

# UniGray™ CNL & HCNL

Integral pressure-compensated, continuously self-flushing, anti-siphon & anti-drain mechanism dripper, dripline colored light gray for protected crops applications

→ 16010 - 16012 - 17012 - 20010 - 20012



Pressure-compensated



Anti-Drain mechanism



Self-flushing mechanism

## / Benefits & Features

- **Pressure-compensated** Precise and equal amounts of water delivered over a broad pressure range, ensuring 100% uniformity of water and nutrient distribution along the laterals.
- **Anti-Siphon mechanism** Prevents contaminants from being drawn into the dripper, making it ideal for sub surface applications.
- **Anti-Drain (CNL) mechanism** Eliminates drainage and refill effect, and improves efficiency in pulse irrigation even in steep topography.
- **Continuously self-flushing** Flushes debris, throughout operation, while ensuring constant dripper operation.
- **Wide filtration area** Makes UniGray™ highly resistant to clogging with poor quality water, thus increasing filtration efficiency.
- **Physical root barrier** Better protection against root intrusion without reliance on chemicals.
- **TurboNet™** Labyrinth ensures wide water passages, to increase flushing efficiency.
- **Colored coded** Light gray on the outer surface, makes it absorb less energy and utilize most of the radiation in the greenhouse.

## / Specifications

- ✓ Pressure-compensated range: according to the product model, 1.0-4.0 for the CNL model and 1.5-4.0 for the HCNL. Anti-Siphon and Anti-Drain mechanism.
- ✓ Recommended filtration: 130 micron / 120 mesh. Filtration method selected based on the kind and concentration of dirt particles contained in the water. Wherever sand exceeding 2 ppm exists in the water, a Hydrocyclone shall be installed before the main filter. Where sand/silt/clay solids exceed 100 ppm, pre treatment shall be applied following Netafim expert instructions.
- ✓ Double TurboNet™ labyrinth with large water passage.
- ✓ Weldable into thick wall driplines (1.00, 1.20 mm).
- ✓ Injected dripper, very low CV with injected silicon diaphragm.
- ✓ High UV resistant. Resistant to standard nutrients used in agriculture.
- ✓ UniGray™ driplines meet ISO 9261 Standards with Israel Standard Institute (SII)-certified production.

## → DRIPPERS TECHNICAL DATA - CNL MODEL

FLOW RATE* (L/H)	WORKING PRESSURE RANGE (BAR)	WATER PASSAGES DIMENSIONS WIDTH-DEPTH-LENGTH (MM)	FILTRATION AREA (MM <sup>2</sup> )	CONSTANT K	EXPONENT * X	RECOMMENDED FILTRATION (MICRON)/(MESH)	SHUT OFF PRESSURE (BAR)
0.70	1.0 - 4.0	0.70 x 0.65 x 40	110	0.70	0	130/120	0.14
1.00	1.0 - 4.0	0.83 x 0.74 x 40	130	1.00	0	130/120	0.14
1.60	1.0 - 4.0	1.07 x 0.79 x 40	130	1.60	0	130/120	0.14
2.30	1.0 - 4.0	1.26 x 0.95 x 40	130	2.30	0	130/120	0.14
3.50	1.0 - 4.0	1.59 x 1.10 x 40	150	3.50	0	130/120	0.14

\* Within working pressure range

## → DRIPLINES TECHNICAL DATA - CNL MODEL

MODEL	INSIDE DIAMETER (MM)	WALL THICKNESS (MM)	OUTSIDE DIAMETER (MM)	MAX. WORKING PRESSURE (BAR)	MAXIMUM FLUSHING PRESSURE (BAR)	KD
16010	14.20	1.00	16.20	3.5	4.6	1.30
16012	14.20	1.20	16.60	4.0	5.2	1.30
17012	14.60	1.20	17.00	4.0	5.2	1.10
20010	17.50	1.00	19.50	3.5	4.6	0.40
20012	17.50	1.20	19.90	4.0	5.2	0.40

## → DRIPLINES PACKAGE DATA (ON BUNDLED COIL) - CNL MODEL

MODEL	WALL THICKNESS (MM)	COIL LENGTH (M)	DISTANCE BETWEEN DRIPPERS (M)	AVERAGE* COIL WEIGHT (KG)	COILS IN A 40 FEET CONTAINER (UNITS)	TOTAL IN A 40 FEET CONTAINER (M)
16010	1.00	500	0.15 to 1.00	22.1	330	165000
16012	1.20	400	0.15 to 1.00	21.2	352	140800
17012	1.20	400	0.15 to 1.00	22.4	352	140800
20010	1.00	300	0.15 to 1.00	17.4	330	99000
20012	1.20	300	0.15 to 1.00	20.2	330	99000

\* Calculated weight average. For further details see "Average Coil Weight Disclaimer"

