



# TEST REPORT

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**Report Number:** 2475-17001

**Report Issued:** September 29, 2017 **Project No.:** 28587

**Client:** Swiss Aqua Technologies SK s.r.o.,  
Obereggerstrasse 50,  
Berneck, Switzerland, CH-9442 **Contact:** František Pancurák

**Source of Samples:** The sample was supplied by the manufacturer, and the testing was witnessed by and IAPMO lab personnel, Robert Schut, at the manufacturer's laboratory.

**Date of Testing:** August 29, 2017 to September 14, 2017.

**Test location:** Šebastovska 2, 080 06 Prešov, Slovakia.

**Sample Description:** IPS Sirius water softener.  
Model No.: IPS Kalyxx.

**Scope of Testing:** The purpose of the testing is to determine if the tested sample of the water softener, IPS Kalyxx, reduces the limescale deposit on the surfaces of heating elements of water heaters per Test Protocol by Swiss Aqua Technologies SK s r.o.

**Conclusion:** See results

Tested by,

Robert Schut, Project Specialist

Reviewed by,

Sean Vuu, P.E., Manager, Specialty Projects

*All testing and sample preparation for this report was performed under the continuous, direct supervision of IAPMO R&T Lab, unless otherwise stated. The observations, test results and conclusions in this report apply only to the specific samples tested and are not indicative of the quality or performance of similar or identical products. Only the Client shown above is authorized to copy or distribute the report, and then only in its entirety. Any use of the IAPMO R&T Lab name for the sale or advertisement of the tested material, product or service must first be approved in writing by IAPMO R&T Lab.*

**Sample description:** The tested IPS Kalyxx device (Sirius) is made from a PEX-Al-PEX multilayer pipe with 12 electrodes of plated silver and 11 electrodes of Ti/Zn inside. The plates are shaped for obtaining a double turbulence in the water to improve the effect of the ionization.

**Test procedure (see Test Protocol from Swiss Aqua Tech, attached at the bottom of the report).**

Each tank of 50 liters capacity, filled with 45 liters of water, as follows:

- Line 1) Stainless steel heating element, without water softener (untreated)
- Line 2) Stainless steel heating element, with IPS Kalyxx device.
- Line 3) Copper heating element, without water softener (untreated).
- Line 4) Copper heating element, with IPS Kalyxx device.

Note: Lines 2 & 4 were connected to the same IPS Kalyxx device (by a Tee).

During a period of 11 days, 4 times per day (at 8 AM, 11 AM, 1 PM and 4 PM), a 30 liters of water each time was drained and refilled simultaneously. Except the 2 weekend days, only 3 water exchanges were done (at 8AM, 12PM and 4PM).

Before each water draw, the hot water temperature was measured and registered, average of 65.2°C (min: 65.0°C / max: 65.5°C). During each water refill, the cold water temperature was measured and registered, average of 17.2°C (min: 16.9°C / max: 17.7°C). On daily basis, the water hardness was verified and registered, average of 17.9° dH (min: 17.51° dH / max: 18.06° dH).

At the end of the 11-day test, the heating elements were left drying and then taken out from the tanks. The lime scale, which was attached to the heating elements, were mechanically scraped off and weighed.

**Finding:**

Line number	1	2	3	4
Weight of deposited limescale (g)	0.7133	0.1759	4.7843	1.1336

From these results, it's concluded that the IPS Kalyxx reduced 75.3% limescale deposit on stainless steel heating element, and 76.3% limescale deposit on copper heating element.



