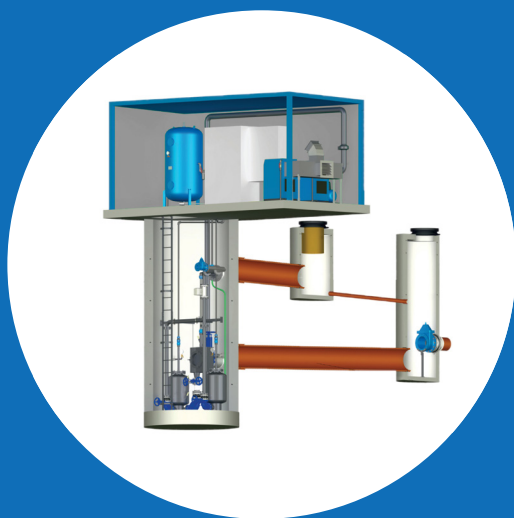
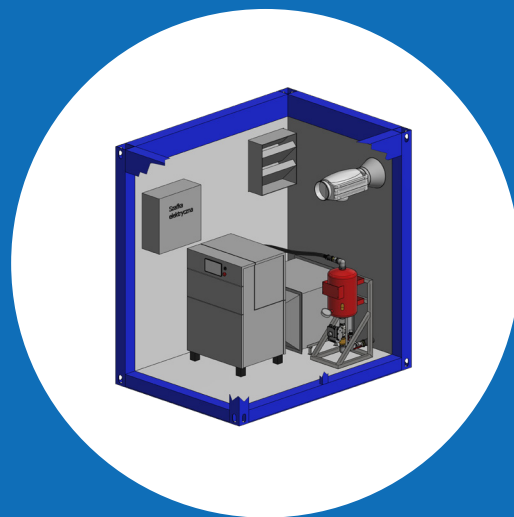




### BALL CHECK VALVES

Patents no.: US 8,146,618 B2, US 8,082,949 B2

### BTS FREE-EMISSION WASTEWATER TRANSPORT



### EPP PNEUMATIC LIFT STATION

Patents no.: US 8,347,912 B2, US 8,641,386 B2

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BTS FREE-EMISSION WASTEWATER TRANSPORT.....	12
EPP PNEUMATIC LIFT STATIONS.....	15

# BALL CHECK VALVES

## Technical data

- Range of available diameters: 1 1/4" – 12".
- Pressure rating: 230 PSI (all valves are tested to 145 PSI leak test / 230 PSI hydrostatic shell test).
- Temperature rating: max 104°F (temporarily to 140°F), pH range of 4-8.
- Threads comply with ANSI/ASME B1.20.1.
- Flanges comply with ANSI/ASME B16.1 Class 125.
- API 598 tests and requirements.
- Patents no.: US 8,146,618 B2, US 8,082,949 B2.



Type ESK 11



Type COMBI 11



Type ESL 11



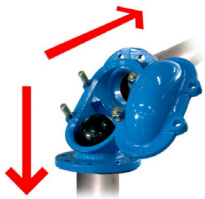
Type ESK 01



Type ESL 01

## Key features

**1. INNOVATIVE AND PATENTED PRODUCT** The valve is patented and can easily be specified. The valve is self-cleaning, but periodic checkups are recommended in order to inspect the condition of the ball surface.

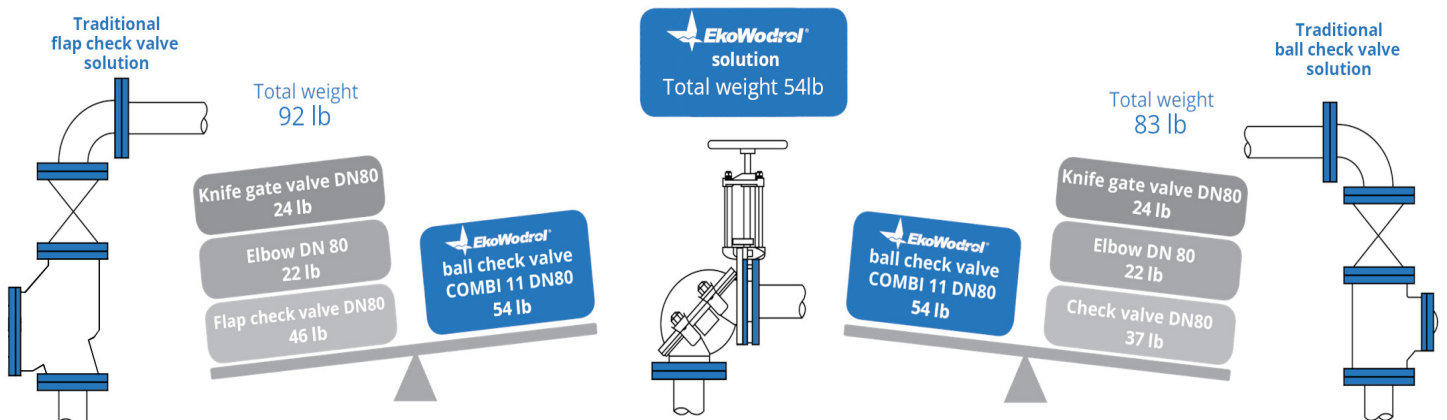


**2. QUICK ACCESS TO THE INTERIOR OF THE SYSTEM** The easy-access design allows for quick servicing without dismantling the whole valve. Customers perform the 3" valve service in an average of 5 minutes. Service of other valves lasts up to 4 times longer.

**3. PREVENT CLOGGING** Plastic cutlery, diapers, and more can often be found in sewage systems. These items can easily clog common valves. This valve's fully open starting position from the flow rate of 2.3fps eliminates this issue. We've proven the quality of our promise in the video linked here. Check it out!



**4. SPACE-SAVING, LIGHTWEIGHT CONSTRUCTION** With a choice of a **2-in-1** (elbow + check valve) or **3-in-1** (elbow + check valve + knife gate valve), this compact solution saves on cost. Minimum flange connections takes up less space in the lift station, which in turn reduces construction costs. (See diagram below.)



# BALL CHECK VALVES

## Additional options

Type of check valve	Characteristics	Application examples
Version with floating ball (F)	The valve in F version is equipped with a ball, so-called „floating“ ball, with a specific weight of approx 49.9 lb/ft <sup>3</sup> .	Backwater protection (valve is fully opened with the velocity of 0.66 fps).
Version with quasi ball (Q)	The valve in Q version is equipped with a quasi floating ball with a specific weight of approx 63.7 lb/ft <sup>3</sup> .	Lift stations, lift stations with separation of solids, pumps with inverter.
Version with drainage (D)	The valve in D version is equipped with drain plug for valve drainage.	Pumps, dry lift stations, gravity installations with anti reflux valves.

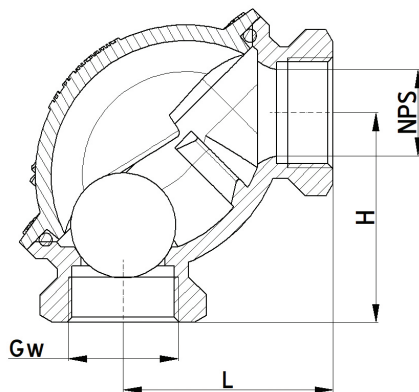
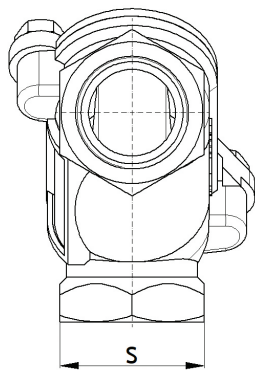
## Table of options

Type	DN	NPS	Cast Iron	Ductile Iron	Floating Ball (F)	Quasi Ball (Q)	Drainage (D)
Type ESK 01 - threaded							
ESK 01	32	1 1/4"	regular	n/a	option	n/a	n/a
ESK 01	40	1 1/2"	regular	n/a	option	n/a	n/a
ESK 01	50	2"	regular	n/a	option	n/a	n/a
Type ESK 11 - flanged							
ESK 11	50	2"	regular	n/a	option	n/a	n/a
ESK 11	80	3"	n/a	regular	option	option	n/a
ESK 11	100	4"	n/a	regular	option	option	n/a
ESK 11	150	6"	n/a	regular	option	option	option
ESK 11	200	8"	n/a	regular	option	option	option
ESK 11	250	10"	n/a	regular	option	n/a	option
ESK 11	300	12"	n/a	regular	option	n/a	option
Type COMBI 01 - threaded inlet, flanged outlet							
COMBI 01	50	2"	regular	n/a	option	n/a	n/a
Type COMBI 11 - flanged							
COMBI 11	50	2"	regular	n/a	option	n/a	n/a
COMBI 11	80	3"	n/a	regular	option	n/a	n/a
COMBI 11	100	4"	n/a	regular	option	option	option
Type COMBI 11 - flanged, oval version							
COMBI 11	50.0	2"	n/a	regular	option	n/a	n/a
Type ESL 01 - threaded							
ESL 01	32	1 1/4"	n/a	regular	n/a	n/a	n/a
ESL 01	40	1 1/2"	n/a	regular	n/a	n/a	n/a
ESL 01	50	2"	n/a	regular	option	n/a	n/a
Type ESL 11 - flanged							
ESL 11	50	2"	n/a	regular	regular	n/a	n/a
ESL 11	65	2 1/2"	n/a	regular	regular	n/a	n/a
ESL 11	80	3"	n/a	regular	regular	option	n/a
ESL 11	100	4"	n/a	regular	regular	option	n/a
ESL 11	125	5"	n/a	regular	regular	option	n/a