## → DRIPPERS TECHNICAL DATA - HCNL MODEL

FLOW RATE* (L/H)	WORKING PRESSURE RANGE (BAR)	WATER PASSAGES DIMENSIONS WIDTH-DEPTH-LENGTH (MM)	FILTRATION AREA (MM <sup>2</sup> )	CONSTANT K	EXPONENT * X	RECOMMENDED FILTRATION (MICRON)/(MESH)	SHUT OFF PRESSURE (BAR)
0.85	1.5 - 4.0	0.70 x 0.65 x 40	110	0.85	0	130/120	0.25
1.25	1.5 - 4.0	0.83 x 0.74 x 40	130	1.25	0	130/120	0.25
2.00	1.5 - 4.0	1.07 x 0.79 x 40	130	2.00	0	130/120	0.25
2.90	1.5 - 4.0	1.26 x 0.95 x 40	130	2.90	0	130/120	0.25
4.40	1.5 - 4.0	1.59 x 1.10 x 40	150	4.40	0	130/120	0.25

\* Within working pressure range

## → DRIPLINES TECHNICAL DATA - HCNL MODEL

MODEL	INSIDE DIAMETER (MM)	WALL THICKNESS (MM)	OUTSIDE DIAMETER (MM)	MAX. WORKING PRESSURE (BAR)	MAXIMUM FLUSHING PRESSURE (BAR)	KD
16010	14.20	1.00	16.20	3.5	4.6	1.30
16012	14.20	1.20	16.60	4.0	5.2	1.30
17012	14.60	1.20	17.00	4.0	5.2	1.10

## → DRIPLINES PACKAGE DATA (ON BUNDLED COIL) - HCNL MODEL

MODEL	WALL THICKNESS (MM)	COIL LENGTH (M)	DISTANCE BETWEEN DRIPPERS (M)	AVERAGE* COIL WEIGHT (KG)	COILS IN A 40 FEET CONTAINER (UNITS)	TOTAL IN A 40 FEET CONTAINER (M)
16010	1.00	500	0.15 to 1.00	22.1	330	165000
16012	1.20	400	0.15 to 1.00	21.2	352	140800
17012	1.20	400	0.15 to 1.00	22.4	352	140800

\* Calculated weight average. For further details see "Average Coil Weight Disclaimer"

## / Drippers flow rate vs. working pressure

In order to calculate the right flow rate of each dripper, under different working pressures, we use the following formula:

$$Q = K * P^X$$

Where:

Q = Dripper flow rate (liters/hour)

K = Constant (each dripper has his singular constant and must be defined by the dripper producer)

P = Real working pressure (meter)

X = Exponent (each dripper has its singular exponent and must be declared and defined by the dripper producer)

\*ISO 9261 require from the manufacturer to declare the constant K and dripper exponent

In all Netafim pressure compensated drippers - including UniGray™ (shown in this document) – the dripper exponent X is equal to 0 [zero] (within the pressure range defined for each of the drippers), so the right flow rate of the dripper will be always equal (+/- 7% as defined by the international standard: ISO 9261).

Each dripper has a compensation range which includes minimum and maximum pressure; under the minimum pressure defined, the dripper will perform as non-regulated dripper and provide flow that increases with the pressure increase until reaching the minimum defined limit working pressure.

If the compensated drippers are exposed to a higher pressure than the defined maximum pressure, the drippers will continue to regulate the flow rate, but become more sensitive to clogging, usually the maximum working pressure of the drippers are determined by the driplines limitations (diameter and wall thickness) and most importantly the pipe and its associated connections.

## / Max. Lateral length

Flow Variation (FV) expresses the flow variation between the dripper “sensing” the highest pressure and the one “sensing” the lowest pressure in an irrigation block (zone).

These drippers will not always be the first and last drippers on the dripline.

$$FV \% = (Q_{max} - Q_{min}) / Q_{max} * 100$$

\*International standards define 10% flow variation to be considered as uniform irrigation.

In order to calculate the maximum run lengths that can be planned for specific dripline (considering all the hydraulic factors influencing the flow within the same dripline), we use a calculation software that was developed by Netafim™ based on Darcy-Waisbach formulas + years of design experience and cooperation with academic institutes.

All the tables presented in this document are for initial reference only; the exact run length of the driplines is obtained from design software that considers various hydraulic factors in the entire system.

There might be small variance between the different software's in the market due to the calculation method and assumptions each software is using. For an initial estimate of the dripline length, the data that is presented in this document (within the tables shown) is sufficiently accurate.

As we have already seen, regulated drippers of Netafim™ will provide equal flow irrespective of the working pressure, therefore, the factors that are affecting the dripline run lengths will be: the dripline inlet pressure, the minimum working pressure set for the dripper and the slope.

