

## Wastewater treatment plants KUNST

### iK-1000 up to iK-5000 PE

Outlet parameters are in accord with legislation of Czech Republic (decree of the government nr. 61/2003 and 229/2007) for source of pollution from 500 PE to 2000 PE as well as from 2001 PE to 10 000 PE. Values are showed in following table.

source of pollution (PE)		500-2000	2001-10000	500-2000	2001-10000
Indicator	unit	value „p“		value „m“	
BOD <sub>5</sub>	mg/l	30,0	25,0	60,0	50,0
COD <sub>Cr</sub>	mg/l	125,0	120,0	180,0	170,0
Undissolved particles	mg/l	35,0	30,0	70,0	60,0
N-NH <sub>4</sub> <sup>+</sup>	mg/l	20,0	15,0	40,0	30,0
Phosphorous <sub>total</sub>	mg/l	-	3,0	-	8,0

Definition of values „p“ and „m“ is given by decree of the government nr. 229/2007. Values „m“ can not be exceeded. Values for phosphorous are set for WWTPs with phosphorous removal. For the rest WWTPs the limit is valid since 31.12.2010 in case, that it's done from qualified setting of emission limits by combined case.

#### KUNST COMPANY offer:

- waste water treatment plant design according to requirements and possibilities of customer
- all degree of project documentation
- authentically and high quality technology including assembly and put into operation
- operator training
- guarantee service
- working regulations
- another services according to customers requirements

**KUNST - YOURS PARTNER IN WATER MANAGEMENT**

## Wastewater treatment plants KUNST

### iK-1000 up to iK-5000 PE



Wastewater treatment plants (WWTP) iKUNST with aerobic stabilization of excess sludge consist of: inlet pumping station (as needed), preliminary clarification, vertical sand trap, activation with fine bubble aeration working in the denitrification-nitrification cycle, vertical final sedimentation tank, aerated sludge box and outlet flow measurement. System could be extended by: storm water basin, faecal tank and dewatering of excess sludge. Waste water treatment plant could be built as outdoor or roofed.

WWTP iKUNST are mainly used for small and medium village sewage water cleaning. Design of waste water treatment plants is based on pollutant equivalent and sewage water production. Dimensioning is made for separate sewer cover ballast water in amount 10 % of dry weather flow.

Innovation lies in process efficiency increasing and in simplification of the process layout by placing vertical final settling tank to activation tank. Differed types of developed separators could be selected according to properties of activated sludge.

Leakage of undissolved particles and creating floating sludge was cut down by the research. Recirculation of returned sludge is possible by optional centrifugal or air-lift pump. Device for phosphorus precipitation could be used in WWTP iKUNST for improved phosphorus removal to fulfil requirements given by the law.

For dimensioning of type series were used:

specific production of sewage water	$Q_{PE}$	=	150	l/PE, day
specific pollution production:	BOD <sub>5</sub>	=	60	g/PE, day
	COD	=	120	g/PE, day
	Undissolved particles	=	55	g/PE, day
	Nitrogen <sub>total</sub>	=	9	g/PE, day
	Phosphorus <sub>total</sub>	=	1,5	g/PE, day

For design and calculation CSN 756401 was used.

### WWTP iKUNST – BASIC DATA

- **WWTP iKUNST** has two technological lines enable easy inspections, and process load optimisation.
- Every **WWTP iKUNST** consist of: inlet pumping station (as needed), preliminary clarification on screen and in vertical sand trap, biological compact unit – activation – final settling tank – sludge treatment.
- Time controlled nitrification and denitrification in one activation tank with fine bubble aeration and mixing.
- Activated sludge separation in vertical final settling tank build into activation tank with innovative equipment (degasification of activated mixture, support of separation sludge layer creation, simplification of discharge trough, floating impurities removing, optional pumping of returned sludge).
- All distributions made from stainless steel or plastic.
- Excess sludge is stored in aerated sludge box.
- **WWTP iKUNST** could be designed as outdoor or roofed one.
- Innovative type series **WWTP iKUNST** are designed for capacity of: 1 000 PE, 1 500 PE, 2 300 PE, 3 000 PE, 4 000 PE, 5 000 PE with trademarks iK-1000, iK-1500, iK- 2300, iK-3000, iK-4000, iK-5000. The equipment of series dimension is available to make as requested.
- Stored thickened sludge (aerobic stabilized with concentration of 3 %) could be transported for agriculture use, optionally dewatered or utilized in a different way according to sludge composition and local chances.

