KIASMA

DREDGING

PeHD and rubber dredge pipes with floats

The system has an international patent N.o TV2001A000053

FLOW CHANGE OF MOTION

EDIZIONE 09/2011

KIASMA S.r.l. / Via M. Adamello,31/H
31059 Zero Branco (TV) ITALY
T 0039 422 97620 / F 0039 422 487447
www.kiasmasrl.it - kiasma@kiasmasrl.it

PeHD DREDGE PIPES FOR DREDGING SEA / PORTS / RIVERS / QUARRIES / CANALS

Kiasma S.r.l. offers 2 types of PeHD dredge pipes suitable for the transport of liquids under pressure with a mixture of inert - **clays, silts, sands, gravels and solids of large size** with a diameter from 160 to 1200 mm.

The excellent mechanical, chemical and hydraulic performance guarantees reliability and safety, also at low temperatures.
The pipes have excellent resistance to water hammer.

application of HDPE pipes in dredging

working	solid	granulometry	Id pipe mm	type pipe PeHD
sea	sand	0,063÷2,0	450÷1000	PE100 EXTREME
port	sans	0,063÷2,0	450÷600	PE100 VERGINE Virgin PE100 PE100 EXTREME
	clay	< 2µ		
	fine gravel	4÷31		
	coarse gravel	31÷60		
	solids	61÷400		
rivers canals	sand	0,063÷2,0	200÷450	PE100 VERGINE Virgin PE100
	clay	< 2µ		
	ordinary gravel	4÷31		
lakes quarries	sand	0,063÷2,0	200÷350	PE100 EXTREME
	clay	< 2µ		
	fine gravel	4÷31		
	coarse gravel	31÷60		
	solids	61÷120		

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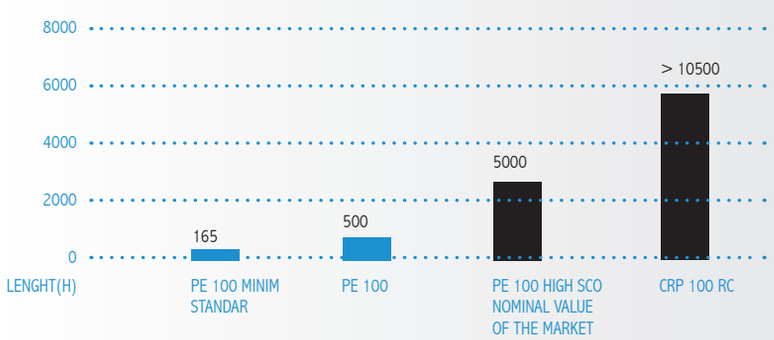
PeHD PE100 - PeHD100 Extreme
UNI EN 12201-1-2 (SCG)> 10.500 hours

The pipes are made of a compound that has extraordinary qualities of resistance to slow crack propagation and exceptional mechanical performance in the medium and long term (MRS > 10 MPa in 50 years plus very low values of roughness and low pressure drop).

TEST OF RESISTANCE TO SCG SLOW CRACK PROPAGATION (Notch Test EN ISO 13479



Technical data sheet PE100 UNI EN 12201

Applications: Transport of water under pressure (UNI EN 12201 norm), and industrial fluids (UNI 10953 + ISO/TR 10358 norms)

Other relevant documents: UNI EN 1622 “Water analysis – TON and TFN treshold determination “Ministry Decree law No. 174: “Rules concerning the materials and the objects which may be used.”

Raw material HD-PE Color: Black with blue stripes
Mass density 960 Kg/m3
Classif. MRS: PE100 according to ISO/TR 9080
MRS type: PE100 according to ISO/TR 9080
Joint type: Butt welding according to UNI 10520 norm E/F welding according to UNI 10521 norm Compression sleeves

Technical data sheet PE100 EXTREME 100 UNI EN 12201

Applications: Transport of water under pressure (UNI EN 12201 norm), and industrial fluids (UNI 10953 + ISO/TR 10358 norms)

Other relevant documents: UNI EN 1622 “Water analysis - TON and TFN threshold determination “Ministry Decree law No. 174: “Rules concerning the materials and the objects which may be used.”