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 16010/16012 • ID 14.2 mm • Kd 1.3 • Flow rate 0.7 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	83	112	135	153	168	180	190	197	204
	2.0	111	154	190	221	248	271	291	310	326
	2.5	130	182	227	267	302	334	362	388	411
	3.0	145	204	256	303	345	383	418	449	478
	3.5	158	223	281	333	380	424	463	500	534
	4.0	169	239	302	359	412	459	503	545	583

FLAT TERRAIN	1.5	96	137	176	213	247	279	310	340	369
	2.0	121	174	224	270	314	356	395	434	471
	2.5	139	200	257	311	361	410	456	500	543
	3.0	153	221	284	343	400	453	504	554	600
	3.5	165	239	306	371	431	489	545	598	649
	4.0	176	254	326	395	460	522	581	637	692

DOWNHILL 2%	1.5	108	163	219	275	331	387	443	500	557
	2.0	131	195	258	321	382	444	505	565	626
	2.5	148	218	288	355	422	488	553	617	681
	3.0	161	238	312	384	455	524	593	661	727
	3.5	173	254	332	409	483	557	628	698	768
	4.0	183	269	351	431	509	585	659	733	805

Minimum considered pressure 1.0 bar. Max. working pressure according the dripline wall thickness definition

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 16010/16012 • ID 14.2 mm • Kd 1.3 • Flow rate 1.0 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	68	93	113	131	145	158	167	176	184
	2.0	90	125	156	183	207	228	247	265	280
	2.5	105	147	185	219	249	277	302	326	347
	3.0	116	164	208	247	282	315	345	373	399
	3.5	126	179	227	270	310	347	381	412	442
	4.0	135	192	243	291	334	375	412	447	480

FLAT TERRAIN	1.5	76	109	140	169	196	222	246	270	293
	2.0	96	138	177	214	249	282	314	345	374
	2.5	110	158	204	246	286	325	362	397	431
	3.0	121	175	225	272	317	359	400	439	477
	3.5	131	189	243	294	342	388	432	474	515
	4.0	139	201	258	313	364	414	461	506	549

DOWNHILL 2%	1.5	83	125	166	208	248	290	330	372	412
	2.0	102	151	199	246	292	337	382	428	472
	2.5	115	170	223	274	325	374	422	471	518
	3.0	126	185	242	298	352	404	456	507	556
	3.5	135	198	259	318	374	430	484	537	590
	4.0	144	210	274	336	395	453	510	565	620

Minimum considered pressure 1.0 bar. Max. working pressure according the dripline wall thickness definition

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 16010/16012 • ID 14.2 mm • Kd 1.3 • Flow rate 1.6 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	51	71	88	103	116	127	138	147	155
	2.0	67	95	119	141	160	179	195	210	224
	2.5	78	110	140	166	191	214	234	254	272
	3.0	86	123	156	187	214	241	265	288	309
	3.5	93	133	170	204	235	263	290	316	340
	4.0	100	143	182	218	251	284	313	341	367

FLAT TERRAIN	1.5	56	80	103	124	144	163	182	200	216
	2.0	70	101	130	158	184	208	231	254	276
	2.5	81	116	150	181	211	239	266	293	318
	3.0	89	128	165	200	233	265	294	324	352
	3.5	96	139	178	216	252	286	318	350	380
	4.0	102	147	190	230	268	305	339	373	405

DOWNHILL 2%	1.5	60	89	117	145	173	200	228	255	282
	2.0	74	108	142	175	206	238	269	299	329
	2.5	84	122	160	197	232	266	300	333	365
	3.0	92	134	175	214	252	289	325	360	395
	3.5	98	144	187	229	269	309	346	384	421
	4.0	104	152	198	242	285	326	366	405	444

Minimum considered pressure 1.0 bar. Max. working pressure according the dripline wall thickness definition

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 16010/16012 • ID 14.2 mm • Kd 1.3 • Flow rate 2.3 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	46	68	90	111	132	153	173	193	212
	2.0	57	84	110	135	160	183	206	230	252
	2.5	65	95	124	153	179	206	231	257	281
	3.0	72	105	136	167	196	224	252	279	305
	3.5	77	113	146	179	209	240	270	298	326
	4.0	82	119	155	189	222	254	285	315	344

FLAT TERRAIN	1.5	44	63	81	98	114	130	144	158	171
	2.0	55	80	103	125	145	165	183	201	218
	2.5	64	92	118	143	167	189	210	231	251
	3.0	70	101	130	158	184	209	233	256	278
	3.5	76	109	141	171	199	226	252	276	301
	4.0	80	116	150	182	212	241	268	294	320

DOWNHILL 2%	1.5	41	58	72	85	97	106	116	124	132
	2.0	53	76	96	114	130	146	160	174	186
	2.5	62	88	112	134	154	173	190	207	222
	3.0	68	98	124	150	172	194	214	233	251
	3.5	74	106	135	163	188	211	234	256	276
	4.0	79	113	145	174	202	228	251	275	297

Minimum considered pressure 1.0 bar. Max. working pressure according the dripline wall thickness definition

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 16010/16012 • ID 14.2 mm • Kd 1.3 • Flow rate 3.5 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	32	45	56	67	77	85	94	101	108
	2.0	41	58	74	89	102	114	126	137	147
	2.5	47	68	86	104	119	134	149	162	175
	3.0	52	75	96	115	133	151	166	182	196
	3.5	56	81	104	125	145	164	182	198	215
	4.0	60	86	111	134	155	175	194	213	230

