

UniGray™ HCNL

Premium integral pressure-compensated dripper with continuous self-flushing, anti-siphon and high anti-drain (HCNL) mechanisms. Ideal for greenhouses, deciduous orchards, tree irrigation and permanent applications requiring highly intensive irrigation scheduling or installation in complex topographies. Dripline manufactured with a light gray outer layer to reduce solar radiation absorption.



Benefits & Features

Uniform water distribution

Ensures precise, uniform discharge across a broad pressure range, delivering consistent water and nutrient application along the entire dripline length.

Prevents drainage (HCNL)

The HCNL (high anti-drain) mechanism maintains dripline pressure at a higher shut-off threshold, preventing drainage from emitters even on steep slopes and ensuring uniform water distribution.

Eliminates the drainage and refill effect, improving irrigation efficiency in intensive pulse irrigation applications.

Long-lasting, high clogging resistance

Ensures reliable performance through a self-cleaning labyrinth that continuously flushes debris during operation.

The advanced dripper structure, combined with an internal protective barrier, helps reduce the risk of root intrusion into the flow path, ensuring long-term system durability.

An extra-large filtration area significantly reduces the risk of suspended particle ingress, ensuring dependable performance across a wide range of water quality levels.

The TurboNet™ labyrinth features wide, deep flow passages with large cross-sections that enhance clogging resistance. Water is drawn from the center of the flow stream, further minimizing particle ingress.

Hybrid (optional)

Optional patented configuration with an on-line saddle connection that combines the advantages of an integral dripper with compatibility for Netafim™ press-fit adaptors. Includes an advanced feature that helps reduce drop migration on slopes under specific operating conditions.

*Contact your local Netafim™ representative for detailed guidance on drop-migration functionality.



Applications



Open field



Orchards



Protected crops

- Suitable for on-surface installation across a wide range of field conditions.
- Delivers uniform hydraulic performance on flat terrain, sloping fields and variable topographies.
- Ideal for intensive and precision irrigation in orchards, greenhouses and nurseries where maintaining a fully pressurized dripline and preventing drainage is required.



Specifications

- Pressure-compensated operating range: 1.5–4.0 bar.
- Dripper shut-off pressure: 0.25 bar.
- Filtration requirements: Filtration level depends on the dripper flow rate and must be selected according to the type and concentration of particles in the water. When sand content exceeds 2 ppm, a Hydrocyclone must be installed upstream of the main filter. For sand/silt/clay solids above 100 ppm, apply pre-treatment in line with Netafim™ expert guidelines.
- Double TurboNet™ labyrinth with extra-wide flow passages for enhanced clogging resistance.
- Weldable into thick-wall driplines: 0.90, 1.00 and 1.20 mm.
- Injection-molded dripper with ultra-low coefficient of variation (CV) and an injection-molded silicone diaphragm for exceptional uniformity and long-term performance.
- High UV resistance and fully compatible with standard agricultural nutrients and fertilizers.
- Fully compliant with ISO 9261 international manufacturing and performance standards.
- Driplines are black with a light gray external layer.

Drippers technical data

Flow rate* (l/h)	Working pressure range (bar)	Water passages dimensions width-depth-length (mm x mm x mm)	Filtration area (mm²)	Constant K	Exponent* X	Recommended filtration (micron)/(mesh)
0.85	1.5 - 4.0	0.70 x 0.65 x 40	110	0.85	0	130/120
1.25		0.83 x 0.74 x 40	130	1.25	0	130/120
2.00		1.09 x 0.76 x 40	130	2.00	0	200/80
2.90		1.26 x 0.93 x 40	130	2.90	0	200/80
4.40		1.59 x 1.07 x 40	150	4.40	0	200/80

* Within working pressure range.

** Dripper nominal shut-off pressure: 0.25 bar, applicable to all flow rates.

Both the K constant and the X exponent are fundamental hydraulic parameters used to calculate the actual flow rate of each dripper at a given operating pressure (within its specified working range), as detailed in the following pages.