Raw material: BORSAFE™ HE3490-LS-H (cod. B9H)
Color: Black with blue stripes
Classif. MRS: MRS type: PE100 according to ISO/TR 9080
Caratter. MP: RM properties: High resistance to SCG (> 10,000 h according to ISO 13479 method)

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KGP PeHD DREDGE PIPES WITH INTEGRATED FLOATS

PeHD pipe

Diameter OD 200-1200mm, with a float made of rigid expanded polyurethane resin, free from freon and with a PE outer sheath.

According to the density of the wastewater and the weight of the system, the appropriate float polyurethane resin guarantees the buoyancy of the pipe.

The system has an international patent No TV2001A000053

Properties:

The transport and storage on site is optimized since the floating sheaths are reduced in height;

Free from labor installation costs of the traditional floating;

the buoyancy of the pipe is studied as a function of Archimede buoyancy;

The flexibility of the pipe remains unchanged;

Exempt from repair costs and replacements of the floats;

Elimination of operating costs of the traditional floats;

All the pipes are produced according to the abrasion calculation;

It is a very cost effective system

The liners of the floats can be produced in red, yellow or orange.

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DIMENSIONAL SHEET OF PeHD PIPES and FLOATS

PIPE BASIC DATA					FLOATS BASIC DATA			STATIC DATA AT FULL LOAD CAPACITY			
Ø internal pipe	**Ø external pipe**	**Pressure rating of the pipe**	**Wall thickness of the pipe**	**Length of the pipe**	**Nominal diameter of the float**	**Length of float**	**Number of the floats**	**Inerts specific weight (gravity)**	**Full load weight of the system**	**Archimedes buoyancy**	**Positive buoyancy**
mm	mm		mm	m	mm	mm	N°	kg/dm3	kg	kg	kg
200	**176.2**	PN 10	11.9	5.8	500	700	2.000	2.2	402	487	85
200	**176.2**	PN 10	11.9	11.8	500	800	3.000	2.2	788	878	89
200	**163.6**	PN 16	18.2	5.8	500	650	2.000	2.2	377	471	94
200	**163.6**	PN 16	18.2	11.8	500	650	3.000	2.2	731	803	72
225	**198.2**	PN 10	13.4	5.8	500	700	2.000	2.2	492	515	23
225	**198.2**	PN 10	13.4	11.8	500	950	3.000	2.2	981	1013	32
225	**184**	PN 16	20.5	5.8	500	700	2.000	2.2	463	515	52
225	**184**	PN 16	20.5	11.8	500	950	3.000	2.2	919	1013	94
250	**220.4**	PN 10	14.8	5.8	500	1000	2.000	2.2	610	635	25
250	**220.4**	PN 10	14.8	11.8	500	1400	3.000	2.2	1218	1281	64