FLAT TERRAIN	1.5	33	48	62	75	87	99	110	121	131
	2.0	42	61	78	95	110	125	139	153	166
	2.5	48	70	90	109	127	144	161	176	192
	3.0	53	77	99	120	140	159	178	195	212
	3.5	57	83	107	130	151	172	192	211	229
	4.0	61	88	114	138	161	183	204	224	244

DOWNHILL 2%	1.5	35	51	67	82	97	112	126	140	154
	2.0	43	63	82	101	119	136	153	169	186
	2.5	49	72	94	114	134	153	173	191	209
	3.0	54	79	102	125	147	168	188	208	228
	3.5	58	85	110	134	158	180	202	223	244
	4.0	62	90	117	143	167	191	214	236	258

Minimum considered pressure 1.0 bar. Max. working pressure according the dripline wall thickness definition

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 17012 • ID 14.6 mm • Kd 1.1 • Flow rate 0.7 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	89	119	142	160	175	186	195	203	209
	2.0	120	164	202	234	260	284	304	322	338
	2.5	141	195	242	283	319	351	380	406	429
	3.0	157	219	274	323	365	405	440	472	501
	3.5	171	240	300	355	404	449	490	527	562
	4.0	183	257	324	383	437	487	533	574	614

FLAT TERRAIN	1.5	104	148	190	228	264	299	331	363	393
	2.0	131	188	241	290	337	381	422	463	502
	2.5	151	216	277	334	388	438	487	534	579
	3.0	166	239	306	369	428	484	538	590	640
	3.5	180	258	330	399	463	524	582	638	692
	4.0	191	274	352	425	493	559	621	680	738

DOWNHILL 2%	1.5	118	179	239	300	361	422	483	545	606
	2.0	143	212	281	349	415	482	547	613	678
	2.5	161	238	312	386	457	528	598	667	736
	3.0	176	258	338	416	492	567	641	713	785
	3.5	188	276	360	443	523	601	678	753	828
	4.0	199	292	380	466	550	631	711	789	867

Minimum considered pressure 1.0 bar

Due to lateral filling time and flushing effectiveness it is not recommended to exceed 800 meters lateral length

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 17012 • ID 14.6 mm • Kd 1.1 • Flow rate 1.0 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	73	99	120	138	152	164	174	183	190
	2.0	97	134	166	194	218	240	260	277	293
	2.5	113	158	198	233	264	293	318	342	364
	3.0	126	177	222	263	300	334	365	393	420
	3.5	136	193	243	289	330	368	403	437	467
	4.0	146	206	261	311	356	398	437	473	507

FLAT TERRAIN	1.5	82	118	150	181	209	237	263	288	312
	2.0	104	149	191	230	267	302	335	367	398
	2.5	119	171	219	265	307	348	386	424	459
	3.0	132	189	242	293	340	384	427	469	508
	3.5	142	204	262	316	367	416	462	507	550
	4.0	151	217	279	337	391	443	493	540	586

DOWNHILL 2%	1.5	91	137	181	226	271	315	359	403	448
	2.0	111	164	216	267	316	365	414	463	510
	2.5	126	185	242	297	351	404	456	508	559
	3.0	137	201	262	322	380	436	491	546	599
	3.5	147	215	280	344	404	464	522	579	635
	4.0	156	228	296	363	427	489	550	608	667

Minimum considered pressure 1.0 bar

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 17012 • ID 14.6 mm • Kd 1.1 • Flow rate 1.6 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	55	76	94	109	122	134	144	153	161
	2.0	72	101	127	150	170	189	206	221	235
	2.5	84	119	150	178	203	226	248	268	287
	3.0	93	132	167	200	229	256	281	304	327
	3.5	101	144	182	218	250	281	309	335	360
	4.0	108	154	195	234	269	302	333	362	389

FLAT TERRAIN	1.5	60	86	110	133	155	175	194	212	231
	2.0	76	110	140	170	197	223	247	271	294
	2.5	88	126	161	195	226	256	285	312	339
	3.0	97	139	178	215	250	284	315	346	375
	3.5	104	150	192	233	270	307	341	374	406
	4.0	111	160	205	248	288	326	363	399	432

DOWNHILL 2%	1.5	65	97	127	158	188	217	246	276	305
	2.0	80	118	154	189	223	257	290	323	355
	2.5	91	133	173	213	250	287	323	358	393
	3.0	100	146	189	231	272	312	350	388	425
	3.5	107	156	203	248	290	333	374	413	452
	4.0	114	165	214	262	307	351	394	436	476

Minimum considered pressure 1.0 bar



## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 17012 • ID 14.6 mm • Kd 1.1 • Flow rate 2.3 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	44	62	77	90	102	113	122	131	138
	2.0	58	81	102	122	139	155	170	183	196
	2.5	67	95	120	143	164	183	202	219	235
	3.0	74	105	134	160	184	207	228	248	266
	3.5	80	114	146	174	201	226	250	271	292
	4.0	86	122	156	187	215	242	268	292	315