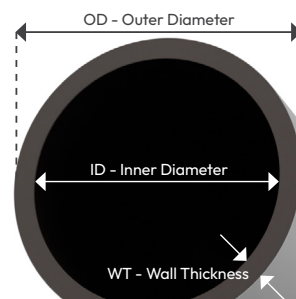


Driplines technical data

Model	Inner diameter (mm)	Wall thickness (mm)	Outer diameter (mm)	Max. working pressure (bar)	Max. flushing pressure (bar)	Kd
16009	14.20	0.9	16.00	3.0	3.9	1.30
16010	14.20	1.0	16.20	3.5	4.6	1.30
16012	14.20	1.2	16.60	4.0	5.2	1.30
20010	17.50	1.0	19.50	3.5	4.6	0.40
20012	17.50	1.2	19.90	4.0	5.2	0.40

Kd: An integral dripper installed inside the dripline creates a localized disturbance in the water flow, generating minor head losses (Kd) as its shape and volume partially obstruct the internal flow path. The lower the Kd value for a given inner diameter, the longer the driplines can be designed under similar operating conditions.

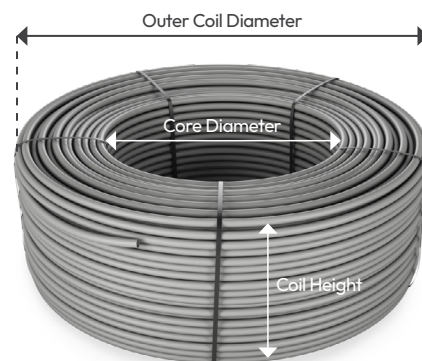
Max. flushing pressure: The maximum permissible flushing pressures shown in the table apply to continuous flushing cycles of up to 30 minutes, with the ends of at least five driplines opened for flushing.



Driplines package data (on bundled coil)

Model	Wall thickness (mm)	Distance between drippers (m)	Coil length		Average* coil weight		Outer coil diameter (cm)	Core coil diameter (cm)	Coil height (cm)
			smooth (m)	w/hybrid (m)	smooth (kg)	w/hybrid (kg)			
16009	0.9	0.15 to 1.00	500	N/R	20.3	N/R	84	41	27
16010	1.0	0.15 to 1.00	500	300	22.2	13.5	84	41	27
16012	1.2	0.15 to 1.00	400	300	21.2	16.0	78	41	28
20010	1.0	0.15 to 1.00	300	200	17.4	16.5	84	50	27
20012	1.2	0.15 to 1.00	300	200	20.2	19.0	84	50	27

*Values shown are average weights and may vary due to dripper spacing and extrusion tolerances. Refer to the official Netafim™ disclaimers for details.



Driplines package data (on bundled coil) within container

Model	Coil length		Coils in a 40 foot container (units)	Total in a 40 foot container	
	smooth (m)	w/hybrid (m)		smooth (m)	w/hybrid (m)
16009	500	N/R	330	165000	N/R
16010	500	300	330	165000	99000
16012	400	300	330	132000	99000
20010	300	200	330	99000	66000
20012	300	200	330	99000	66000

A standard 40-foot container has internal dimensions of 12.0 m (L) × 2.35 m (W) × 2.39 m (H). In certain cases, a 40-foot High Cube container may be used, providing an increased internal height of 2.69 m, allowing improved volume utilization depending on product configuration.



Catalog numbers

Because of the wide range of available configurations (different flow rates, emitter spacings, coil lengths and additional specifications), the final catalog number must be confirmed with your local Netafim™ representative after completing the product definition.

Complete the product specification using the options provided in the following flow chart.

How to use: Select one option from each category in the chart to define the most appropriate product configuration for your application.