250	**204.6**	PN 16	22.7	5.8	500	1000	2.000	2.2	575	635	60
250	**204.6**	PN 16	22.7	11.8	500	1200	3.000	2.2	1132	1193	61
315	**277.6**	PN 10	18.7	5.8	650	1300	2.000	2.2	982	1237	255
315	**277.6**	PN 10	18.7	11.8	720	750	3.000	2.2	1907	1952	45
315	**257.8**	PN 16	28.6	5.8	720	500	2.000	2.2	900	976	76
315	**257.8**	PN 16	28.6	11.8	720	600	3.000	2.2	1774	1804	30
355	**312.8**	PN 10	21.1	5.8	720	900	2.000	2.2	1219	1293	74
355	**312.8**	PN 10	21.1	11.8	720	1150	3.000	2.2	2421	2477	56
355	**290.6**	PN 16	32.2	5.8	720	750	2.000	2.2	1142	1200	58
355	**290.6**	PN 16	32.2	11.8	720	950	3.000	2.2	2256	2292	36
400	**352.6**	PN 10	23.7	5.8	720	1300	2.000	2.2	1540	1591	51
400	**352.6**	PN 10	23.7	11.8	720	1700	3.000	2.2	3069	3113	44
400	**365.7**	PN 16	36.3	5.8	720	1100	2.000	2.2	1439	1478	39
400	**365.7**	PN 16	36.3	11.8	720	1500	3.000	2.2	2860	2944	84
450	**396.6**	PN 10	26.7	5.8	970	550	2.000	2.2	1934	1992	59
450	**396.6**	PN 10	26.7	11.8	970	800	3.000	2.2	3860	3917	57
450	**368.2**	PN 16	40.9	5.8	970	450	2.000	2.2	1816	1876	61
450	**368.2**	PN 16	40.9	11.8	970	650	3.000	2.2	3600	3656	56
500	**440.6**	PN 10	29.7	5.8	970	900	2.000	2.2	2388	2478	91
500	**440.6**	PN 10	29.7	11.8	970	1200	3.000	2.2	4761	4815	54
500	**409.2**	PN 16	45.4	5.8	970	750	2.000	2.2	2255	2315	60
500	**409.2**	PN 16	45.4	11.8	970	1000	3.000	2.2	4455	4489	34
560	**493.6**	PN 10	33.2	5.8	970	1350	2.000	2.2	3000	3040	40
560	**493.6**	PN 10	33.2	11.8	970	1850	3.000	2.2	5987	6063	76
560	**458.4**	PN 16	50.8	5.8	970	1200	2.000	2.2	2847	2893	46
560	**458.4**	PN 16	50.8	11.8	970	1600	3.000	2.2	5613	5694	81
630	**555.2**	PN 10	37.4	5.8	1250	650	2.000	2.2	3744	3797	53
630	**555.2**	PN 10	37.4	11.8	1250	980	3.000	2.2	7507	7569	62
630	**514.5**	PN 16	57.72	5.8	1250	550	2.000	2.2	3547	3614	67
630	**514.5**	PN 16	57.72	11.8	1250	800	3.000	2.2	7025	7074	49
710	**625.8**	PN 10	42.1	5.8	1250	1100	2.000	2.2	4734	4744	10
710	**625.8**	PN 10	42.1	11.8	1250	1600	3.000	2.2	9517	9590	72
800	**705.2**	PN 10	47.4	5.8	1450	950	2.000	2.2	6050	6127	77
800	**705.2**	PN 10	47.4	11.8	1450	1350	3.000	2.2	12102	12127	25
900	**793.4**	PN 10	53.3	5.8	1600	980	2.000	2.2	7627	7698	72
900	**793.4**	PN 10	53.3	11.8	1600	1420	3.000	2.2	15284	15334	50
1000	**881.4**	PN 10	59.3	5.8	1750	1000	2.000	2.2	9392	9442	50
1000	**881.4**	PN 10	59.3	11.8	1750	1480	3.000	2.2	18842	18931	89