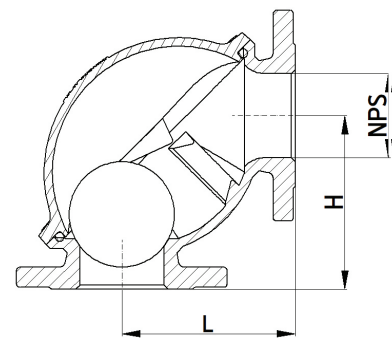
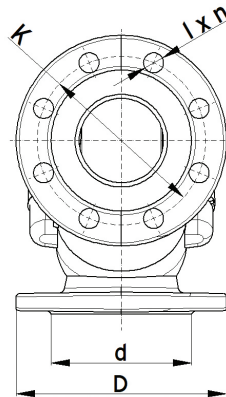
# BALL CHECK VALVES

## ESK ball check valves dimensions

ESK 01



ESK 11



Type	DN	NPS	L	H	D	K	l x n	s	Gw	FK	Weight
ESK 01	32	1 1/4"	3 1/8"	3 1/8"	—	—	—	2 3/16"	NPT 1 1/4"	1.4	4
ESK 01	40	1 1/2"	3 3/4"	3 3/4"	—	—	—	2 3/8"	NPT 1 1/2"	3.9	5.1
ESK 01	50	2"	3 3/4"	3 3/4"	—	—	—	3"	NPT 2"	2.4	9.3
ESK 11	50	2"	3 3/4"	3 3/4"	6 1/2"	4 3/4"	3/4" x 4	—	—	2.4	16.1
ESK 11	80	3"	6 1/2"	6 1/2"	7 1/2"	6"	3/4" x 4	—	—	1.7	33.3
ESK 11	100	4"	8"	8"	9"	7 1/2"	3/4" x 8	—	—	1.6	56.3
ESK 11	150	6"	11"	11"	11"	9 1/2"	7/8" x 8	—	—	1.6	109.8
ESK 11	200	8"	14"	14"	13 1/2"	11 3/4"	7/8" x 8	—	—	1.6	203.5
ESK 11	250	10"	17"	17"	16"	14 1/4"	1" x 12	—	—	1.5	329.4
ESK 11	300	12"	20 1/2"	20 1/2"	19"	17"	1" x 12	—	—	1.5	491.6

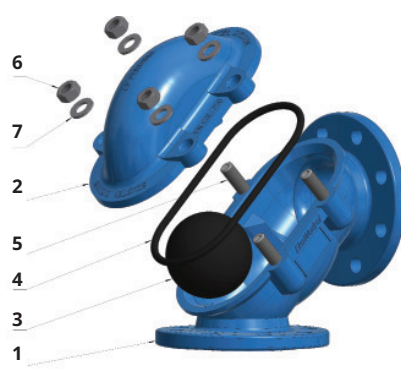
FK - factor K within the recommended range of flow velocity through the valve from 2,3 fps to 8,2 fps

## ESK ball check valves constructions

ESK 01



ESK 11



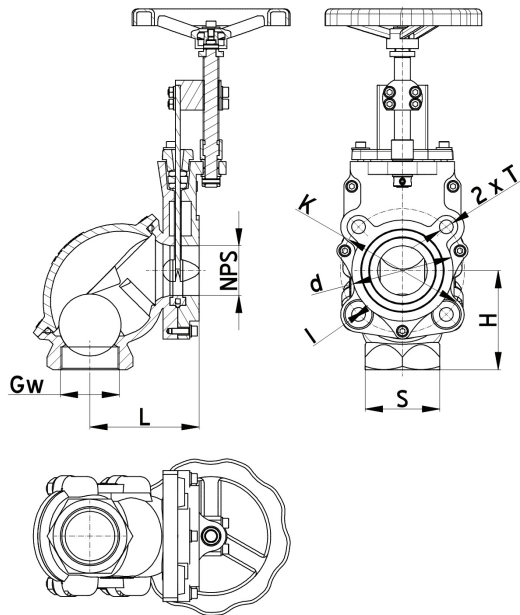
No.	Part	Material*
1	Body	Cast iron, ASTM A126 Class B (for sizes 1 1/4" - 2"); Ductile iron, ASTM A536 Grade 65-45-12 (for sizes 3"-12")
2	Cover	Cast iron, ASTM A126 Class B (for sizes 1 1/4" - 2"); Ductile iron, ASTM A536 Grade 65-45-12 (for sizes 3"-12")
3	Ball	Rubber NBR / EPDM
4	Gasket	Rubber NBR / EPDM
5	Screw cap	Stainless steel, ASTM A240 Grade 304
6	Nut	Stainless steel, ASTM A240 Grade 304
7	Washer	Stainless steel, ASTM A240 Grade 304

\*Types of materials may be subject to change.

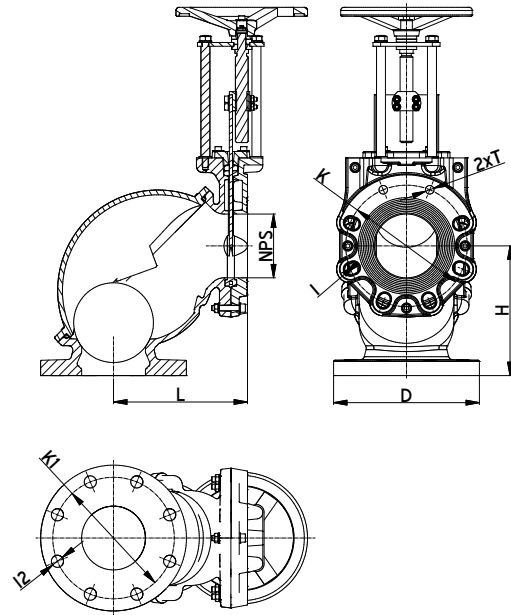
# BALL CHECK VALVES

## COMBI ball check valves dimensions

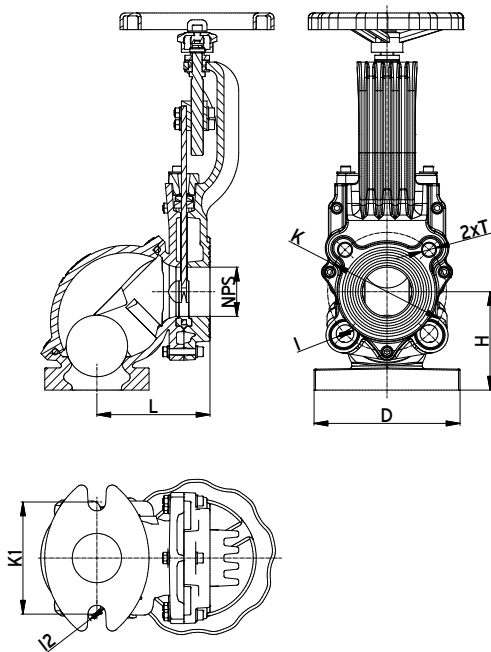
COMBI 01



COMBI 11



COMBI 11 oval



Type	DN	NPS	L	H	D	K	K1	I	2 x T	I2	Gw	FK	Weight
			[inch]										[lb]
COMBI 01	50	2"	4 1/2"	3 15/16"		4 3/4"		3/4" x 2	2 x 5/8-11 UNC		NPT 2"	2.6	19
COMBI 11	50	2"	4 1/2"	3 3/4"	6 1/2"	4 3/4"	4 3/4"	3/4" x 2	2 x 5/8-11 UNC	3/4" x 4		2.6	29
COMBI 11	50.0*	2"	4 1/2"	3 3/4"	5 7/8"	4 3/4"	4 1/2"	3/4" x 2	2 x 5/8-11 UNC	3/4" x 4			22.3
COMBI 11	80	3"	7 1/16"	6 1/2"	7 1/2"	6"	6"	3/4" x 2	2 x 5/8-11 UNC	3/4" x 4			54
COMBI 11	100	4"	8 1/4"	8"	9"	7 1/2"	7 1/2"	3/4" x 6	2 x 5/8-11 UNC	3/4" x 8			74.3