Product name		Commercial diameter (mm)		Wall thickness (mm)		Flow rate (l/h)		Distance between drippers (m)		Coil length (m)		Special features	
UniGray™ HCNL	UGRAY HCNL	16	16	0.9	009	0.85	0.85L/H	0.2	0.20M	Model 16009	500M	No added	
		20	20	1.0	010	1.25	1.25L/H	0.3	0.30M	Model 16010	500M	Hybrid	HYB
				1.2	012	2.00	2.00L/H	0.4	0.40M	Model 16012	400M	Other	XXX
						2.90	2.90L/H	0.5	0.50M	Model 20010	300M	*Other features available upon request. Consult your local Netafim™ distributor.	
						4.40	4.40L/H	0.6	0.60M	Model 20012	300M		
								0.7	0.70M				
						*Other distances between drippers can be ordered.		Coil length (m) w/hybrid					
								Model 16010	300M				
								Model 16012	300M				
								Model 20010	200M				
								Model 20012	200M				
UGRAY HCNL 16010 0.85L/H 0.30M 300M HYB													

Catalog description example

Drippers flow rate vs working pressure

To determine the actual flow rate of a dripper under different operating pressures, the following equation is applied:

$$Q = K \times P^X$$

Where:

Q = Dripper flow rate (liters per hour)

K = Dripper-specific flow constant (manufacturer-defined)

P = Actual working pressure (meters of water column)

X = Dripper-specific exponent (manufacturer-defined)

In accordance with ISO 9261, manufacturers must declare both the K constant and the X exponent for each dripper model.

In all Netafim™ pressure-compensated drippers, including UniRam™ (featured in this document), the dripper exponent X is equal to 0 within the specified pressure-compensation range for each model. This ensures that the actual dripper flow rate remains constant within $\pm 7\%$, in full compliance with ISO 9261 international standards.

Each pressure-compensated dripper model operates within a defined compensation range, with clearly specified minimum and maximum pressure limits. Below the minimum compensation pressure, the dripper behaves as a non-pressure-compensated emitter and its flow rate increases proportionally with pressure until the minimum operating threshold is reached.

Above the maximum compensation pressure, Netafim™ pressure-compensated drippers will continue to regulate flow; however, they become more susceptible to clogging. In most cases, the maximum operating pressure is determined by the physical limitations of the dripline, such as diameter, wall thickness and most importantly, the structural integrity of the pipe and its associated connections.

UniGray™ HCNL flow (l/h) vs pressure (bar)

Dripper	Flow rate* (l/h)	Working pressure (bar)					
		1.50	2.00	2.50	3.00	3.50	4.00
UniGray™ HCNL	0.85	0.70	0.70	0.70	0.70	0.70	0.70
	1.25	1.00	1.00	1.00	1.00	1.00	1.00
	2.00	1.60	1.60	1.60	1.60	1.60	1.60
	2.90	2.30	2.30	2.30	2.30	2.30	2.30
	4.40	3.50	3.50	3.50	3.50	3.50	3.50

* Within working pressure range

In HCNL drippers, the flow rate remains zero until the pressure exceeds the minimum working pressure.

As the pressure within the dripline decreases below the minimum working pressure, the flow rate gradually decreases until it reaches the shut-off pressure. When the pressure falls below the shut-off pressure, the flow rate returns to zero.

Maximum driplines length

To determine the maximum feasible run length for a given dripline, considering all hydraulic factors that influence flow within the dripline, Netafim™ uses proprietary design software based on the Darcy-Weisbach equations, supported by decades of engineering expertise and long-standing collaboration with leading academic institutions.

The precise maximum run length for any installation must be calculated using this dedicated design software, which evaluates all relevant hydraulic parameters across the system.

Minor differences may occur between design tools available on the market, due to variations in calculation methodologies and underlying design assumptions.

To calculate the maximum feasible dripline length, taking into account the required variables, such as flow rate and emitter spacing, pipe inner diameter, field slope, inlet pressure and other parameters, Netafim™ HydroCalc design software can be used.



The following tables present the maximum dripline lengths that can be used in driplines to achieve optimal performance.

The values provided here are intended to offer a preliminary reference. The actual maximum dripline length must be calculated by a hydraulic engineer responsible for designing the complete system, in order to account for additional constraints and site-specific limitations.