PeHD pipes manufactured till the max wall thickness of 60mm

DISCHARGE DREDGING
RUBBER HOSE

Discharge hose suitable for the discharge of abrasive material, is used in the dredging system as connection between the PUMP and the SUCTION PIPE, discharging the material collected from the dredger. It can be manufactured with vulcanized flanges or rubber flanges (with heel).

discharge hose with
vulcanized flanges
DIN UNI ANSI

example of beaded ends
reinforced by a
metallic ring

Hose : NR-SBR

Pipe: smooth, black NR-SBR, thickness 16 mm, abrasion resistant

Cover: smooth, synthetic black rubber, abrasion resistant / aging and ozone resistant / seawater resistant.

Reinforcement: textile plies

Temperature range: -40°/ +70° C

Max working pressure: 8 bar

Burst pressure: 24 bar

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DISCHARGE DREDGING RUBBER HOSE WHIT INTEGRATED FLOATS (KGP SYSTEM)

Discharge rubber hose, ID200-800 mm, with floats in rigid expanded polyurethane resin, free from Freon and with a PE outer sheath.

According to the density of the wastewater and the weight of the system, the appropriate float in polyurethane resin guarantees the buoyancy of the pipe.

The system has an international patent No TV2011A000053

Properties:

The transport and storage on site is optimized since the floating sheaths are reduced in height;

-Free from labor installation coasts of the traditional floating

-The buoyancy of the pipe is studied as a function of Archimedes buoyancy

-The flexibility of the pipe remains unchanged

-Exempt from repair costs and replacements of the floats;

-Elimination of operating costs of the traditional floats

-All the pipes are produced according to the abrasion calculation

-It is a very cost effective system

-The liners of the floats can be produced in red, yellow or orange

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RUBBER FLOATS - DIMENSIONAL DATA CHART

RUBBER HOSE BASIC DATA					FLOATS BASIC DATA			STATIC DATA AT FULL LOAD CAPACITY			
Ø internal rubber hose	**Ø external rubber hose**	**Pressure rating**	**Thickness of the rubber hose**	**Length of the rubber hose**	**Nominal diameter of the float**	**Length of float**	**Number of the floats**	**Inerts specific weight (gravity)**	**Full load weight of the system**	**Archimedes buoyancy**	**Positive buoyancy**
mm	mm	PN bar	mm	m	mm	mm	N°	kg/dm3	kg	kg	kg
203	**218**	PN 8	19	5,8	550	600	2,000	2	574	634	60
203	**218**	PN 8	19	8	550	850	2,000	2	755	831	76
203	**218**	PN 8	19	10,5	550	650	3,000	2	964	1063	99
203	**241**	PN 8	19	5,8	550	600	2,000	2	574	634	60
203	**241**	PN 8	19	8	550	850	2,000	2	755	831	76
203	**241**	PN 8	19	10,5	550	650	3,000	2	964	1063	99
254	**293**	PN 8	19,5	5,8	650	600	2,000	2	850	930	80
254	**293**	PN 8	19,5	8	650	800	2,000	2	1120	1184	64
254	**293**	PN 8	19,5	10,5	650	600	3,000	2	1434	1516	82
305	**347**	PN 8	21	5,8	750	500	2,000	2	1165	1224	58
305	**347**	PN 8	21	8	750	700	2,000	2	1545	1571	26
305	**347**	PN 8	21	10,5	750	550	3,000	2	1989	2058	69
350	**402**	PN 8	26	5,8	850	500	2,000	2	1550	1639	89
350	**402**	PN 8	26	8	850	700	2,000	2	2054	2095	41
350	**402**	PN 8	26	10,5	850	500	3,000	2	2640	2687	47
404	**455**	PN 8	25,5	5,8	950	450	2,000	2	2019	2068	48
404	**455**	PN 8	25,5	8	950	750	2,000	2	2689	2753	64
404	**455**	PN 8	25,5	10,5	950	550	3,000	2	3461	3558	97
450	**502,5**	PN 8	26,25	5,8	1050	350	2,000	2	2456	2472	16
450	**502,5**	PN 8	26,25	8	1050	700	2,000	2	3280	3376	96
450	**502,5**	PN 8	26,25	10,5	1050	450	3,000	2	4217	4265	48
508	**564,5**	PN 8	28,25	5,8	1120	500	2,000	2	3096	3143	48
508	**564,5**	PN 8	28,25	8	1120	850	2,000	2	4134	4209	75
508	**564,5**	PN 8	28,25	10,5	1120	600	3,000	2	5324	5386	63
***508**	***564,5**	PN 8	28,25	5,8	1250	200	2,000	2	3382	3399	17
***508**	***564,5**	PN 8	28,25	8	1250	450	2,000	2	4417	4438	20
***508**	***564,5**	PN 8	28,25	10,5	1250	250	3,000	2	5613	5695	82

*** with flange DN600**

Ruber pipes manufactured till the max diameter of 800mm.

KIASMA S.r.l. reserves the right to make changes after the evaluation by the Technical Department

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ABRASION OF PeHD PE100 DREDGE PIPES

The hydrophilic PeHD which reduces the interaction between the transported material and the pipe wall allows a high abrasion resistance, thus allowing the pumping of abrasive materials like sands - gravels and mud.

Specific studies, conducted at the Darmstadt Faculty of Hydraulic (Germany) and at the U.S. Army Eng. Waterways Experiment Station (U.S.A.) show a linear wear of HDPE pipe wall thickness in the presence of linear flow motion.