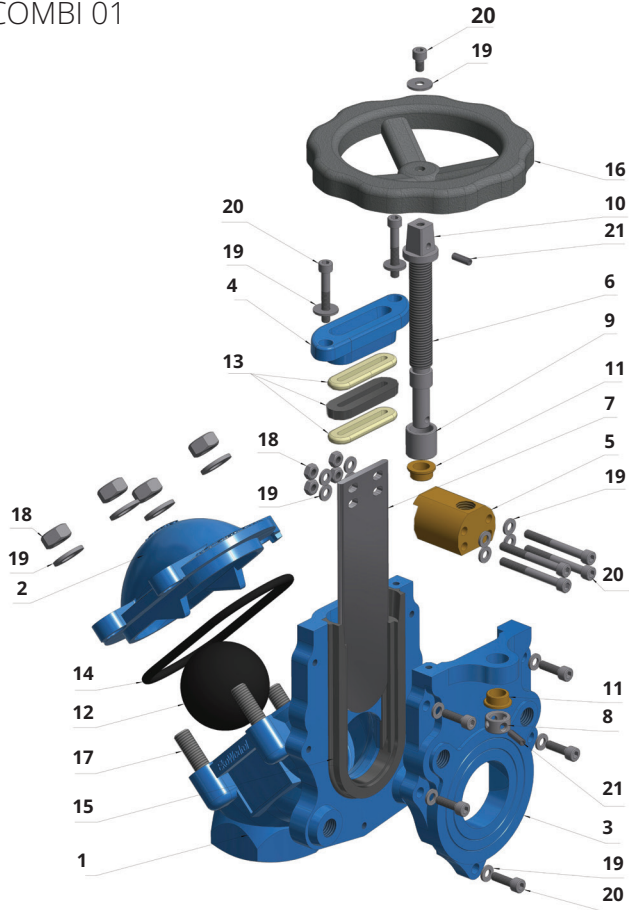
\*Oval version

FK - factor K within the recommended range of flow velocity through the valve from 2.3 fps to 8.2 fps

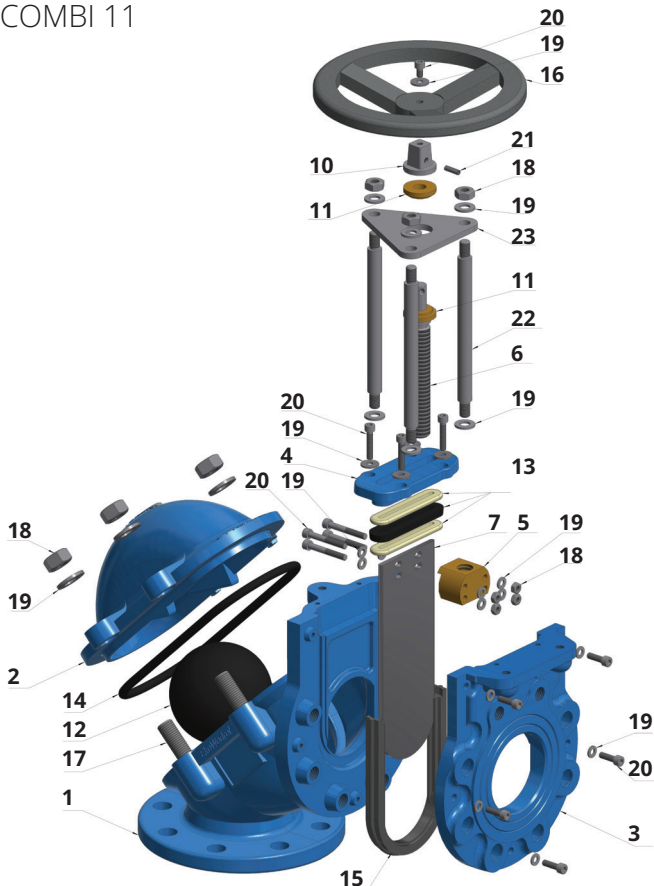
# BALL CHECK VALVES

## COMBI ball check valves construction

COMBI 01



COMBI 11



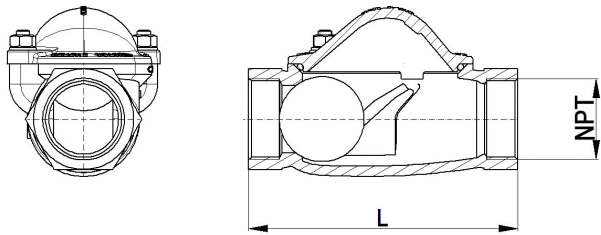
No.	Part	Material*
1	Body	Cast iron, ASTM A126 Class B (for size 2"); Ductile iron, ASTM A536 Grade 65-45-12 (for sizes from 2" - oval version to 4")
2	Cover	Cast iron, ASTM A126 Class B (for size 2"); Ductile iron, ASTM A536 Grade 65-45-12 (for sizes from 2" - oval version to 4")
3	Plate	Cast iron, ASTM A126 Class B; Ductile iron, ASTM A536 Grade 65-45-12 (for COMBI 11 2" - oval version, 3", 4")
4	Gland clamp	Cast iron, ASTM A126 Class B (for size 2"); Ductile iron, ASTM A536 Grade 65-45-12 (for sizes from 2" - oval version to 4")
5	Spindle nut	Brass, ASTM C38500
6	Spindle	Stainless steel, ASTM A240 Grade 304
7	Knife	Stainless steel, ASTM A240 Grade 304
8	Fastening sleeve	Stainless steel, ASTM A240 Grade 304
9	Spacer sleeve	Stainless steel, ASTM A240 Grade 304
10	Wheel fastening sleeve	Stainless steel, ASTM A240 Grade 304
11	Slide sleeve	Brass, ASTM C38500
12	Ball	Rubber NBR / EPDM
13	Gland: packing	Cord PTFE + rubber NBR / EPDM
14	Seal: O-ring	Rubber NBR / EPDM
15	Seal: U-type	Rubber NBR / EPDM
16	Wheel	Aluminium, ASTM B26-B108
17	Flat set screw	Stainless steel, ASTM A240 Grade 304
18	Screw cap	Stainless steel, ASTM A240 Grade 304
19	Washer	Stainless steel, ASTM A240 Grade 304
20	Bolt	Stainless steel, ASTM A240 Grade 304
21	Spring-type pin	Stainless steel, ASTM A240 Grade 304
22	Post	Stainless steel, ASTM A240 Grade 304
23	Bracket	Stainless steel, ASTM A240 Grade 304

\*Types of materials may be subject to change.

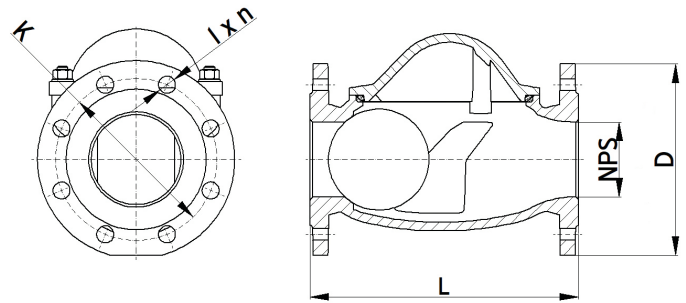
# BALL CHECK VALVES

## ESL ball check valves dimensions

ESL 01



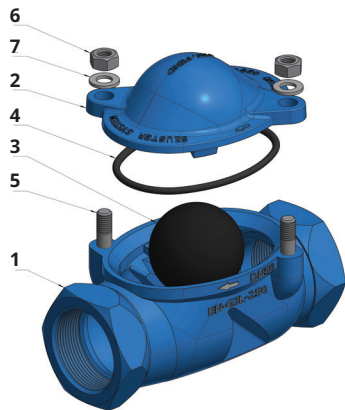
ESL 11



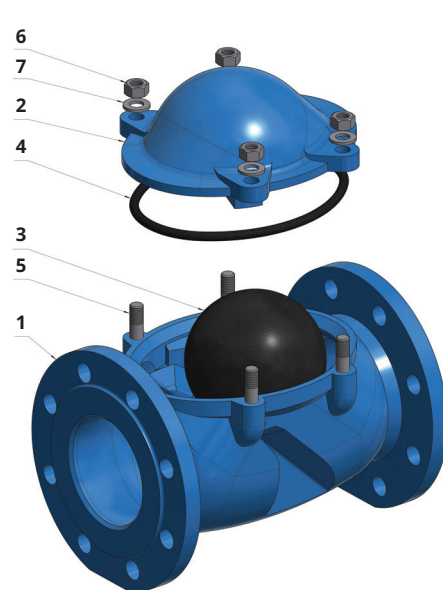
Type	DN	NPS	L	D	K	l x n	NPT	Weight
				[inch]				[lb]
ESL 01	50	-	7 7/8	-	-	-	NPT 2"	6,6
ESL 11	80	3"	9 1/2	7 1/2	6	3/4" x 4	-	23,2
ESL 11	100	4"	11 1/2	9	7 1/2	3/4" x 8	-	40,3