FLAT TERRAIN	1.5	47	68	87	105	122	138	154	168	183
	2.0	60	86	111	134	155	176	196	214	233
	2.5	69	99	127	154	179	202	226	248	268
	3.0	76	110	140	170	197	224	249	274	297
	3.5	82	118	152	184	214	242	270	295	321
	4.0	87	126	162	196	227	258	287	315	342

DOWNHILL 2%	1.5	51	74	98	121	143	165	186	208	229
	2.0	63	92	119	146	172	197	222	247	271
	2.5	71	104	135	165	194	222	249	275	302
	3.0	78	113	147	180	211	242	271	300	328
	3.5	84	122	158	193	226	258	290	320	350
	4.0	89	129	168	204	239	273	306	338	369

Minimum considered pressure 1.0 bar

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 17012 • ID 14.6 mm • Kd 1.1 • Flow rate 3.5 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	34	48	60	72	81	90	98	106	113
	2.0	44	63	79	95	109	122	134	145	156
	2.5	51	73	92	111	128	144	158	172	185
	3.0	57	81	103	124	143	160	178	194	208
	3.5	61	88	112	134	155	175	194	212	228
	4.0	65	93	119	144	166	188	207	227	245

FLAT TERRAIN	1.5	36	52	66	80	93	106	117	129	139
	2.0	46	66	84	102	118	134	149	164	177
	2.5	52	75	97	117	136	154	172	188	205
	3.0	58	83	107	129	151	171	190	208	226
	3.5	62	90	115	140	163	184	205	225	245
	4.0	66	95	123	149	173	196	218	240	261

DOWNHILL 2%	1.5	38	56	72	89	105	121	136	151	166
	2.0	47	68	89	109	128	146	165	183	200
	2.5	54	78	101	124	145	165	186	205	224
	3.0	59	86	111	135	158	181	202	223	244
	3.5	63	92	119	145	170	194	217	239	261
	4.0	67	98	126	154	180	205	230	254	277

Minimum considered pressure 1.0 bar

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 20010/20012 • ID 17.5 mm • Kd 0.4 • Flow rate 0.7 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	130	162	184	199	209	217	223	228	231
	2.0	182	238	280	313	340	361	378	393	406
	2.5	218	289	346	393	432	466	494	518	539
	3.0	246	329	398	456	505	548	586	618	648
	3.5	269	363	442	509	566	617	662	703	739
	4.0	289	392	479	554	620	678	730	777	819

FLAT TERRAIN	1.5	168	233	292	347	397	445	489	532	573
	2.0	213	297	373	443	507	568	626	681	734
	2.5	245	343	430	511	586	656	722	787	848
	3.0	271	379	476	565	648	727	801	871	939
	3.5	293	409	514	611	701	786	866	943	1017
	4.0	312	436	548	652	748	839	925	1006	1085

DOWNHILL 2%	1.5	207	309	412	514	616	718	817	905	990
	2.0	245	359	471	581	689	796	900	995	1087
	2.5	273	397	517	634	748	860	969	1068	1166
	3.0	296	429	556	678	797	914	1027	1132	1235
	3.5	316	456	591	717	841	962	1079	1189	1295
	4.0	334	480	619	752	880	1005	1126	1239	1350

Minimum considered pressure 1.0 bar. Max. working pressure according the dripline wall thickness definition  
Due to lateral filling time and flushing effectiveness it is not recommended to exceed 800 meters lateral length

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 20010/20012 • ID 17.5 mm • Kd 0.4 • Flow rate 1.0 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	109	140	162	178	190	200	208	214	219
	2.0	149	198	236	268	295	316	335	352	366
	2.5	177	238	288	331	367	398	426	451	473
	3.0	199	269	328	380	424	463	498	530	558
	3.5	217	296	362	420	472	517	558	596	630
	4.0	233	318	392	456	512	564	610	653	692

FLAT TERRAIN	1.5	133	185	232	276	316	353	389	423	456
	2.0	169	236	296	352	403	452	498	542	583
	2.5	194	272	341	406	465	522	574	626	674
	3.0	215	300	378	449	515	577	636	693	747
	3.5	232	325	408	485	557	624	689	750	809
	4.0	247	346	435	518	594	666	734	800	863

DOWNHILL 2%	1.5	157	233	308	382	455	528	601	673	745
	2.0	189	275	358	439	518	596	674	750	826
	2.5	212	306	396	483	568	650	731	812	891
	3.0	230	332	428	520	609	696	781	864	947
	3.5	247	354	455	552	645	736	824	911	996
	4.0	261	374	480	581	677	771	863	953	1041

Minimum considered pressure 1.0 bar. Max. working pressure according the dripline wall thickness definition  
Due to lateral filling time and flushing effectiveness it is not recommended to exceed 800 meters lateral length