Line 1 at the end of test



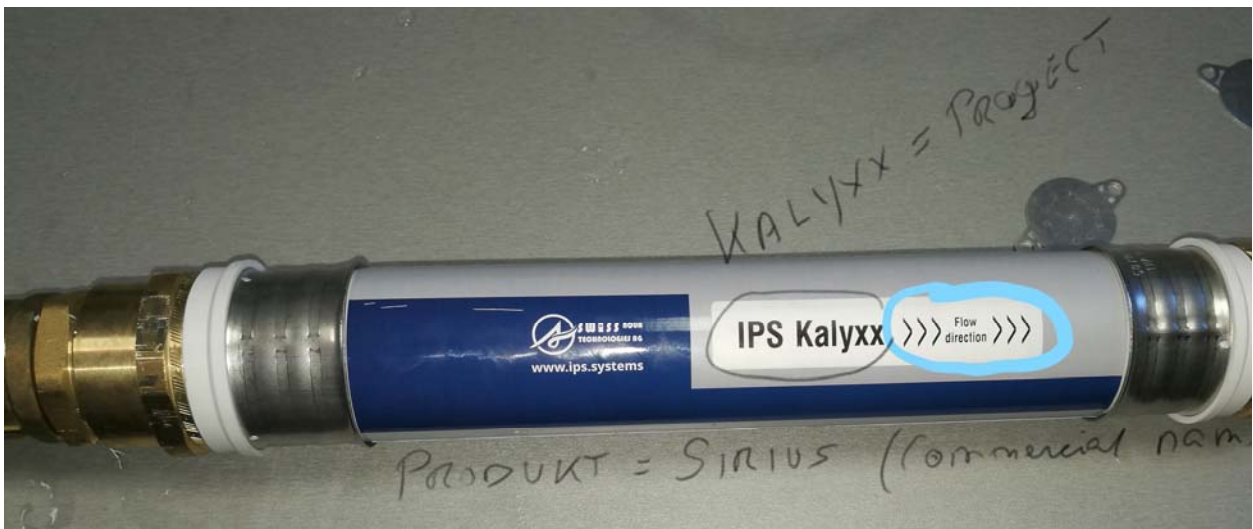
Line 2 at the end of test



Line 3 at the end of test



Line 4 at the end of test



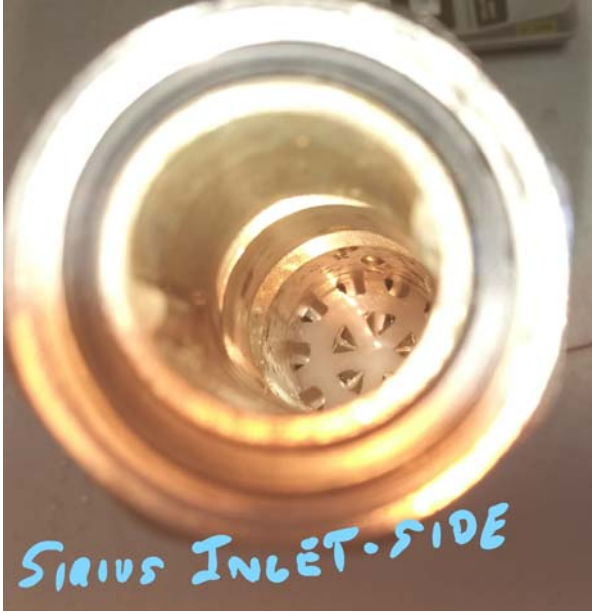
FRONT VIEW



BACK VIEW



TEST SET UP



Inlet with inside the 1<sup>st</sup> ionization plate with turbulence-creating shape

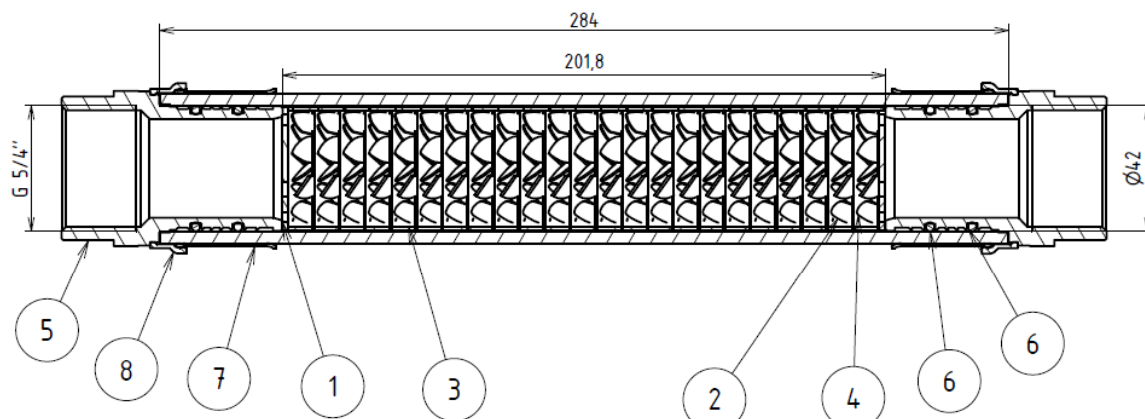


Outlet with inside the final ionization plate with turbulence-creating shape




<<- Water flow

A-A ( 1 : 2 )