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

UniGray™ HCNL 16009/16010/16012 • ID 14.2 mm • Kd 1.30 • 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 design pressure: 1.5 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

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

UniGray™ HCNL 16009/16010/16012 • ID 14.2 mm • Kd 1.30 • 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 design pressure: 1.5 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

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

UniGray™ HCNL 16009/16010/16012 • ID 14.2 mm • Kd 1.30 • 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	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 design pressure: 1.5 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

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

UniGray™ HCNL 16009/16010/16012 • ID 14.2 mm • Kd 1.30 • 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 design pressure: 1.5 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

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

UniGray™ HCNL 16009/16010/16012 • ID 14.2 mm • Kd 1.30 • 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 design pressure: 1.5 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

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

UniGray™ HCNL 20010/20012 • ID 17.5 mm • Kd 0.40 • 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	118	150	172	188	199	209	215	221	225
	2.5	164	215	256	289	315	337	355	372	385
	3.0	195	260	314	359	396	428	457	482	504
	3.5	219	296	359	413	460	501	538	570	599
	4.0	239	325	397	459	513	561	605	644	679
Flat terrain	2.0	148	206	258	306	350	392	432	470	506
	2.5	188	262	329	391	448	501	552	601	648
	3.0	216	302	379	451	517	579	638	694	748
	3.5	239	334	420	499	572	641	706	769	829
	4.0	258	361	454	539	619	694	765	833	898
Downhill 2%	2.0	178	265	351	437	521	607	691	776	860
	2.5	212	310	405	498	589	679	769	857	945
	3.0	238	344	447	546	643	738	831	923	1015
	3.5	258	373	481	586	688	787	885	980	1075
	4.0	276	397	512	621	727	831	932	1031	1129

Minimum design pressure: 1.5 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

Due to considerations related to dripline filling time and flushing effectiveness, it is not recommended to exceed a dripline length of 800 meters.

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

UniGray™ HCNL 20010/20012 • ID 17.5 mm • Kd 0.40 • 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	97	126	147	164	177	188	196	203	209
	2.5	131	176	211	242	266	288	307	324	338
	3.0	155	210	255	295	329	358	386	410	431
	3.5	174	236	290	336	377	414	447	477	504
	4.0	189	259	319	371	418	460	498	533	566
Flat terrain	2.0	115	160	201	239	273	306	337	366	395
	2.5	146	204	256	304	349	391	431	469	506
	3.0	168	235	295	351	403	452	498	542	584
	3.5	185	260	327	389	446	500	551	600	647
	4.0	200	281	353	420	482	541	597	650	701
Downhill 2%	2.0	133	196	258	318	378	438	497	555	614
	2.5	161	233	302	370	435	500	563	626	688
	3.0	181	261	336	409	479	548	615	681	747
	3.5	197	283	364	442	516	589	659	729	797
	4.0	211	303	388	470	548	624	698	770	841

Minimum design pressure: 1.5 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

Due to considerations related to dripline filling time and flushing effectiveness, it is not recommended to exceed a dripline length of 800 meters.

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

UniGray™ HCNL 20010/20012 • ID 17.5 mm • Kd 0.40 • 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	75	99	118	135	148	159	168	176	183
	2.5	99	135	164	190	212	232	250	266	280
	3.0	117	159	196	228	257	282	306	327	347
	3.5	130	179	221	258	292	322	350	375	399
	4.0	141	195	242	283	320	355	386	416	443
Flat terrain	2.0	85	118	148	176	202	226	249	271	292
	2.5	107	150	189	225	257	289	318	347	374
	3.0	124	173	218	259	297	333	368	401	432
	3.5	136	191	241	287	329	369	407	444	478
	4.0	147	207	260	310	356	400	441	480	518
Downhill 2%	2.0	94	137	179	220	259	298	337	375	413
	2.5	115	166	214	260	305	348	390	433	474
	3.0	131	187	240	291	339	386	432	477	521
	3.5	143	204	261	316	367	418	466	514	560
	4.0	153	219	279	337	392	445	496	546	595