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 20010/20012 • ID 17.5 mm • Kd 0.4 • Flow rate 1.6 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	85	111	132	148	161	173	182	190	196
	2.0	114	153	186	214	237	258	277	293	308
	2.5	134	182	222	258	289	317	342	365	386
	3.0	149	204	252	293	330	363	394	421	447
	3.5	162	223	276	323	364	402	437	469	499
	4.0	174	240	297	348	394	436	474	510	544

FLAT TERRAIN	1.5	98	137	171	203	233	261	287	313	337
	2.0	124	174	218	260	298	333	368	401	431
	2.5	143	200	252	299	343	385	425	463	498
	3.0	158	221	278	331	380	426	470	512	552
	3.5	170	239	301	358	411	461	509	554	598
	4.0	181	255	321	382	439	492	542	591	638

DOWNHILL 2%	1.5	111	163	212	262	310	357	404	451	498
	2.0	135	195	252	307	361	412	464	515	564
	2.5	152	219	281	341	399	455	510	564	617
	3.0	166	238	306	370	431	491	549	606	661
	3.5	178	255	326	394	459	522	582	642	700
	4.0	189	270	345	416	484	550	613	674	735

Minimum considered pressure 1.0 bar. Max. working pressure according the dripline wall thickness definition

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 20010/20012 • ID 17.5 mm • Kd 0.4 • Flow rate 2.3 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	69	92	110	126	139	150	159	167	175
	2.0	91	124	152	176	197	216	233	248	263
	2.5	107	146	181	211	238	262	284	304	323
	3.0	119	164	203	238	269	298	324	348	371
	3.5	129	179	222	261	296	328	358	385	411
	4.0	138	192	238	281	319	354	386	417	446

FLAT TERRAIN	1.5	77	108	136	161	184	207	228	248	267
	2.0	98	137	173	205	235	264	291	317	342
	2.5	113	158	199	237	272	305	336	366	395
	3.0	124	175	220	262	301	337	372	405	437
	3.5	134	189	238	283	325	365	402	439	473
	4.0	143	201	254	302	347	389	430	468	505

DOWNHILL 2%	1.5	85	124	161	197	232	267	302	335	369
	2.0	105	150	194	235	275	314	351	389	425
	2.5	119	170	217	263	307	349	390	430	469
	3.0	130	185	237	286	332	378	422	464	506
	3.5	139	199	254	306	355	403	449	494	537
	4.0	148	210	268	323	375	425	474	520	566

Minimum considered pressure 1.0 bar. Max. working pressure according the dripline wall thickness definition

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ CNL 20010/20012 • ID 17.5 mm • Kd 0.4 • Flow rate 3.5 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	1.5	54	73	89	102	114	124	133	141	149
	2.0	71	97	120	140	157	174	188	202	214
	2.5	82	114	141	166	187	207	226	243	259
	3.0	92	127	158	186	211	235	256	276	295
	3.5	99	138	172	203	231	257	281	303	325
	4.0	106	148	184	218	248	277	302	328	351

FLAT TERRAIN	1.5	59	82	103	123	141	158	174	189	204
	2.0	75	104	132	157	179	202	222	242	261
	2.5	86	120	152	181	207	232	257	280	302
	3.0	95	133	168	200	229	258	284	310	334
	3.5	102	144	181	216	248	279	307	335	361
	4.0	109	153	193	230	265	297	328	357	386

DOWNHILL 2%	1.5	63	92	118	144	169	193	217	240	264
	2.0	78	112	144	174	202	230	258	284	310
	2.5	89	127	162	196	227	258	288	317	345
	3.0	98	139	177	214	248	281	313	344	374
	3.5	105	149	190	229	265	300	334	367	399
	4.0	111	158	202	243	281	318	354	388	421

Minimum considered pressure 1.0 bar. Max. working pressure according the dripline wall thickness definition

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ HCNL 16010/16012 • ID 14.2 mm • Kd 1.3 • Flow rate 0.85 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	2.0	75	101	123	141	155	167	178	186	194
	2.5	99	137	171	200	225	247	267	285	301
	3.0	116	162	203	240	272	302	329	353	375
	3.5	129	182	229	271	310	344	377	407	434
	4.0	140	198	250	298	341	380	417	451	483

FLAT TERRAIN	2.0	84	121	155	187	217	246	274	301	326
	2.5	107	153	197	238	277	314	349	383	415
	3.0	122	176	226	274	319	361	402	441	479
	3.5	135	194	250	303	352	399	444	488	530
	4.0	146	210	270	327	380	431	480	527	573

DOWNHILL 2%	2.0	94	141	188	236	283	330	378	425	472
	2.5	114	170	224	277	330	382	434	485	536
	3.0	129	191	250	309	365	421	477	532	586
	3.5	141	207	272	334	395	454	514	572	628
	4.0	151	222	290	356	421	483	545	606	665

Minimum considered pressure 1.5 bar. Max. working pressure according the dripline wall thickness definition

