1200	150	122	1350	1.82	1575	2.71
2400 x 1500	2700	2400	1500	150	114	1650	1.99	1875	2.88
2400 x 1800	2700	2400	1800	150	106	1950	2.15	2175	3.04
2400 x 2100	2700	2400	2100	150	98	2250	2.29	2475	3.19
2400 x 2400	2700	2400	2400	150	90	2550	2.43	2775	3.32
2700 x 1500	3060	2700	1500	180	133	1680	2.54	1905	3.63
2700 x 1800	3060	2700	1800	180	122	1980	2.72	2205	3.81
2700 x 2100	3060	2700	2100	180	111	2280	2.88	2505	3.97
2700 x 2400	3060	2700	2400	180	101	2580	3.04	2805	4.13
2700 x 2700	3060	2700	2700	180	90	2880	3.17	3105	4.26
3000 x 1500	3400	3000	1500	200	142	1700	2.97	1925	4.24
3000 x 1800	3400	3000	1800	200	133	2000	3.18	2225	4.46
3000 x 2100	3400	3000	2100	200	124	2300	3.38	2525	4.65
3000 x 2400	3400	3000	2400	200	115	2600	3.56	2825	4.84
3000 x 2700	3400	3000	2700	200	106	2900	3.73	3125	5.01
3000 x 3000	3400	3000	3000	200	98	3200	3.90	3425	5.18
3300 x 1500	3700	3300	1500	200	142	1700	3.11	1925	4.56
3300 x 1800	3700	3300	1800	200	133	2000	3.32	2225	4.77
3300 x 2100	3700	3300	2100	200	124	2300	3.52	2525	4.97
3300 x 2400	3700	3300	2400	200	115	2600	3.71	2825	5.15
3300 x 2700	3700	3300	2700	200	106	2900	3.88	3125	5.32
3300 x 3000	3700	3300	3000	200	98	3200	4.04	3425	5.49
3600 x 1800	4000	3600	1800	200	133	2000	3.47	2225	5.08
3600 x 2100	4000	3600	2100	200	124	2300	3.67	2525	5.28
3600 x 2400	4000	3600	2400	200	115	2600	3.85	2825	5.46
3600 x 2700	4000	3600	2700	200	106	2900	4.03	3125	5.63
3600 x 3000	4000	3600	3000	200	98	3200	4.19	3425	5.80

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