### WWTP OPERATION

One professionally trained worker for four hours per day cover requirements of iK-1000 up to iK-3000. One professionally trained worker and one assistant cover requirements of iK-4000 and iK-5000. It is more convenient to secure maintenance, chemical monitoring of the process and machinery service and sludge treatment by contract.

### ENERGY DEMAND

Electricity consumption for sewage water cleaning varies (in dependence on amount and composition of sewage water) between 0.55 and 1.75 kWh/m<sup>3</sup>.

### AUTOMATION OF WWTP OPERATION

Controlling of WWTP iK-1000 to iK-5000 is based on time control of air source and stirrer device in activation tanks. Pumping of returned sludge is continuous, excess sludge pumping is fully automatic. WWTP iKUNST enable operating mode adjustment in dependence on real WWTP loading (e.g. blower and stirrer operating time modification, automatic switching-over of blower revolutions, blower alternations). Oxymeter for both oxygen measurement and controlling of blowers revolutions belong to operator facility. The operation of WWTP iKUNST is without service one only with operator supervision. It is possible to secure long distance data transfer as well as components for operator convenience.

### MAIN LOAD PARAMETERS OF iKUNST WWTP

WWTP Trademark Indicator	Unit	iK-1000	iK-1500	iK-2300	iK-3000	iK-4000	iK-5000
Pollutant equivalent*		1000	1500	2300	3000	4000	5000
Average inlet $Q_{24,m}$	m <sup>3</sup> /d	150	225	345	450	600	750
	m <sup>3</sup> /h	6,3	9,4	14,4	18,8	25,0	31,3
Ballast water $Q_B$	m <sup>3</sup> /d	15,0	22,5	34,5	45,0	60,0	75,0
Average daily inlet $Q_{24}$	m <sup>3</sup> /d	165,0	247,5	379,5	495,0	660,0	825,0
Maximal daily inlet $Q_d$	m <sup>3</sup> /d	240	338	518	675	900	1088
Maximal hourly inlet $Q_h$	m <sup>3</sup> /h	21,3	29,8	43,7	57,0	76,0	87,5
BOD <sub>5</sub>	kg/d	60,0	90,0	138,0	180,0	240,0	300,0
COD	kg/d	120,0	180,0	276,0	360,0	480,0	600,0
Undissolved particles	kg/d	55,0	82,5	126,5	165,0	220,0	275,0
Nitrogen <sub>total</sub>	kg/d	9,0	13,5	20,7	27,0	36,0	45,0
Phosphorus <sub>total</sub>	kg/d	1,5	2,3	3,5	4,5	6,0	7,5

\*) Note: Pollutant equivalent (PE) is defined by production of 60 g BOD<sub>5</sub> per day

### MAIN OUTLET PARAMETERS OF ALL iKUNST WWTPs

Indicator	Unit	Average	Maximum
BOD <sub>5</sub>	mg/l	10,0	20,0
COD	mg/l	60,0	90,0
Undissolved particles	mg/l	11,0	20,0
N-NH <sub>4</sub> <sup>+</sup>	mg/l	3,0	10,0
N-NO <sub>3</sub> <sup>-</sup>	mg/l	13,0	18,0
Nitrogen <sub>total</sub>	mg/l	19,0	25,0
Phosphorous <sub>total</sub>	mg/l	4,0	6,0