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

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

UniGray™ HCNL 20010/20012 • ID 17.5 mm • Kd 0.40 • 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	60	81	98	113	125	135	145	153	160
	2.5	79	108	133	155	175	192	207	222	235
	3.0	93	128	158	185	209	230	250	269	287
	3.5	103	143	177	208	236	261	285	307	327
	4.0	112	155	193	227	258	287	314	338	361
Flat terrain	2.0	66	93	116	139	159	178	196	213	230
	2.5	84	118	148	177	203	228	251	274	295
	3.0	97	136	171	204	234	263	290	315	340
	3.5	107	150	189	226	259	291	321	349	377
	4.0	116	162	204	244	280	314	347	378	408
Downhill 2%	2.0	72	105	136	166	194	223	251	278	306
	2.5	89	128	164	199	232	264	296	327	357
	3.0	101	144	185	223	260	295	330	363	395
	3.5	111	158	202	243	283	321	357	392	428
	4.0	119	170	216	261	302	342	381	419	455

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

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

UniGray™ HCNL 20010/20012 • ID 17.5 mm • Kd 0.40 • 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	47	64	78	91	101	111	119	127	134
	2.5	61	84	104	123	139	153	166	179	190
	3.0	71	99	123	145	164	182	198	214	229
	3.5	79	110	137	162	184	205	224	242	259
	4.0	86	119	149	177	201	224	246	266	285
Flat terrain	2.0	51	71	89	106	121	137	150	164	176
	2.5	64	90	113	135	155	174	192	209	225
	3.0	74	104	131	156	179	201	222	241	260
	3.5	81	115	144	172	198	222	245	267	288
	4.0	88	124	156	186	214	240	266	289	312
Downhill 2%	2.0	54	78	100	122	142	162	182	202	221
	2.5	67	96	122	148	172	195	218	240	262
	3.0	76	109	138	167	194	220	245	269	293
	3.5	84	119	152	183	212	239	266	293	318
	4.0	90	128	163	196	227	257	286	313	340

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

UniGray™ CNL

Premium integral pressure-compensated dripper with continuous self-flushing, anti-siphon and anti-drain (CNL) mechanisms. Ideal for greenhouses and permanent applications requiring intensive irrigation scheduling. Dripline manufactured with a light gray outer layer to reduce solar radiation absorption.



Benefits & Features

Uniform water distribution

Ensures precise, uniform discharge across a broad pressure range, delivering consistent water and nutrient application along the entire dripline length.

Prevents drainage (CNL)

The CNL (anti-drain) mechanism maintains dripline pressure by preventing drainage from emitters located in low areas, ensuring uniform water distribution.

Eliminates the drainage and refill effect, improving irrigation efficiency in pulse irrigation applications.

Long-lasting, high clogging resistance

Ensures reliable performance through a self-cleaning labyrinth that continuously flushes debris during operation.

The advanced dripper structure, combined with an internal protective barrier, helps reduce the risk of root intrusion into the flow path, ensuring long-term system durability.

An extra-large filtration area significantly reduces the risk of suspended particle ingress, ensuring dependable performance across a wide range of water quality levels.

The TurboNet™ labyrinth features wide, deep flow passages with large cross-sections that enhance clogging resistance. Water is drawn from the center of the flow stream, further minimizing particle ingress.

Hybrid (optional)

Optional patented configuration with an on-line saddle connection that combines the advantages of an integral dripper with compatibility for Netafim™ press-fit adaptors. Includes an advanced feature that helps reduce drop migration on slopes under specific operating conditions.

*Contact your local Netafim™ representative for detailed guidance on drop-migration functionality.



Applications



Open field



Orchards



Protected crops

- Suitable for on-surface installation, primarily in greenhouses, nurseries and orchards.
- Delivers uniform hydraulic performance on flat terrain, sloping fields, and variable topographies.
- Ideal for intensive and precision irrigation in greenhouses, nurseries and orchards where minimizing solar energy absorption is required.



