

5 Test liquid

5.1 Water, shall be clean and free from solids in suspension with the exception of what might be considered normal for tap water (e.g. lime causing hard water). If an adjuvant or other plant protection products are added, the product identity and properties shall be documented in the test report.

6 General test conditions

6.1 Environmental conditions

The air and testing liquid temperatures shall be not less than +10 °C and not more than +45 °C.

6.2 Suction pressure

The suction pressure, expressed in kilopascals (kPa), shall be measured at the suction fitting, as close as possible to the pump.

6.3 Delivery pressure

The delivery pressure, expressed in kilopascals (kPa), shall be measured at the delivery fitting, before the adjustment valve.

6.4 Rotating speed

The rotating speed shall be expressed in revolutions per minute (r/min).

6.5 Flow-rate

The flow-rate shall be expressed in litres per minute (l/min).

The flow-rate can be determined using a flow meter or alternatively, the liquid flow could be calculated by collecting the liquid in a separate tank, measuring time and mass.

6.6 Power consumption

The power consumption shall be indicated in kilowatts (kW) and can be calculated as the rotating speed multiplied by the load torque measured on the input shaft of the pump, using [Formula \(1\)](#):

$$P = \frac{\pi \times n \times C}{30\,000} \quad (1)$$

where

P is the power, in kilowatts (kW);

n is the rotating speed, in revolutions per minute (r/min);

C is the load torque, in newton metres (N·m), measured on the input shaft of the pump.

Other methods giving the same result can be used when the input shaft of the pump is not accessible.

7 Test methods

7.1 General

Before starting the tests, ensure visually that all connections work properly without leakage at the maximum pressure and without unintended air intake at the maximum depression in the suction line.

If present, set the pressure of the pneumatic pressure pulsation damper as indicated by the manufacturer.

Use the test liquid specified in [Clause 5](#).

7.2 Stand-alone pump

7.2.1 Test bench

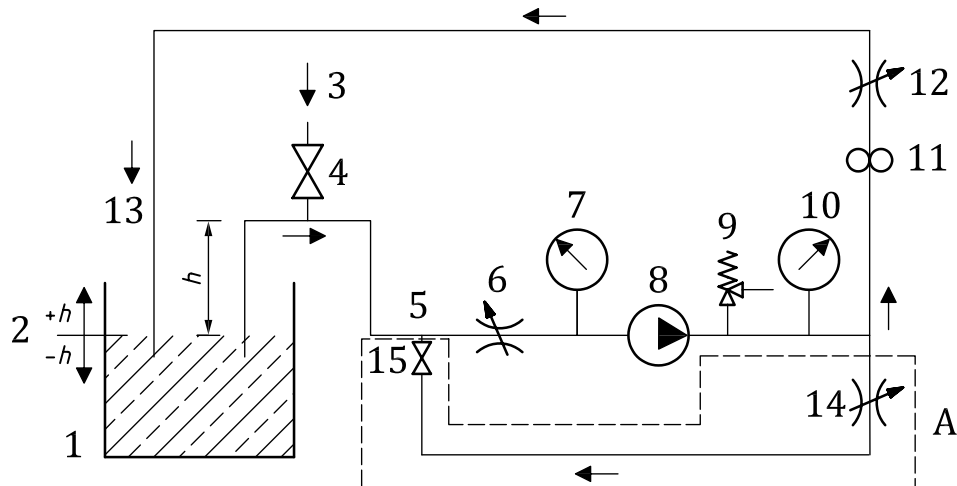
7.2.1.1 The test bench shall have a main circuit containing the devices for flow control and pressure adjustment; see [Figure 1](#) with the scheme of hydraulic circuit for self-priming pump or [Figure 2](#) with the scheme of hydraulic circuit for non-self-priming centrifugal pump. To simulate the installation of positive displacement pump on the sprayer, the test bench shall have an extra circuit (key A in [Figure 1](#)) with part of the flow coming back directly to the suction line of the pump.

7.2.1.2 The suction line connects the pump with the tank. It shall be fitted with an air inlet valve (key 4 in [Figure 1](#) or [Figure 2](#)), a suction pressure adjustment valve (key 6 in [Figure 1](#) or key 5 in [Figure 2](#)) and a suction pressure gauge (key 7 in [Figure 1](#) or key 6 in [Figure 2](#)). For self-priming pumps, the *h* value shall be (400 ± 100) mm ([Figure 1](#)). For non-self-priming pumps, the *h* value shall be (-400 ± 100) mm ([Figure 2](#)). The inlet of the suction line shall be free, without non-return valves.

7.2.1.3 The delivery line shall be fitted with a safety valve (key 9 in [Figure 1](#)) with appropriate range able to protect the test bench, a pressure gauge (key 10 in [Figure 1](#) or key 8 in [Figure 2](#)), a device for flow-rate measurement (key 11 in [Figure 1](#) or key 9 in [Figure 2](#)) and a pressure adjustment valve (key 12 in [Figure 1](#) or key 10 in [Figure 2](#)). The output of the delivery line shall be connected to the tank in order to guarantee the re-circulation of the test liquid (key 13 in [Figure 1](#) or key 11 in [Figure 2](#)). Ensure that the back flow does not create turbulence in the suction line.

7.2.1.4 The extra circuit (key A in [Figure 1](#)) shall be fitted with a re-circulation adjustment valve (key 14 in [Figure 1](#)) and a shut-off valve (key 15 in [Figure 1](#)) able to isolate this part of the circuit.

7.2.1.5 The level of the liquid in the tank (key 2 in [Figure 1](#) or [Figure 2](#)) shall be equal (± 10 mm) to the top of the pump housing at the beginning of the test. Set the level when all the lines are filled with the test liquid. During the measurement, the level of the liquid in the suction tank shall not change by more than ± 50 mm.



Key

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|---|---|
| 1 tank | 9 safety valve |
| 2 water level in the tank | 10 delivery pressure gauge |
| 3 air inlet | 11 flow-rate measurement |
| 4 air inlet valve | 12 delivery pressure adjustment valve / nozzle flow-rate adjustment valve |
| 5 re-circulation input | 13 back flow in the tank |
| 6 suction pressure adjustment valve | 14 re-circulation adjustment valve |
| 7 suction pressure gauge | 15 shut-off valve |
| 8 pump to be tested connected to rpm measuring device | |
| A extra circuit to simulate re-circulation for positive displacement pump | |
- $h(\pm)$ height between the water level in the tank and the air inlet valve (see keys 2 and 3)

NOTE When using centrifugal pump with air vent lines, ensure its proper connection to the hydraulic circuit of the test.

Figure 1 — Scheme of hydraulic circuit for self-priming pump