9	Pipe 50x4			Všeobecné	0,16	Pipe 50x4 - L284	1
8	Sleeve Plastic			Polyamid	0	Sleeve plastic 50x4	2
7	Sleeve Inox 50x4			1.4301 (AISI 304)	0,04	Sleeve - inox 1	2
6	Seal 36x6			EPDM (guma)	0	36x3 (Sirius42)	4
5	Fitting 50x4 - G5-4 (1 1-4)			Mosadz CW602N	0,36	FK-50x4-G5-4	2
4	Vital Turbine D42 Ag			Střebro	0,01	Sirius-D42-Ag	12
3	Spacer ring D42			POM-C	0	DV-D42	23
2	Vital Turbine D42 TiZn			Titán	0	Sirius-D42-TiZn	11
1	Entrance shield D42			POM-C	0	VŠ-D42	2

Poz.	Názov	Polotovár	Norma	Materiál	Hmotnosť	Číslo výkresu	ks.
Materiál:		Výrobok:					
Polotovár:		Hmotnosť: 1,175 kg					
Norma:		Dátum: 14.09.2017	Formát:				
Vypracoval: Ing. Michal Špak		Podpis:					
Kontroloval:		Podpis:					
Schválil:		Podpis:		Poznámka:			
Názov výkresu:				Číslo výkresu:		Sirius42 G5-4	
						Listov/List: 1/1	

## **A procedure for assessing IPS technology for water treatment and scale reduction during the heating of drinking water - comparative method.**

### The explanation of the used concepts:

This working procedure describes the process of assessing IPS system installed for the purposes of prevention and permanent scale reduction in the water heating devices for drinking water.

In terms of this working procedure the term “drinking water heating” refers to the preparation of hot water with the quality of drinking water in a device with heating spiral. This working procedure does not include the heating of non-potable water.

In terms of this working procedure the term “scale build-up” refers to building up of calcareous sediments in a solid form on the surfaces of heat transfer (heating spirals), or directly in the hot water tanks.

### The parameters of the inlet of cold drinking water for heating

The temperature of cold drinking water is up to 22°C. The total hardness of the inlet cold drinking water is 2,5 mmol/l (14°dH) and its conductivity ranges from 50 to 2000 µS/cm. The total hardness of regular drinking water supplied by water companies in Slovakia ranges from 3 to 3,6 mmol/l (17 - 20 °dH).

The incoming water pressure in the heater is regulated between  $2,5 \pm 0,3$  bar (control valve).

### The equipment used

**The water heater with electrically powered heating spiral** - for all branches equal in size and performance (e. g. 700 W). The volume of the heated water tank is 50 litres. The volume of the heated water is 45 litres.

**The switch for heating spiral** with the thermometer for heated water with the possibility of setting and maintaining of the temperature of water.

**The numerical flowmeter** - the same in all branches; measures the total amount of the water flow.

**The pressure control valve with the pressure indicator** - the same for all branches ranging from 0 to 6 bars.

**IPS system** - a selected type for water treatment before heating

### Linking material

Plasticmetal (aluminium) tubes PE-RT, pressed grommet and pipefitting, pressure pipes for drinking water with pressed end

### The process of comparative method

The common inlet for cold drinking water is expanded on the number of pipes for the water heating devices.

One of the inlets is without any water treatment system (for purpose of comparing results) and the number of all the other pipes depends on the number of the IPS systems selected for testing. Usually, two types of IPS systems are tested simultaneously for which three pipes are necessary. This is to ensure that the water flowing through the pipes with and without IPS system is from one source prior to heating. Consequently, in precise time intervals, an amount of hot water is drained from all the tanks and the same amount of cold water is added to all the tanks. Daily, there is an amount of 120l exchanged in each tank with hot water.

