



Document no.: 65-55/21TS

Date 19.4.2021

**SIST EN 15359:2012, Solid recovered fuels (SRF) - Specifications and classes**

**JP VODOVOD KANALIZACIJA SNAGA d.o.o., Vodovodna cesta 90, 1000 Ljubljana**

WWTP Ljubljana, Cesta v prod 100, 1000 Ljubljana

**SRF Class and origin**

Class code: **NCV 4; Cl 1; Hg 3**

Origin: **19 08 05**

**SRF Origin and preparation**

Ljubljana Central Wastewater Treatment Plant (WWTP Ljubljana) is designed for 360,000 PU. Depending on the cleaning technology used, it is a single-stage mechanical-biological treatment plant with a secondary treatment stage. It can treat up to 38 million m<sup>3</sup> of wastewater annually. The cleaning effect with respect to COD is about 90% and with respect to BOD<sub>5</sub> about 96%. Excess sludge is generated at the treatment plant in the process of biological treatment of municipal wastewater (19 08 05). This sludge is led to gravitational and mechanical pre-thickening and then to a decay site where anaerobic mesophilic stabilization is performed. Due to the implementation of the obligatory public utility service, septic sludge (20 03 04) and sludge from small municipal sewage treatment plants (19 08 05) and excess sludge from other municipal sewage treatment plants (19 08 05), which are managed by PC, are also accepted at the plant. PC Vodovod Kanalizacija Snaga d.o.o. The stabilized digested sludge is then dehydrated and dried/ pelletize. The final product is hygienic pellets with a dry matter content of at least 90%.

**Biomass content**

Biomass fraction: 49,3 %

**Composition**

Composition	Wood	Paper	Plastic	Rubber	Textile	Other
Dry basis <input type="checkbox"/>	/ %	/ %	/ %	/ %	/ %	/ %
As received <input checked="" type="checkbox"/>	Specification of Other: /					

**Physical parameters**

	Unit	Value		Test Method
		Typical	Limit	
Bulk density	kg/m <sup>3</sup> ar	683,2	/	SIST EN 12580:2001 (analiza 2014)
Content of volatile matter	% d	53,0	/	SIST-TS CEN/TS 15402:2011 (analiza 2016)
Ash melting behaviour	°C	1127 °C - 1131 °C	/	Laboratorijska metoda FKKT (analiz.2013)

**Physical parameters**

Oblika delcev: <b>Round</b>				
Velikost delcev: <b>&lt; 5 mm</b>		Preskusna metoda: Laboratorijska metoda NLZOH		
	Enota	Vrednost		Preskusna metoda
		Tipična	Mejna	
Ash content	% d	32,1	/	SIST-TS CEN/TS 15403:2007*
Moisture content	% ar	9,8	/	SIST-TS CEN/TS 15414-3:2007*
Net calorific value	MJ/kg ar	13,96	14	SIST EN 15400:2011
Net calorific value	MJ/kg d	15,35	/	SIST EN 15400:2011

**Chemical parameters**

	Unit	Value		Test method
		Typical	Limit	
Chlorine (Cl)	% d	0,09	0,1	SIST EN 15408:2011
Antimony (Sb)	mg/kg d	3	/	SIST-TS CEN/TS 15411:2007*
Arsenic (As)	mg/kg d	3,4	/	SIST-TS CEN/TS 15411:2007*
Cadmium (Cd)	mg/kg d	0,8	/	SIST-TS CEN/TS 15411:2007
Chromium (Cr)	mg/kg d	73	/	SIST-TS CEN/TS 15411:2007*
Cobalt (Co)	mg/kg d	8	/	SIST-TS CEN/TS 15411:2007*
Copper (Cu)	mg/kg d	350	/	SIST-TS CEN/TS 15411:2007*
Lead (Pb)	mg/kg d	56	/	SIST-TS CEN/TS 15411:2007*

**NACIONALNI LABORATORIJ ZA ZDRAVJE, OKOLJE IN HRANO**

Prvomajska ulica 1, 2000 Maribor

**CENTER ZA OKOLJE IN ZDRAVJE**

Oddelek za okolje in zdravje Novo mesto

Mej vrti 5, 8000 Novo mesto, T: (07) 39 34 100, F: (07) 39 34 101, E: [nmlcoz@rizohst.si](mailto:nmlcoz@rizohst.si)**Chemical parameters**