## ESL ball check valves constructions

ESL 01



ESL 11



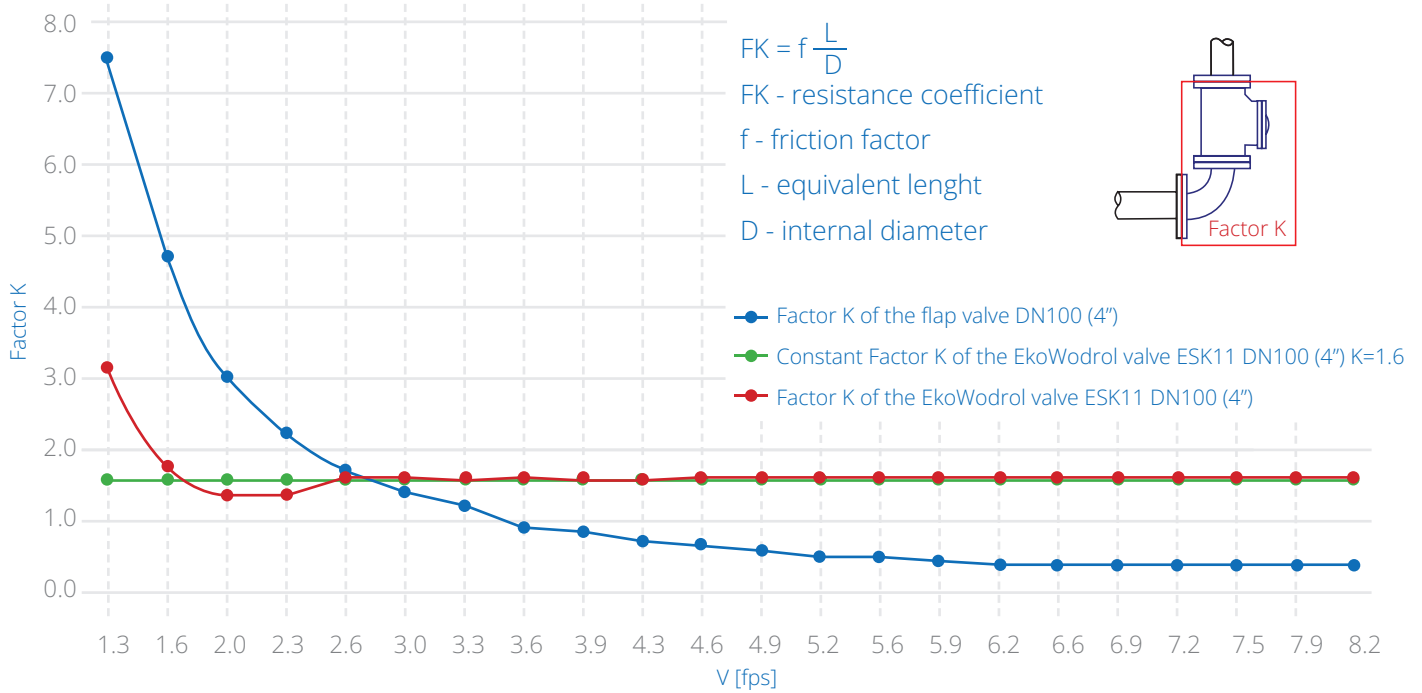
No.	Part	Material*
1	Body	Cast iron, ASTM A126 Class B (for sizes 1 1/4" - 2"); Ductile iron, ASTM A536 Grade 65-45-12 (for sizes 3"-12")
2	Cover	Cast iron, ASTM A126 Class B (for sizes 1 1/4" - 2"); Ductile iron, ASTM A536 Grade 65-45-12 (for sizes 3"-12")
3	Ball	Rubber NBR / EPDM
4	Gasket	Rubber NBR / EPDM
5	Screw cap	Stainless steel, ASTM A240 Grade 304
6	Nut	Stainless steel, ASTM A240 Grade 304
7	Washer	Stainless steel, ASTM A240 Grade 304

\*Types of materials may be subject to change.

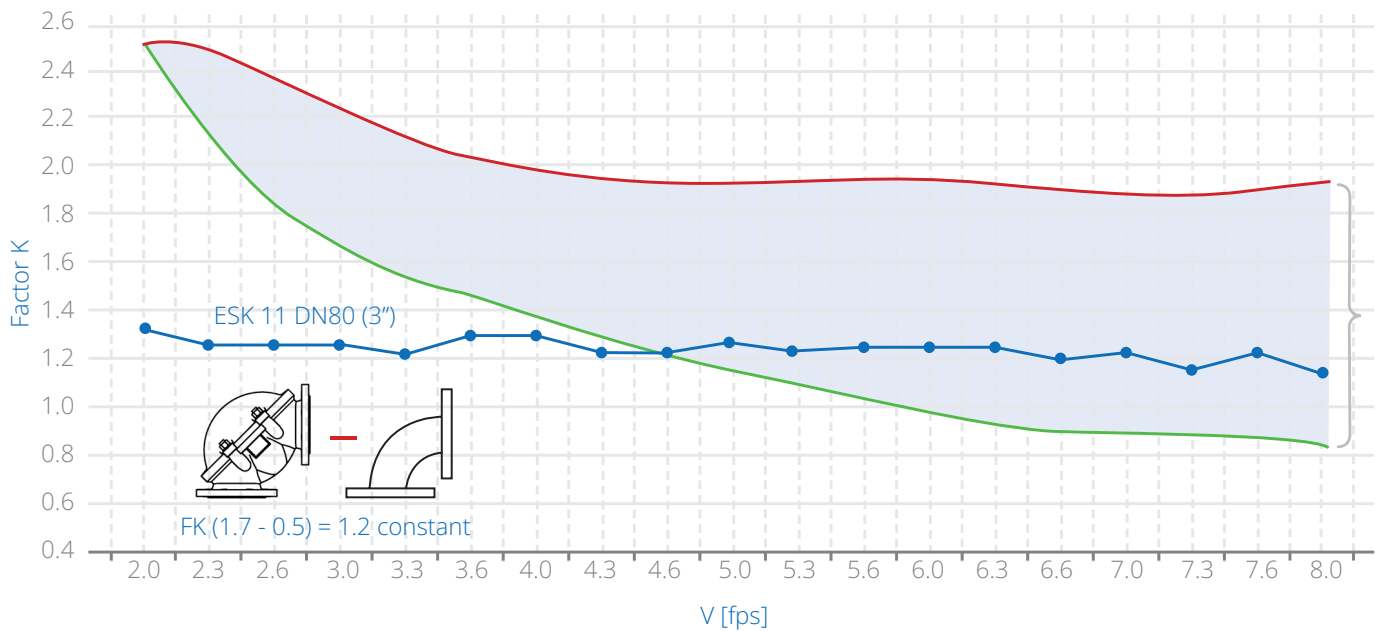
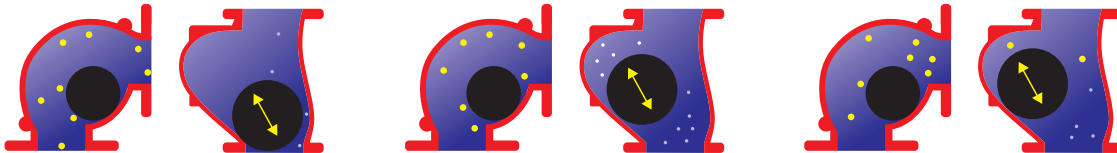


# BALL CHECK VALVES

## Factor K of the flap valve DN100 (4") with one elbow 90° and Factor K of the EkoWodrol ball check valve ESK



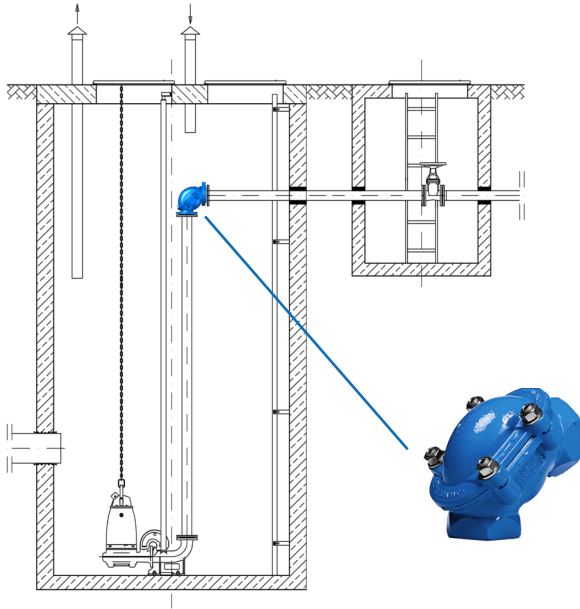
## Factor K of the EkoWodrol ball check valve ESK 11 DN80 (3") in comparison to other standard ball check valves



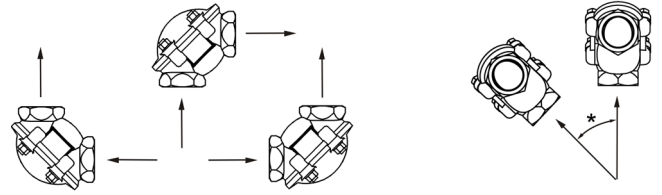
# BALL CHECK VALVES

## Examples of using EkoWodrol ball check valves type ESK, COMBI and ESL in a lift station

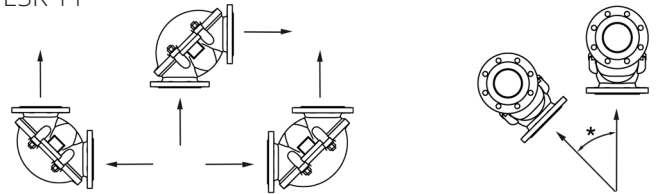
ESK (elbow check valve)