The exchange times are as follows:

- week days - 8 a.m. = 30l, 11 a.m. = 30l, 1 p.m. = 30l, 4 p.m. = 30l
- weekends or bank holidays - 8 a.m. =30l, 12 p.m. =30l, 4 p.m. = 30l

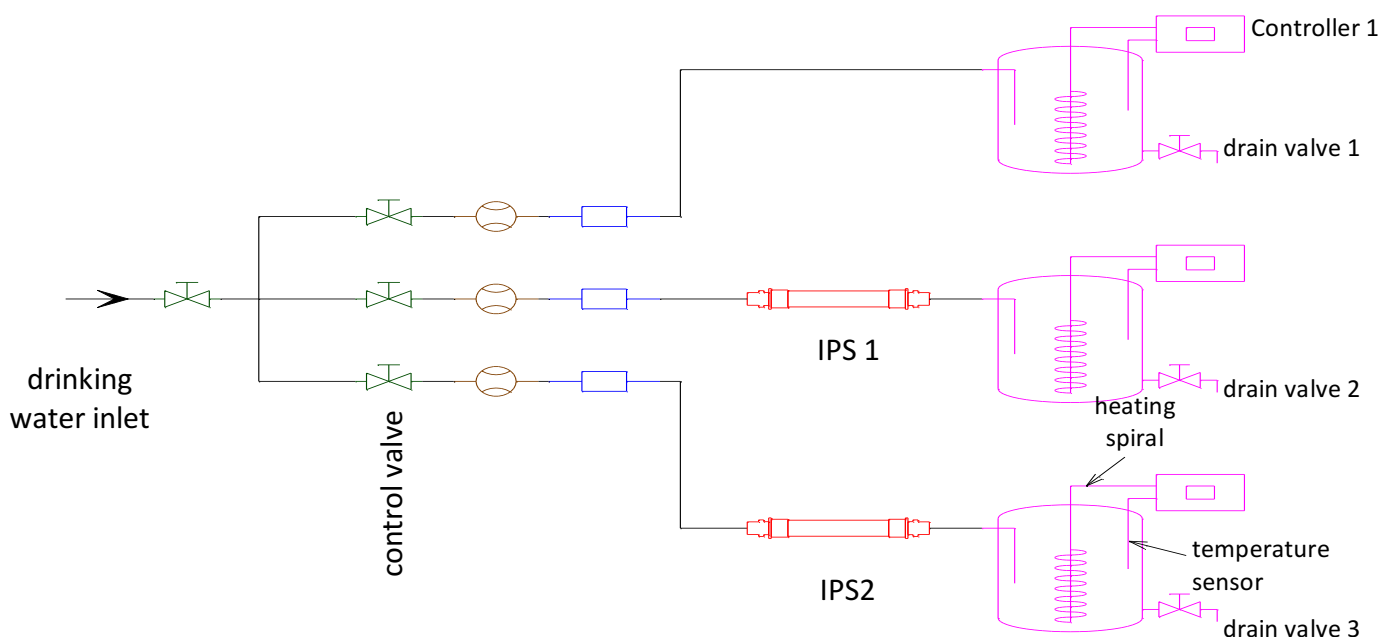
Continuous water heating up to 65°C lasts for 11 days.

### Connecting of IPS water treatment system without circulation:

IPS system is connected directly to cold water piping no further than 30 cm before a water heating device so the cold water is first treated by an IPS system before entering the water heating device.

### Connecting of the whole tested system without circulation:

The list of equipment - cold drinking water inlet, control valve, splitter (for 2 or more drain valves - depends on the number of IPS systems being teste), piping (1 without water treatment system, two or more with water treatment system), IPS system (one or more - depends on the number of systems being tested), water tank with heating spiral and a drain valve (one for the piping without water treatment system and one or more for the piping with water treatment system(s)), graduated measure container with the volume of 30l (the number depends on the number of tanks).





*Evaluation of the IPS system effectivity regarding scale build-up on heating spirals*

After 11 days of testing the heating spirals are turned off and taken out of the tanks. Scale is carefully separated from each spiral individually. The samples are evaluated and logged by the Accredited Testing Laboratory. The amount/weight of the scale from spiral with and without IPS system treatment is compared. The final ratio between the spirals with and without IPS system treatment determines the effectivity of IPS systems