Specifications

- Pressure-compensated operating range: 1.0–4.0 bar.
- Dripper nominal shut-off pressure: 0.14 bar.
- Filtration requirements: Filtration level depends on the dripper flow rate and must be selected according to the type and concentration of particles in the water. When sand content exceeds 2 ppm, a Hydrocyclone must be installed upstream of the main filter. For sand/silt/clay solids above 100 ppm, apply pre-treatment in line with Netafim™ expert guidelines.
- Double TurboNet™ labyrinth with extra-wide flow passages for enhanced clogging resistance.
- Weldable into thick-wall driplines: 0.90, 1.00 and 1.20 mm.
- Injection-molded dripper with ultra-low coefficient of variation (CV) and an injection-molded silicone diaphragm for exceptional uniformity and long-term performance.
- High UV resistance and fully compatible with standard agricultural nutrients and fertilizers.
- Fully compliant with ISO 9261 international manufacturing and performance standards.
- Driplines are black with a light gray external layer.

Drippers technical data

Flow rate* (l/h)	Working pressure range (bar)	Water passages dimensions width-depth-length (mm x mm x mm)	Filtration area (mm²)	Constant K	Exponent* X	Recommended filtration (micron)/(mesh)
0.70	1.0 - 4.0	0.70 x 0.65 x 40	110	0.70	0	130/120
1.00		0.83 x 0.74 x 40	130	1.00	0	130/120
1.60		1.09 x 0.76 x 40	130	1.60	0	200/80
2.30		1.26 x 0.93 x 40	130	2.30	0	200/80
3.50		1.59 x 1.07 x 40	150	3.50	0	200/80

* Within working pressure range.

** Dripper nominal shut-off pressure: 0.14 bar, applicable to all flow rates.

Both the K constant and the X exponent are fundamental hydraulic parameters used to calculate the actual flow rate of each dripper at a given operating pressure (within its specified working range), as detailed in the following pages.

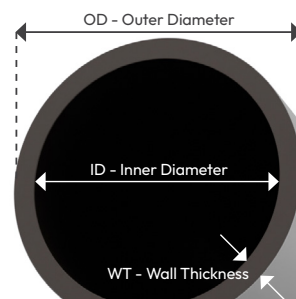


Driplines technical data

Model	Inner diameter (mm)	Wall thickness (mm)	Outer diameter (mm)	Max. working pressure (bar)	Max. flushing pressure (bar)	Kd
16009	14.20	0.9	16.00	3.0	3.9	1.30
16010	14.20	1.0	16.20	3.5	4.6	1.30
16012	14.20	1.2	16.60	4.0	5.2	1.30
20010	17.50	1.0	19.50	3.5	4.6	0.40
20012	17.50	1.2	19.90	4.0	5.2	0.40

Kd: An integral dripper installed inside the dripline creates a localized disturbance in the water flow, generating minor head losses (Kd) as its shape and volume partially obstruct the internal flow path. The lower the Kd value for a given inner diameter, the longer the driplines can be designed under similar operating conditions.

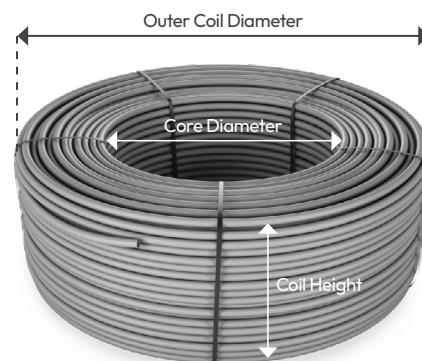
Max. flushing pressure: The maximum permissible flushing pressures shown in the table apply to continuous flushing cycles of up to 30 minutes, with the ends of at least five driplines opened for flushing.



