

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.

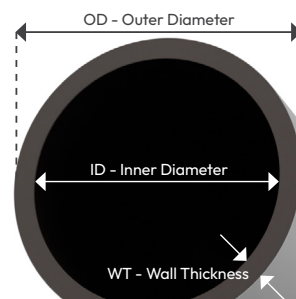


Driplines technical data

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.

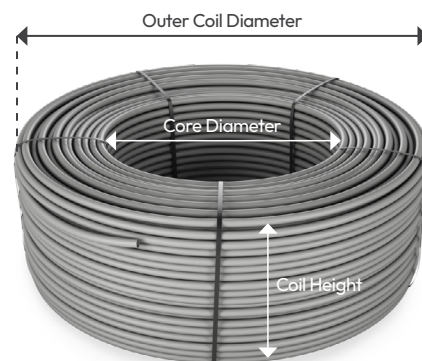
Max. flushing pressure: The maximum permissible flushing pressures shown in the table apply to continuous flushing cycles of up to 30 minutes, with the ends of at least five driplines opened for flushing.



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.