ESK 01

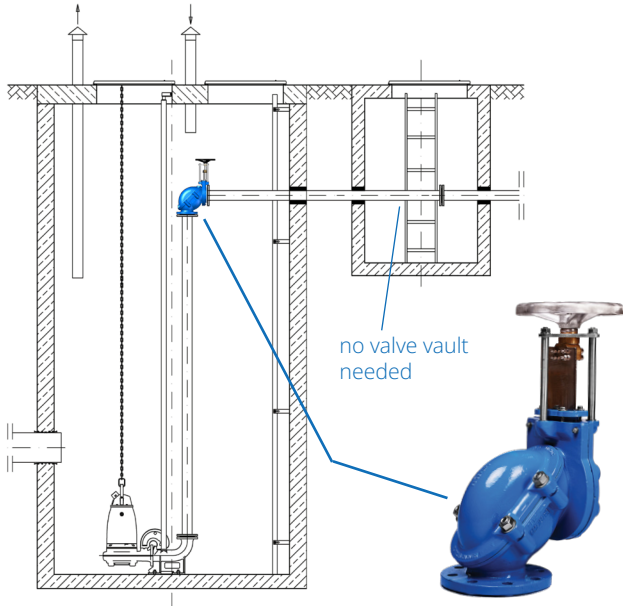


ESK 11

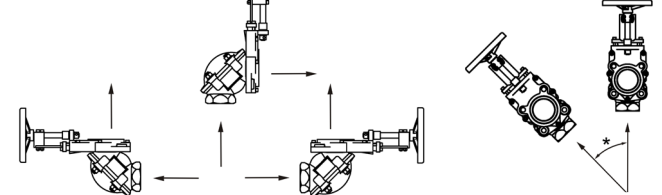


Multiple installation methods

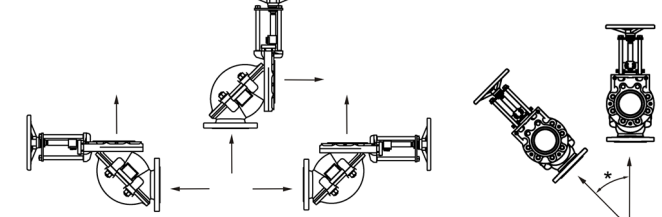
COMBI (elbow check valve + knife gate)



COMBI 01

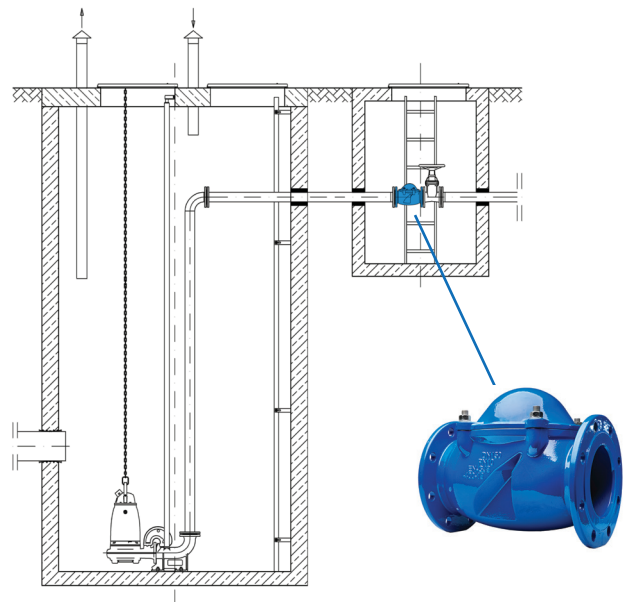


COMBI 11

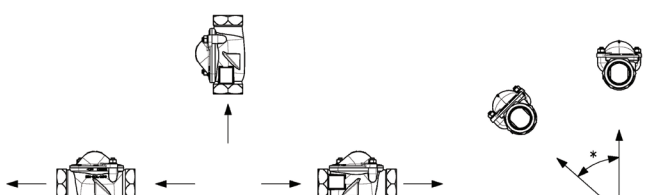


Multiple installation methods

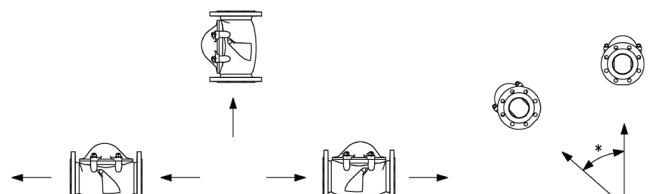
ESL (inline check valve)



ESL 01



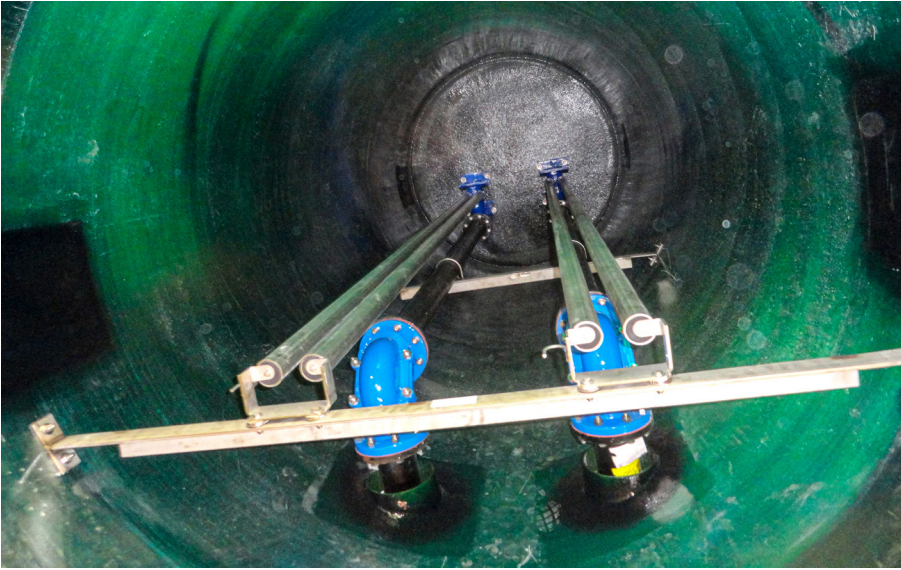
ESL 11



Multiple installation methods

# BALL CHECK VALVES

## Reference photos



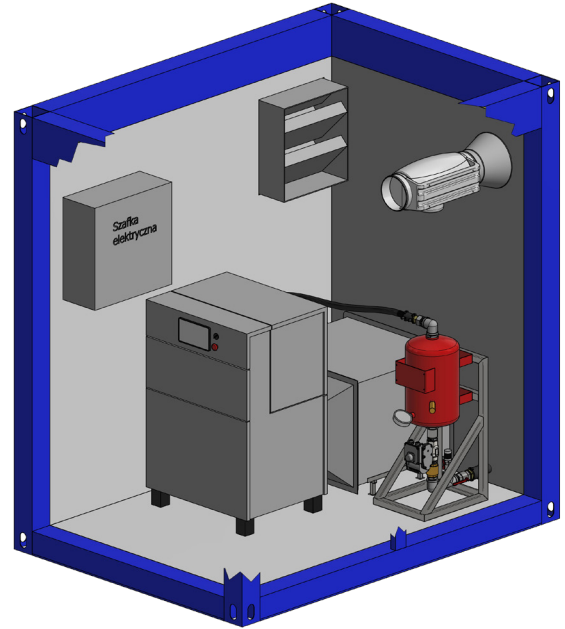
# BTS FREE-EMISSION WASTEWATER TRANSPORT

## What is Free-Emission Sewage Transport

BTS is an innovative device for blowing and aerating the discharge pipeline with compressed air as an ecological method for sewage without odors. The principle of operation is based on a dynamic and intelligent algorithm modeling the flow of air and wastewater in the discharge pipeline and maintaining the pump within the permissible operating range.

### Application

- Discharge pipes with prolonged time of keeping sewage within, causing its putrefaction
- Existing or planned sewage pumping stations, with pipelines of a diameter up to 8"
- Discharge systems with low flow velocities that become silted up



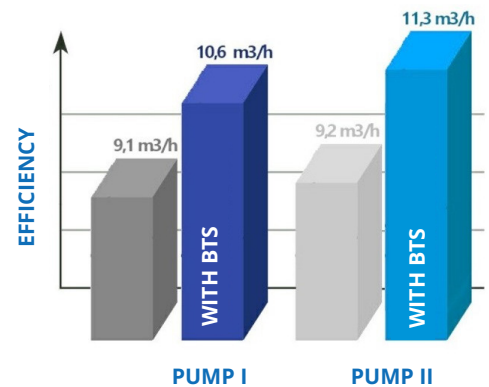
### Key features

#### 1. ODOR ELIMINATION

By injecting compressed air into the pipeline, the presence time of the sewage is shortened, and thus the rotting effect is limited. In addition, the BTS prevents re-rotting and odors creation due to the aeration effect of the wastewater.