Driplines package data (on bundled coil)

Model	Wall thickness (mm)	Distance between drippers (m)	Coil length		Average* coil weight		Outer coil diameter (cm)	Core coil diameter (cm)	Coil height (cm)
			smooth (m)	w/hybrid (m)	smooth (kg)	w/hybrid (kg)			
16009	0.9	0.15 to 1.00	500	N/R	20.3	N/R	84	41	27
16010	1.0	0.15 to 1.00	500	300	22.2	13.5	84	41	27
16012	1.2	0.15 to 1.00	400	300	21.2	16.0	78	41	28
20010	1.0	0.15 to 1.00	300	200	17.4	16.5	84	50	27
20012	1.2	0.15 to 1.00	300	200	20.2	19.0	84	50	27

*Values shown are average weights and may vary due to dripper spacing and extrusion tolerances. Refer to the official Netafim™ disclaimers for details.



Driplines package data (on bundled coil) within container

Model	Coil length		Coils in a 40 foot container (units)	Total in a 40 foot container	
	smooth (m)	w/hybrid (m)		smooth (m)	w/hybrid (m)
16009	500	N/R	330	165000	N/R
16010	500	300	330	165000	99000
16012	400	300	330	132000	99000
20010	300	200	330	99000	66000
20012	300	200	330	99000	66000

A standard 40-foot container has internal dimensions of 12.0 m (L) × 2.35 m (W) × 2.39 m (H). In certain cases, a 40-foot High Cube container may be used, providing an increased internal height of 2.69 m, allowing improved volume utilization depending on product configuration.



Catalog numbers

Because of the wide range of available configurations (different flow rates, emitter spacings, coil lengths and additional specifications), the final catalog number must be confirmed with your local Netafim™ representative after completing the product definition.

Complete the product specification using the options provided in the following flow chart.

How to use: Select one option from each category in the chart to define the most appropriate product configuration for your application.

Product name		Commercial diameter (mm)		Wall thickness (mm)		Flow rate (l/h)		Distance between drippers (m)		Coil length (m)		Special features	
UniGray™ CNL	UGRAY CNL	16	16	0.9	009	0.7	0.7L/H	0.2	0.20M	Model 16009	500M	No added	
		20	20	1.0	010	1.0	1.0L/H	0.3	0.30M	Model 16010	500M	Hybrid	HYB
				1.2	012	1.6	1.6L/H	0.4	0.40M	Model 16012	400M	Other	XXX
						2.3	2.3L/H	0.5	0.50M	Model 20010	300M	*Other features available upon request. Consult your local Netafim™ distributor.	
						3.5	3.5L/H	0.6	0.60M	Model 20012	300M		
								0.7	0.70M	Coil length (m) w/hybrid Model 16010300M Model 16012300M Model 20010200M Model 20012200M			
UGRAY CNL 16010 0.7L/H 0.30M 300M HYB													

Catalog description example

Drippers flow rate vs working pressure

To determine the actual flow rate of a dripper under different operating pressures, the following equation is applied:

$$Q = K \times P^X$$

Where:

Q = Dripper flow rate (liters per hour)

K = Dripper-specific flow constant (manufacturer-defined)

P = Actual working pressure (meters of water column)

X = Dripper-specific exponent (manufacturer-defined)

In accordance with ISO 9261, manufacturers must declare both the K constant and the X exponent for each dripper model.

In all Netafim™ pressure-compensated drippers, including UniRam™ (featured in this document), the dripper exponent X is equal to 0 within the specified pressure-compensation range for each model. This ensures that the actual dripper flow rate remains constant within $\pm 7\%$, in full compliance with ISO 9261 international standards.

Each pressure-compensated dripper model operates within a defined compensation range, with clearly specified minimum and maximum pressure limits. Below the minimum compensation pressure, the dripper behaves as a non-pressure-compensated emitter and its flow rate increases proportionally with pressure until the minimum operating threshold is reached.

Above the maximum compensation pressure, Netafim™ pressure-compensated drippers will continue to regulate flow; however, they become more susceptible to clogging. In most cases, the maximum operating pressure is determined by the physical limitations of the dripline, such as diameter, wall thickness and most importantly, the structural integrity of the pipe and its associated connections.