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ HCNL 16010/16012 • ID 14.2 mm • Kd 1.3 • Flow rate 1.25 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	2.0	60	82	101	117	131	143	154	162	170
	2.5	78	110	137	162	184	204	222	238	253
	3.0	91	128	162	192	220	245	268	290	310
	3.5	101	143	181	216	248	277	305	330	354
	4.0	109	156	198	236	272	305	335	365	391
FLAT TERRAIN	2.0	65	94	121	146	169	192	214	234	254
	2.5	83	119	153	185	215	244	272	298	324
	3.0	95	137	176	213	248	281	313	344	373
	3.5	105	151	194	235	274	311	346	380	413
	4.0	113	163	210	254	296	335	374	410	446
DOWNHILL 2%	2.0	71	106	140	175	209	243	277	311	344
	2.5	87	129	169	209	247	286	323	360	397
	3.0	99	146	190	234	276	318	358	399	438
	3.5	108	159	207	254	300	344	388	430	472
	4.0	116	170	222	272	320	367	413	458	502

Minimum considered pressure 1.5 bar. Max. working pressure according the dripline wall thickness definition

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ HCNL 16010/16012 • ID 14.2 mm • Kd 1.3 • Flow rate 2.0 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	2.0	45	63	78	92	104	114	124	133	141
	2.5	58	82	104	124	142	158	173	187	200
	3.0	67	96	122	146	167	188	206	224	240
	3.5	75	107	136	163	188	211	233	253	272
	4.0	81	116	148	177	205	230	254	277	299
FLAT TERRAIN	2.0	48	69	89	107	125	141	158	173	187
	2.5	61	88	112	136	158	180	200	220	239
	3.0	70	101	130	157	182	207	230	253	275
	3.5	77	111	143	173	202	229	255	280	304
	4.0	83	120	154	187	218	247	275	302	329
DOWNHILL 2%	2.0	51	76	100	123	146	169	192	214	236
	2.5	63	93	121	149	176	202	228	254	279
	3.0	72	105	137	168	198	227	255	284	311
	3.5	79	115	150	184	215	247	278	308	337
	4.0	85	124	161	197	231	264	297	329	359

Minimum considered pressure 1.5 bar. Max. working pressure according the dripline wall thickness definition

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ HCNL 16010/16012 • ID 14.2 mm • Kd 1.3 • Flow rate 2.90 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	2.0	36	50	63	75	85	95	103	111	118
	2.5	46	65	83	99	114	127	141	152	164
	3.0	53	76	97	116	134	151	166	181	195
	3.5	59	84	108	130	149	169	186	203	220
	4.0	64	92	117	141	163	184	203	222	240
FLAT TERRAIN	2.0	38	54	70	84	98	111	124	136	147
	2.5	48	69	88	107	125	141	158	173	188
	3.0	55	79	102	123	143	162	182	199	216
	3.5	60	87	112	136	158	180	200	221	239
	4.0	65	94	121	147	171	194	217	238	259
DOWNHILL 2%	2.0	40	58	76	94	111	128	145	161	178
	2.5	49	72	94	115	135	155	174	194	213
	3.0	56	82	106	130	153	175	197	218	238
	3.5	61	89	116	142	167	191	214	237	259
	4.0	66	96	125	153	179	204	230	254	277

Minimum considered pressure 1.5 bar. Max. working pressure according the dripline wall thickness definition

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ HCNL 16010/16012 • ID 14.2 mm • Kd 1.3 • Flow rate 4.40 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	2.0	28	39	49	59	67	75	82	89	96
	2.5	35	50	64	77	89	100	110	120	129
	3.0	41	58	74	90	104	117	130	141	153
	3.5	45	65	83	100	116	131	145	158	171
	4.0	49	70	90	108	125	142	158	173	187
FLAT TERRAIN	2.0	29	41	53	64	75	85	94	104	113
	2.5	36	52	67	82	95	108	120	132	144
	3.0	41	60	77	94	109	124	138	152	165
	3.5	46	66	85	104	121	137	153	168	183
	4.0	49	71	92	112	130	148	165	182	198
DOWNHILL 2%	2.0	30	44	57	70	83	95	107	119	130
	2.5	37	54	70	86	101	116	130	144	158
	3.0	42	62	80	98	115	131	147	163	178
	3.5	46	68	88	107	125	144	161	178	194
	4.0	50	73	94	115	135	154	173	191	208

Minimum considered pressure 1.5 bar. Max. working pressure according the dripline wall thickness definition

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ HCNL 17012 • ID 14.6 mm • Kd 1.1 • Flow rate 0.85 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	2.0	80	108	130	148	162	174	184	192	199
	2.5	107	147	182	212	237	260	280	298	313
	3.0	125	174	217	255	289	319	346	371	393
	3.5	139	195	245	289	329	365	398	428	456
	4.0	151	213	268	317	362	403	441	476	508
FLAT TERRAIN	2.0	91	131	167	201	233	263	292	320	347
	2.5	116	166	212	256	296	335	373	409	443
	3.0	133	191	244	294	341	386	430	471	510
	3.5	146	210	270	325	377	427	475	521	565
	4.0	158	227	291	351	408	462	514	563	611
DOWNHILL 2%	2.0	103	154	205	257	308	359	410	462	513
	2.5	125	185	243	301	358	414	470	525	580
	3.0	141	207	271	334	395	456	516	574	633
	3.5	154	225	294	362	427	491	554	616	677
	4.0	165	241	314	386	454	522	587	653	716