#### 2. RESTORING ORIGINAL EFFICIENCY OF THE SYSTEM

As a result of intensive cleaning of the discharge line, the biological membrane that reduces the capacity of the pipeline is torn apart, thanks to which the system regains its original efficiency. Additionally, it prevents re-silting and fouling of the pipeline.



#### 3. ENERGY CONSUMPTION OPTIMIZATION

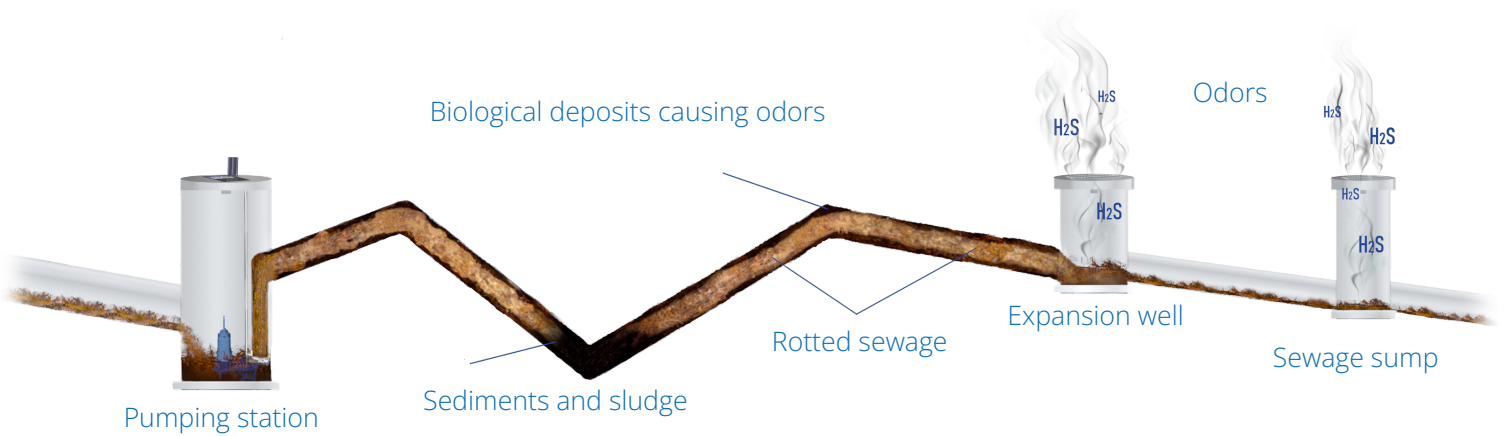
The innovative control algorithm keeps the pumps in their characteristics, optimizing energy consumption, and the regained original efficiency of the system additionally boosts their performance, improving energy-saving factor.



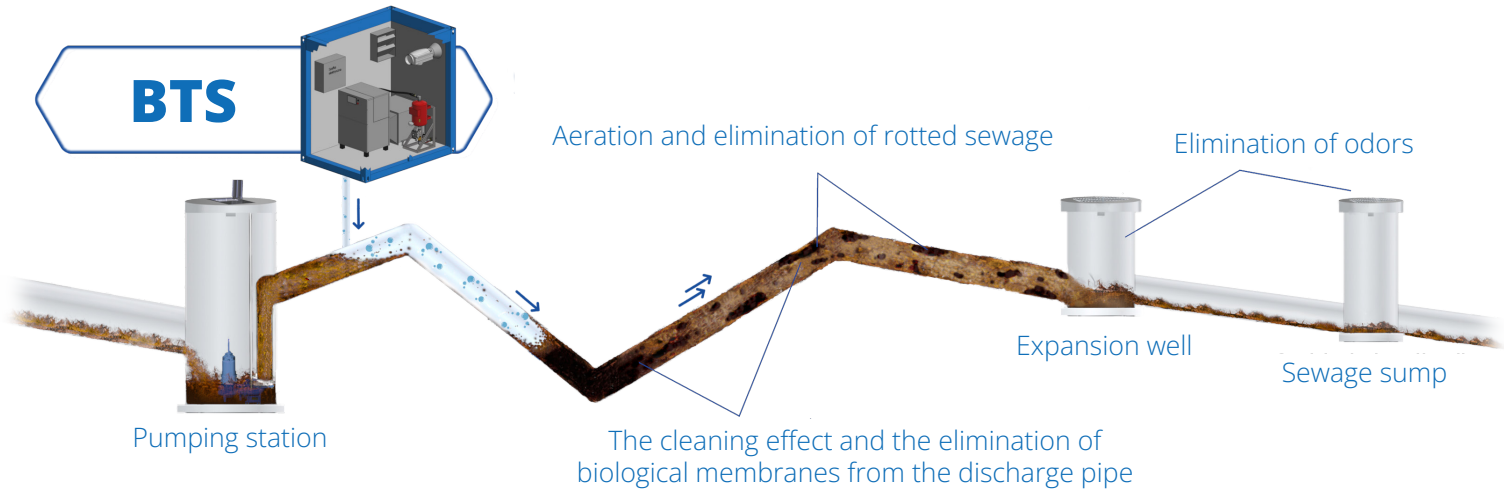
\*badania przepi \*research conducted in Giezkowo, Poland, 1kWh: 0.65 PLN

# BTS FREE-EMISSION WASTEWATER TRANSPORT

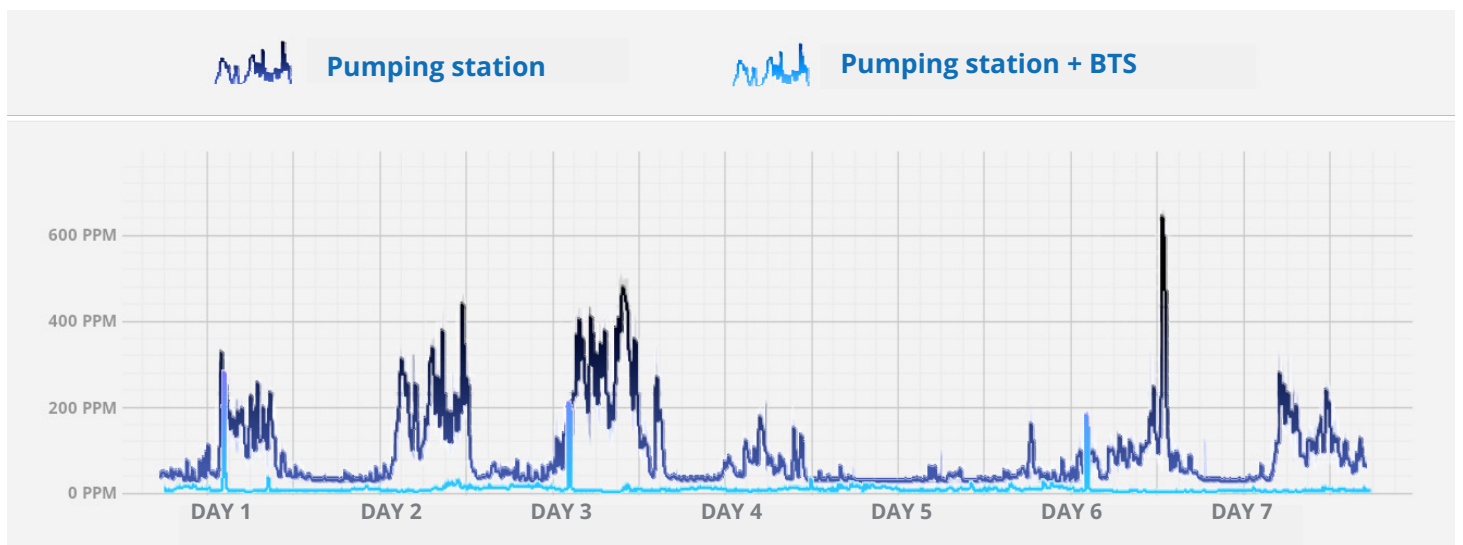
## The reasons for the formation of odors in the pressure sewage system



## Working principle of the BTS



## Distribution of hydrogen sulphide concentration in PPM for the weekly measurement period in the pressure pipeline expansion well in Załom before and after the application of the BTS system



# BTS FREE-EMISSION WASTEWATER

## Range of parameters

Type	Maximum system power	The minimum diameter of the compressed air line	Maximum pressure	Maximum dimensions of the BTS container
-	[kW]	[inch]	[psi]	[ft]
01	0,8	1 1/4	145.04	5.84 x 8.14 x 8.43
02	9,5	1 1/4	145.04	9.12 x 9.68 x 9.35
03	11,5	1 1/4	188.55	9.12 x 9.68 x 9.35
04	15,0	1 1/2	188.55	9.12 x 9.68 x 9.35
05	19,0	1 1/2	188.55	9.12 x 9.68 x 9.35
06	22,5	1 1/2	188.55	9.12 x 9.68 x 9.35
07	26,0	2	188.55	9.12 x 9.68 x 9.35
08	34,0	2	188.55	9.12 x 9.68 x 9.35
09	41,0	2 1/2	188.55	9.12 x 9.68 x 9.35
10	49,0	2 1/2	188.55	9.12 x 9.68 x 9.35

## Reference photos



# EPP PNEUMATIC LIFT STATIONS

## Technical data

- Lifting height up to 145 PSI.
- Full flow from 3" to 6".
- Patents no.: US 8,347,912 B2 , US 8,641,386 B2.