UniGray™ CNL flow (l/h) vs pressure (bar)

Dripper	Flow rate* (l/h)	Working pressure (bar)						
		1.00	1.50	2.00	2.50	3.00	3.50	4.00
UniGray™ CNL	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50

* Within working pressure range

In CNL drippers, the flow rate remains zero until the pressure exceeds the minimum working pressure.

As the pressure within the dripline decreases below the minimum working pressure, the flow rate gradually decreases until it reaches the shut-off pressure. When the pressure falls below the shut-off pressure, the flow rate returns to zero.

Maximum driplines length

To determine the maximum feasible run length for a given dripline, considering all hydraulic factors that influence flow within the dripline, Netafim™ uses proprietary design software based on the Darcy-Weisbach equations, supported by decades of engineering expertise and long-standing collaboration with leading academic institutions.

The precise maximum run length for any installation must be calculated using this dedicated design software, which evaluates all relevant hydraulic parameters across the system.

Minor differences may occur between design tools available on the market, due to variations in calculation methodologies and underlying design assumptions.

To calculate the maximum feasible dripline length, taking into account the required variables, such as flow rate and emitter spacing, pipe inner diameter, field slope, inlet pressure and other parameters, Netafim™ HydroCalc design software can be used.



The following tables present the maximum dripline lengths that can be used in driplines to achieve optimal performance.

The values provided here are intended to offer a preliminary reference. The actual maximum dripline length must be calculated by a hydraulic engineer responsible for designing the complete system, in order to account for additional constraints and site-specific limitations.

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

UniGray™ CNL 16009/16010/16012 • ID 14.2 mm • Kd 1.30 • Flow rate 0.70 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 design pressure: 1.0 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

Due to considerations related to dripline filling time and flushing effectiveness, it is not recommended to exceed a dripline length of 800 meters.

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

UniGray™ CNL 16009/16010/16012 • ID 14.2 mm • Kd 1.30 • Flow rate 1.00 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%	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 design pressure: 1.0 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

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

UniGray™ CNL 16009/16010/16012 • ID 14.2 mm • Kd 1.30 • Flow rate 1.60 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 design pressure: 1.0 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

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

UniGray™ CNL 16009/16010/16012 • ID 14.2 mm • Kd 1.30 • Flow rate 2.30 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	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

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	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

Minimum design pressure: 1.0 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

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

UniGray™ CNL 16009/16010/16012 • ID 14.2 mm • Kd 1.30 • Flow rate 3.50 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 design pressure: 1.0 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

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

UniGray™ CNL 20010/20012 • ID 17.5 mm • Kd 0.40 • Flow rate 0.70 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	820	922	1024
	2.0	245	359	471	581	689	796	902	1008	1114
	2.5	273	397	517	634	748	860	970	1080	1189
	3.0	296	429	556	678	797	914	1029	1142	1254
	3.5	316	456	589	717	841	962	1081	1198	1313
	4.0	334	480	619	752	880	1005	1128	1248	1366

Minimum design pressure: 1.0 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

Due to considerations related to dripline filling time and flushing effectiveness, it is not recommended to exceed a dripline length of 800 meters.

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

UniGray™ CNL 20010/20012 • ID 17.5 mm • Kd 0.40 • Flow rate 1.00 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%	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 design pressure: 1.0 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

Due to considerations related to dripline filling time and flushing effectiveness, it is not recommended to exceed a dripline length of 800 meters.

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

UniGray™ CNL 20010/20012 • ID 17.5 mm • Kd 0.40 • Flow rate 1.60 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 design pressure: 1.0 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

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

UniGray™ CNL 20010/20012 • ID 17.5 mm • Kd 0.40 • Flow rate 2.30 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 design pressure: 1.0 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.

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

UniGray™ CNL 20010/20012 • ID 17.5 mm • Kd 0.40 • Flow rate 3.50 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 design pressure: 1.0 bar. Maximum working pressure: Determined by the dripline wall-thickness limitations.