	Unit	Value		Test method
		Typical	Limit	
Manganese (Mn)	mg/kg d	250	/	SIST-TS CEN/TS 15411:2007*
Mercury (Hg)	mg/kg d	1,11	/	SIST EN ISO 12846:2012, mod. v točki 5
Nickel (Ni)	mg/kg d	64,0	/	SIST-TS CEN/TS 15411:2007*
Thallium (Tl)	mg/kg d	0,1	/	SIST-TS CEN/TS 15411:2007*
Vanadium (V)	mg/kg d	20	/	SIST-TS CEN/TS 15411:2007*
Σ Heavy metals*	mg/kg d	820	/	SIST-TS CEN/TS 15411:2007*
Sulphur (S)	% d	0,90	/	SIST EN 15408:2011
Mercury (Hg) - median	mg/MJ ar	0,07	/	SIST EN ISO 12846:2012, mod. v točki 5 in SIST EN 15400:2011
Mercury (Hg) - 80 percentile	mg/MJ ar	0,07	/	SIST EN ISO 12846:2012, mod. v točki 5 in SIST EN 15400:2011

**Hazardous properties**

Waste form company PC Vodovd Kanalizacija Snaga, d.o.o. is based on a review of technology, performed analyzes and research of hazardous properties in accordance with Regulation of Waste OJ RS 37/15, 69/15, 129/20 classified as non-hazardous waste with classification number 19 08 05.

**Evaluation according to Austrian legislation**

Median	Unit	Result	Limit value	Test method
Antimony (Sb)	mg/MJ	0,16	7	SIST-TS CEN/TS 15411:2007*
Arsenic (As)	mg/MJ	0,23	2	SIST-TS CEN/TS 15411:2007*
Lead (Pb)	mg/MJ	3,66	20	SIST-TS CEN/TS 15411:2007*
Cadmium (Cd)	mg/MJ	0,05	0,8	SIST-TS CEN/TS 15411:2007
Chromium (Cr)	mg/MJ	4,84	25	SIST-TS CEN/TS 15411:2007*
Cobalt (Co)	mg/MJ	0,49	1,5	SIST-TS CEN/TS 15411:2007*
Nickel (Ni)	mg/MJ	4,23	10	SIST-TS CEN/TS 15411:2007*
Živo srebro (Hg)	mg/MJ	0,07	0,15	SIST EN ISO 12846:2012, mod. v točki 5
80 percentile	Unit	Result	Limit value	Test method
Antimony (Sb)	mg/MJ	0,17	10	SIST-TS CEN/TS 15411:2007*
Arsenic (As)	mg/MJ	0,24	3	SIST-TS CEN/TS 15411:2007*
Lead (Pb)	mg/MJ	3,74	36	SIST-TS CEN/TS 15411:2007*
Cadmium (Cd)	mg/MJ	0,05	0,95	SIST-TS CEN/TS 15411:2007
Chromium (Cr)	mg/MJ	5,08	37	SIST-TS CEN/TS 15411:2007*
Cobalt (Co)	mg/MJ	0,52	2,7	SIST-TS CEN/TS 15411:2007*
Nickel (Ni)	mg/MJ	4,34	18	SIST-TS CEN/TS 15411:2007*
Živo srebro (Hg)	mg/MJ	0,07	0,25	SIST EN ISO 12846:2012, mod. v točki 5

Waste form company PC Vodovd Kanalizacija Snaga, d.o.o. meets the requirements of the Regulation (AVV), BGBl. II 2002/389 idF BGBl. II 2010/476, Annex 8.

**Legend:**

d = dry basis

ar = as received

\* = The heavy metals in the sum are Sb, As, Cr, Co, Cu, Pb, Mn, Ni and V and equals those in the Waste Incineration Directive (WID)

Head of task  
**Sebastijan Lamut**, MSc in ecol.biod.

Head of Environment and Health Department  
**Dušan Harlander**, MD, MSc Epidemiology