## Applications

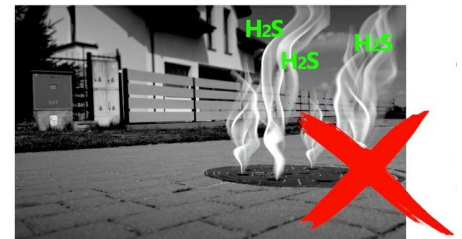
- Sewage pumping over very large distances and/or heights (pumping pressure up to 145 PSI).
- Municipal or industrial sewage.
- Main, zonal or local pumping station.
- Pumping sewage in sections threaten by putrescibility in the discharge pipe (periodic aeration and/or emptying of the pipeline from the wastewater function).



## Key features

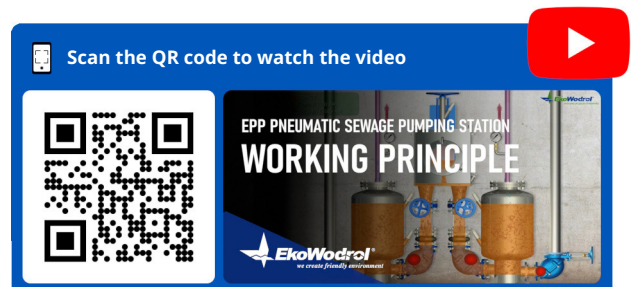
### 1. GET RID OF COMPLAINTS OF RESIDENTS

EPP refreshes the pumped wastewater, thus preventing it from rotting during transport. It allows the discharge pipeline to be periodically completely cleaned with compressed air, thus reducing the formation of unpleasant odors.



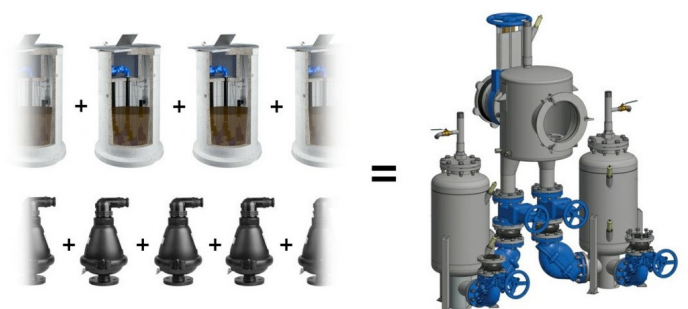
### 2. SAFE AND HYGIENIC OPERATION

By placing the technological part of the pumping station in a dry chamber, employees do not have direct contact with sewage, thus avoiding the dangers related to, for example, poisoning with hydrogen sulphide. See the principle of operation of the EPP on our YouTube channel.



### 3. REDUCTION OF INVESTMENT COSTS

The use of a pneumatic pumping station allows for pumping sewage over long distances and high altitudes, with building only one device instead of a cascade of several pumping stations. In addition, there is no need to use air valves, which allows for even greater savings.



# EPP PNEUMATIC LIFT STATIONS

## Operating principle of EPP pneumatic lift station

The EPP pneumatic lift station constitutes a complete and fully automated installation.

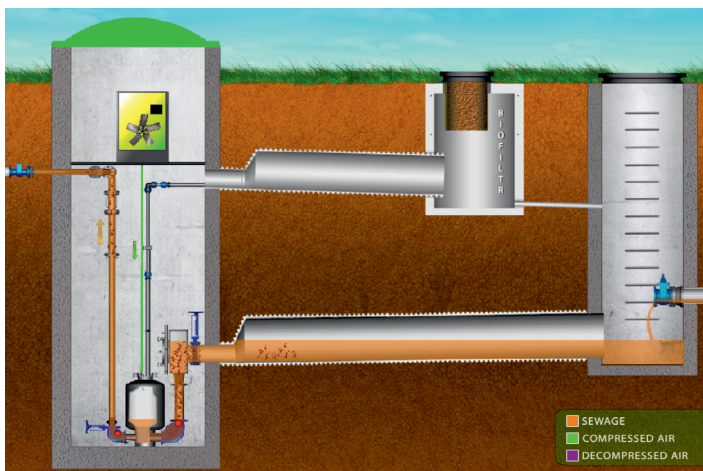
The operating principle of the EPP pneumatic lift station consists in a cyclical and alternate occurrence of two operating phases of the lift station: the filling phase and the pumping phase.

In the filling phase, sewage flows to the vertical external pipe retention chamber; from there, it flows through the inflow well to the working chambers through open inlet valves. The outlet valve is open so that air could be released from the working chambers, while all the other valves remain closed. Once the working chambers have been filled with sewage, waste continues to accumulate in the inflow well and in the pipe retention chamber. Once the adequate level of sewage has been reached in the pipe retention chamber, the sewage pumping phase is switched on, which continues until the switching off level has been reached.

The pumping phase starts with the outlet valves being closed. The inlet elbow valve is closed under the influence of control air supplied to the working chamber by opening of the control valve. Once the inlet valve is closed, the working air valve is open, through which compressed air is pumped,

as a result of which the elbow check valve is open that is located on the outlet from the working chambers, while sewage is forced out with compressed air from the working chamber and is forced into the pressure conduit. Pumping of sewage continues until the time set has elapsed or an adequate level in the working chamber has been reached. Then, the outlet valve is open and air that is inside the working chamber is decompressed in the suppressor, after which the biofilter is located. After the completion of the compression phase, the system enters the filling phase. These cycles are repeated, and air is alternately forced into the working chambers until the level of sewage in the retention chamber has reached the minimum.

One of the chief advantages of the EPP pneumatic lift station is the function of periodical (e.g. at night) entire emptying of the pressure pipeline from sewage using compressed air. In this manner, excessive putrefying of sewage in the pressure conduit is prevented, and odors that are hazardous to human life in the release wells are eliminated.



