

SAELENS GmbH Drip Irrigation Systems

Pressure-Compensating Drip Tube ADI PC

DLG Test Report 5369



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Deutsche Landwirtschafts-
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DLG Testzentrum
Technik & Betriebsmittel

Short Description

Pressure-compensating drip irrigation system with emitters pressed into the interior of the drip tube.

Pressure is relieved in an inclined double labyrinth with a pressure-compensating membrane.

The emitters are pre-installed and evenly spaced.

(Technical data cf. page 4)



Evaluation – Short Version

Test Criterion	Test Result	Evaluation
Suitability	For use in drip irrigation systems on level fields (use on sloped fields with additional equipment)	
Water flow rate and evenness of water distribution		
In the pressure range up to 300 kPa	good	+
In the higher pressure range	very good	++
Pressure-compensating behaviour		
During pressure increase	good overall values	+
During pressure drop	very good in the pressure range from 100 to 400 kPa	++
Functional Reliability	Trouble-free	+
Emitter installation	Not necessary	
Cleaning	Easy, through rinsing effect	+ / ++
Safety of operation	Given	+
Durability	No deficiencies	+
Insensitivity to frost	Given	+
Handling	Easy, fully automatic control possible	+
Maintenance	Not necessary	+
Instructions of use and installation	Short and understandable	○

Range of evaluation: ++ / + / ○ / - / -- (○ = Standard)

Test Results

Suitability

The drip tube is suitable for use in drip irrigation systems on level fields. For the installation of the drip tube on sloped fields, special additional equipment is offered. However, this equipment guarantees even dripping on sloped fields only under certain conditions. This also applies to sagging drip tubes on level fields. In the interest of water distribution accuracy, drip tubes on sloped fields should therefore be installed on the ground. Since the emitters are integrated into the tube, they cannot get caught during winding and unwinding. Thus, the drip tube is also suitable for mobile use.

Water Flow Rate and Evenness of Water Distribution

At an operating pressure of 300 kPa, the average water flow rate of the tested emitter type was 2.17 l/h.

Table 1:

Water flow rate and coefficient of variation at different operating pressure (increasing pressure)

Operating pressure (kPa)	50	100	200	300	400	500	600
Flow rate (l/h)	1,97	2,28	2,22	2,21	2,25	2,37	2,42
VC (%)	7,0	4,6	4,9	3,7	2,0	1,6	1,6
Evaluation	○	+	+	+	++	++	++

Table 2:

Water flow rate and coefficient of variation at different operating pressure (falling pressure)

Operating pressure (kPa)	600	500	400	300	200	100	50
Flow rate (l/h)	2,41	2,30	2,13	2,12	2,13	2,13	1,97
VC (%)	1,6	2,7	2,3	4,7	4,7	4,4	7,2
Evaluation	++	+	++	+	+	+	○

Range of evaluation: ++ = < 2,5 + = < 5 ○ = < 10 -- = < 15 --- = > 15

At increasing pressure, the evenness of water distribution is „good“ in the pressure range up to 300 kPa and „very good“ in the higher pressure range.

At falling pressure, water distribution accuracy is „good“ in the pressure range from 300 kPa downwards. Above this value, it is „very good“.

The coefficients of variation at different operating pressure are shown in Table 1 and 2.

Pressure Compensation Behaviour

The emitters control the water flow rate during pressure increase well

Table 3:

Emitter exponent and pressure compensation behaviour (increasing pressure)

Pressure (kPa)	50	100	150	200	250	300	350	400	450	500
Water flow rate (l/h)	1,97	2,28	2,27	2,22	2,21	2,21	2,19	2,25	2,28	2,37
Emitter exponent/evaluation	0,14	-	-0,03	-0,03	+	0,01	+	++	0,07	○

Table 4:

Emitter exponent and pressure compensation behaviour (falling pressure)

Pressure (kPa)	500	450	400	350	300	250	200	150	100	50		
Water flow rate (l/h)	2,30	2,21	2,13	2,13	2,12	2,13	2,13	2,13	2,13	1,97		
Emitter exponent/evaluation	0,07	0,00	0,00	-0,01	-0,01	+	++	++	0,00	++	0,08	○

Range of evaluation: ++ = < 0,02 + = < 0,05 ○ = < 0,1 -- = < 0,2 --- = > 0,2

in the pressure range from 100 to 300 kPa and very well up to 400 kPa. During the pressure drop phase, the emitter exponents^{*)} determined according to ISO 9260 are rated very good in the pressure range from 100 to 400 kPa. In the lower and higher pressure ranges, they are satisfactory.

Water Quality

The emitters can be used for irrigation with well- and surface water. This requires sufficient filtration of the water. In the test, the 120 mesh filters required by the emitter manufacturer were used for both well- and river water. With these filters, emitter operation was trouble-free. Malfunctions due to clogging were not observed during practical use.

Even in a test under extreme conditions on the test stand, no malfunctions were recorded when dirty water with a defined dirt load was fed into the system. During this test, the flow rate fell to 98.0% after an operating time of one hour. After an interruption and a new start, the flow rate was 102.1% of the original value.

Water which contains extreme quantities of calcium, iron, and manganese can influence the function of the emitters in the long run. In this case, the recommendations of the manufacturer must be observed.

Installation of the Emitters in the Drip Tube

Not necessary. The emitters are installed by the manufacturer. Spacing is variable.

Cleaning

At a water pressure below 50 kPa, the emitter is fully opened, which results in a rinsing effect. Thus, the emitters are cleaned when the irrigation system is turned off and on. The drip tubes are rinsed by means of manual opening of the tube ends or automatically through rinsing valves.

Operational Reliability

If the water is sufficiently filtered, operational reliability is good. During practical use and during the test stand trials, no technical malfunctions occurred.

Durability

Durability is good. Even in extremely cold weather, no damage occurred over the course of the test.

Insensitivity to Frost

The drip tubes are insensitive to frost. Since they let the water out even at the slightest pressure differ-

ence, the drip tube is always emptied to a point where it cannot be endangered by frost.

Handling

- The handling of the drip irrigation system is easy.
- Fully automatic control is possible.
- The emitters are rinsed automatically when pressure drops.
- The drip tubes can be wound up.

Maintenance

The drip tubes do not require any maintenance.

Instructions of Operation and Installation.

The instructions of operation and installation provided are short and understandable.

^{*)} The emitter exponent describes the change in the outflow rate when pressure is doubled.

Description and Specifications (Measured Values)

Pressure-compensating drip irrigation system with emitters pressed into the interior of the drip tube. Pressure is relieved in an inclined double labyrinth with a pressure-compensating membrane. The emitters are evenly spaced.

Accessories

(not tested)

Drip tube seals are offered as accessories.

Main Measurements and Weights

Length	50 mm
Width	15 mm
Inner diameter of the tube	14.5 mm
Outer diameter of the tube	16 mm

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The test stand measurements were carried out according to the ISO 9260 and 9261 standards.

The tests included the measurement of the water flow rate as a function of water pressure as well as the determination of the variation coefficient of the water flow rate and the emitter coefficient along with other parameters.

In addition, functional reliability was examined after water with a defined dirt load (10 g/l of Ca bentonite) had been fed into the system.

Realization of the Tests

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Published

with the support of the Federal Ministry of Consumer Protection, Food, and Agriculture.



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September 2004

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