Minimum considered pressure 1.5 bar

## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ HCNL 17012 • ID 14.6 mm • Kd 1.1 • Flow rate 1.25 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	2.0	64	88	107	124	137	149	160	168	176
	2.5	84	118	146	172	194	215	233	249	265
	3.0	98	138	173	205	233	260	283	305	326
	3.5	109	154	194	231	264	295	323	349	373
	4.0	118	168	212	253	290	324	356	385	413
FLAT TERRAIN	2.0	71	101	130	157	181	205	228	249	270
	2.5	90	129	165	199	231	261	290	318	345
	3.0	103	148	190	229	266	301	334	366	398
	3.5	114	163	209	253	293	333	370	406	440
	4.0	123	176	226	273	317	360	400	438	476
DOWNHILL 2%	2.0	78	116	153	190	227	264	300	337	372
	2.5	95	140	184	226	268	309	350	389	429
	3.0	108	158	206	253	299	343	386	429	472
	3.5	118	173	224	275	324	371	418	464	508
	4.0	127	185	240	294	346	396	445	492	540

Minimum considered pressure 1.5 bar

### Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ HCNL 17012 • ID 14.6 mm • Kd 1.1 • Flow rate 2.00 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	2.0	48	67	83	97	110	120	130	139	147
	2.5	63	89	111	132	150	167	182	197	210
	3.0	73	103	131	156	178	200	218	237	254
	3.5	81	115	146	174	200	225	247	268	288
	4.0	88	125	159	190	218	246	270	294	317
FLAT TERRAIN	2.0	52	75	96	115	134	151	168	185	200
	2.5	66	95	121	147	170	193	214	235	255
	3.0	76	109	140	169	196	222	246	271	294
	3.5	83	120	154	186	217	245	273	299	325
	4.0	90	130	166	201	234	265	295	323	351
DOWNHILL 2%	2.0	56	82	108	134	158	183	207	231	256
	2.5	69	101	132	161	190	218	246	274	300
	3.0	78	114	148	182	214	245	275	305	334
	3.5	86	125	162	198	233	266	298	330	362
	4.0	92	134	174	212	249	284	319	353	386

Minimum considered pressure 1.5 bar

### Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ HCNL 17012 • ID 14.6 mm • Kd 1.1 • Flow rate 2.90 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	2.0	39	54	67	80	90	100	109	117	124
	2.5	50	71	89	106	121	136	149	161	173
	3.0	58	82	104	124	143	160	177	192	206
	3.5	64	91	116	139	160	180	198	216	233
	4.0	69	99	126	151	174	196	217	237	255
FLAT TERRAIN	2.0	41	59	75	91	105	119	132	145	157
	2.5	52	74	95	115	134	151	168	185	200
	3.0	59	85	110	132	154	174	194	212	231
	3.5	65	94	121	146	170	193	214	235	255
	4.0	70	101	130	158	184	208	232	255	276
DOWNHILL 2%	2.0	43	63	83	102	121	139	157	175	192
	2.5	53	78	102	124	146	167	188	209	229
	3.0	61	89	115	141	165	188	211	234	256
	3.5	67	97	126	154	180	206	230	255	278
	4.0	72	104	135	165	193	221	246	273	298

Minimum considered pressure 1.5 bar



## Max. Lateral length (meter) at different inlet pressure and different slopes

UniGray™ HCNL 17012 • ID 14.6 mm • Kd 1.1 • Flow rate 4.40 l/h

	DISTANCE BETWEEN DRIPPERS (METER)									
	INLET PRESSURE (BAR)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
UPHILL 2%	2.0	30	42	53	63	71	80	87	95	101
	2.5	38	54	69	83	95	106	118	128	137
	3.0	44	63	80	96	111	125	138	150	162
	3.5	49	70	89	107	124	139	154	168	182
	4.0	53	76	97	116	134	152	168	184	199
FLAT TERRAIN	2.0	31	45	57	69	80	91	101	111	120
	2.5	39	56	72	88	102	116	129	141	153
	3.0	45	65	83	101	118	133	148	163	176
	3.5	50	72	92	112	130	147	164	180	195
	4.0	54	77	99	120	140	159	177	194	211
DOWNHILL 2%	2.0	32	47	62	76	89	102	115	128	140
	2.5	40	59	76	93	109	125	140	155	170
	3.0	46	67	86	106	124	141	158	175	191
	3.5	50	73	95	116	136	155	173	191	208
	4.0	54	79	102	124	145	166	186	204	223

Minimum considered pressure 1.5 bar