## Range of parameters

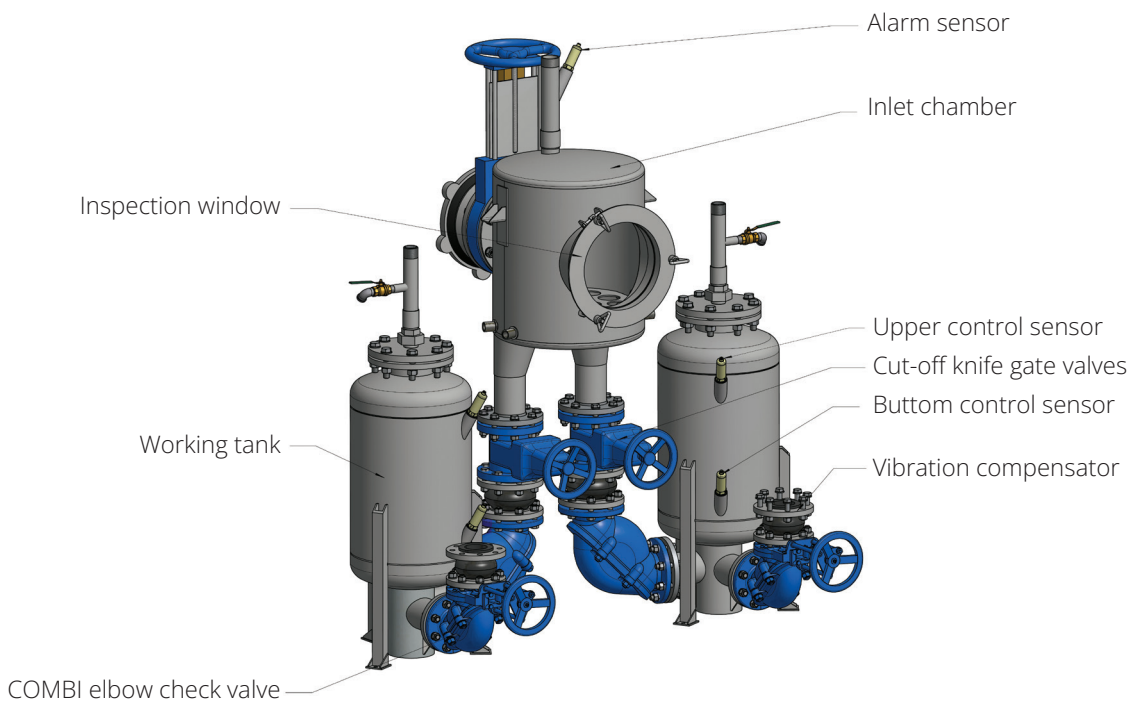
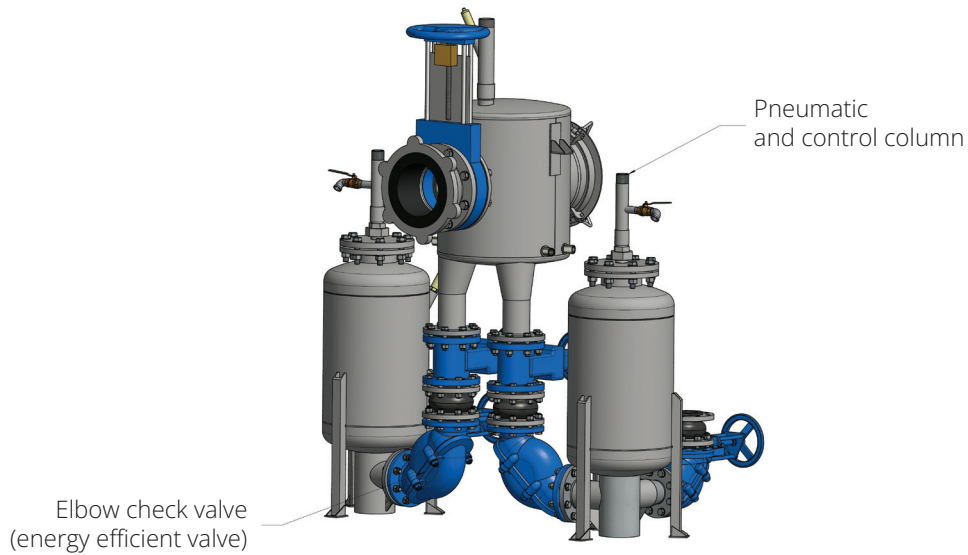
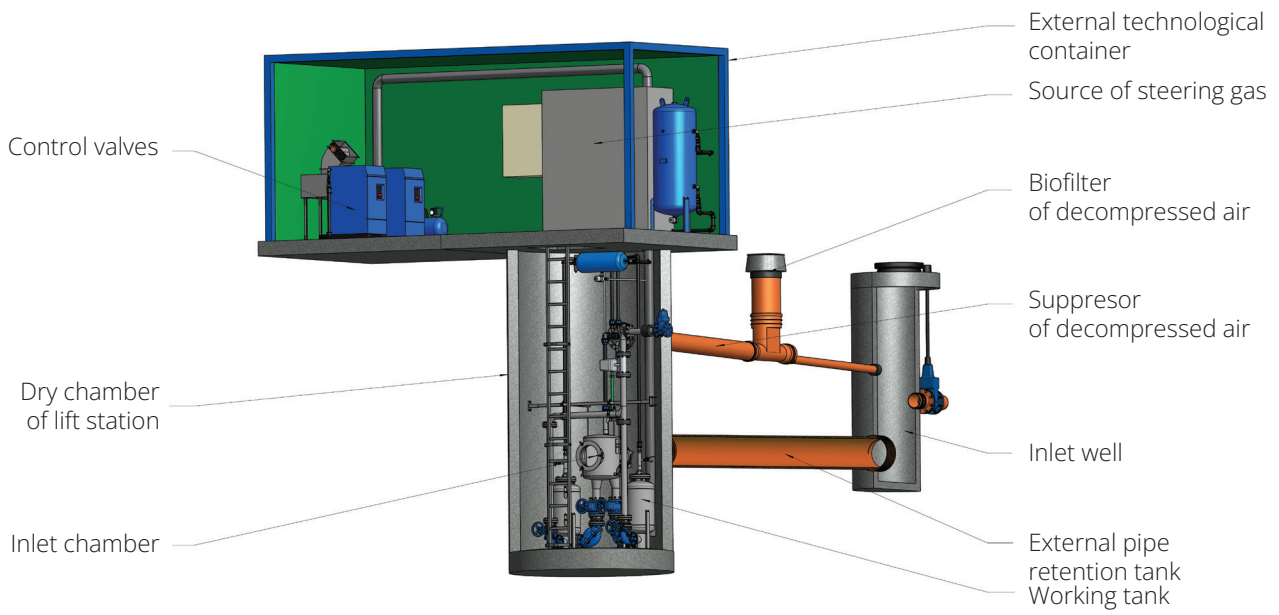
Type	Maximum inflow	Minimal diameter of pressing pipeline	Minimum number of compressors	Number of working tanks	Minimum retention capacity*
EPP	[gal/h]	[inch]	[psc.]	[psc.]	[gal]
01	2113	3 1/4"	1	1	92
02	4226	3 1/4"	1	2	92
03	7396	3 1/4"	1	2	92
04	10567	3 15/16"	1	2	145
05	18492	5"	2	2	112
06	26417	6"	2	2	162
07	36984	6"	2	2	162
08	52834	7 7/8"	2	2	291

\*Minimum retention capacity may be decreased when the inflow is less than maximum or/and the number of compressors will be reduced



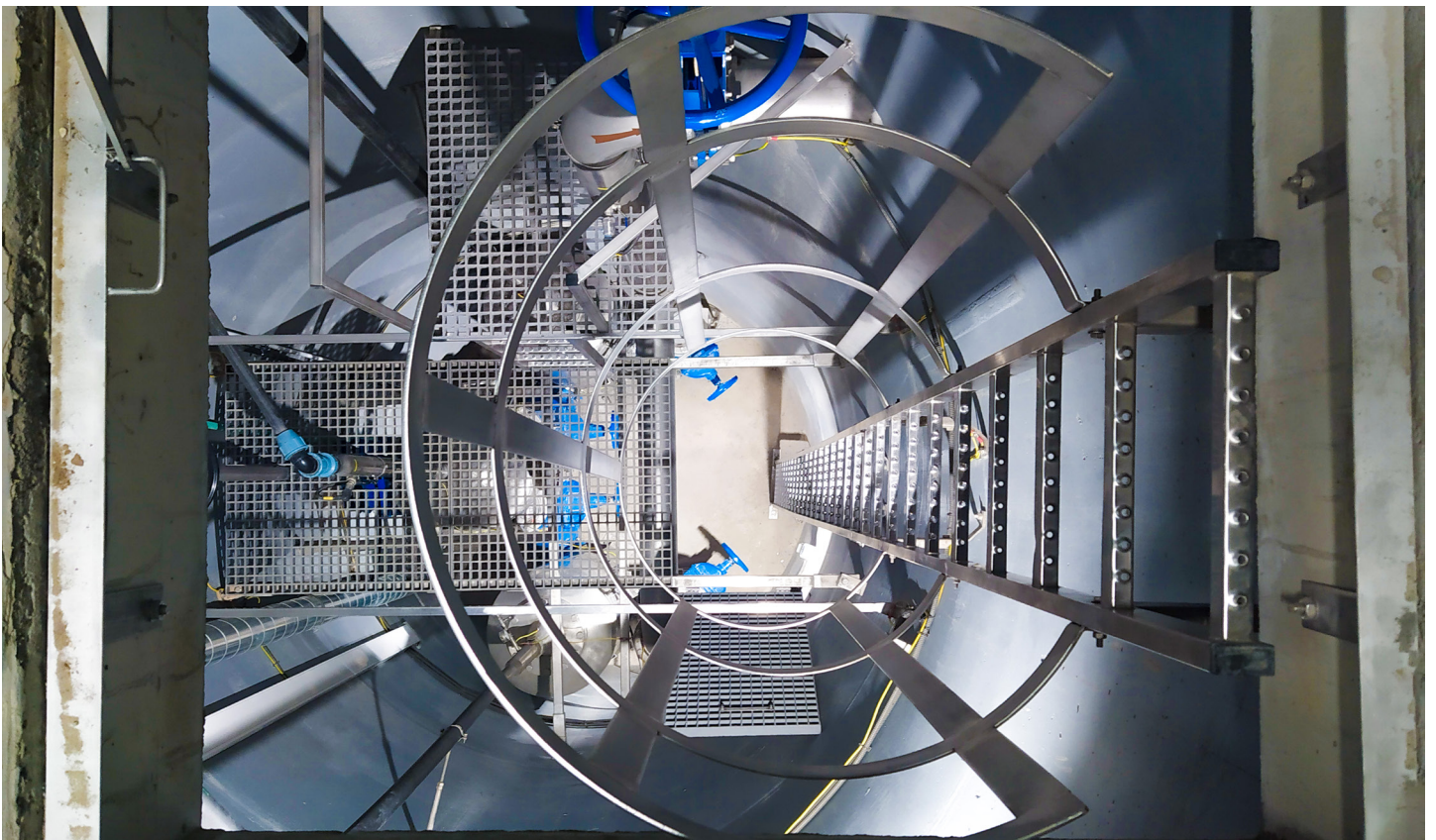
# EPP PNEUMATIC LIFT STATIONS

## EPP pneumatic lift station construction



# EPP PNEUMATIC LIFT STATIONS

## Reference photos



# EPP PNEUMATIC LIFT STATIONS

## Reference photos





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