In the test case performed in Darmstadt, samples of sands and gravel (60% concentration), with thickness 2,0mm – 8,4mm and water (40% concentration) have been used ; in the test of U.S. Army Eng., the dredged material varied in fine sand, pebbles and coarse sand.

In the presence of linear motion, it is verified that most abrasion occurs in the sliding surface of the HDPE pipe, where the biggest amount of material passes. In the presence of turbulent motion, abrasion occurs in a completely different way.

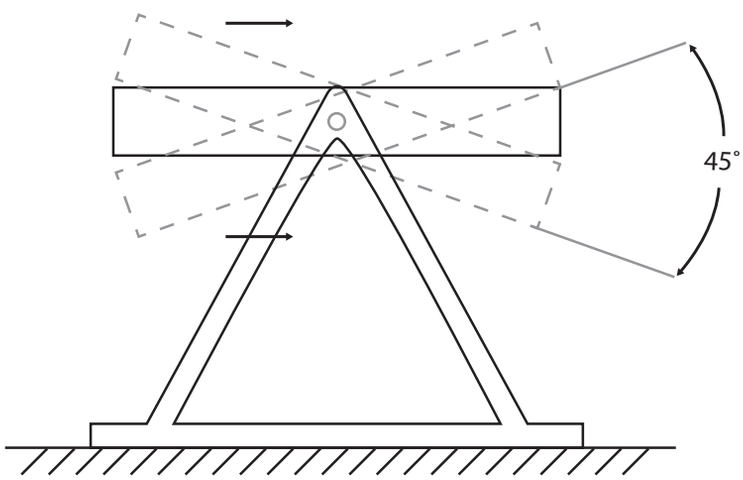
Abrasion calculation of dredge pipes (internal linear motion)

mc daily real	MC TOTAL	
total daily working hours (dredge)	MC/DAY	
working days for all the work	HOURS	
TEST: every minute is 20 cycles	DAYS	
variable X		
ABRASION PE100 pipe OD Inert concentration stress: 60% gravel 6-8,4-4,2mm – 40% water	MM/DAY	

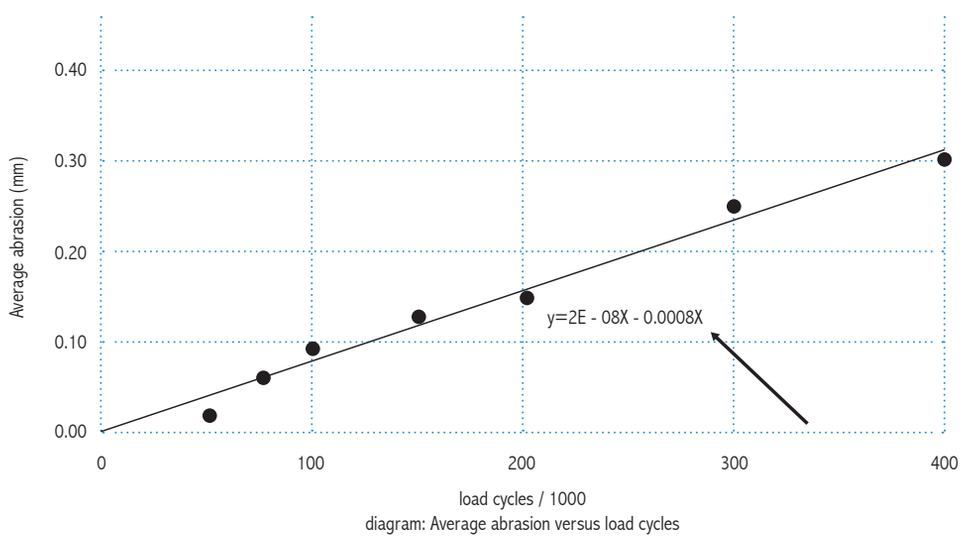
With flow change of motion the medium abrasive is reduced for 42% (turbulent motion)

ABRASION TEST ACCORDING TO EN 295-3 INSIDE LINEAR MOTION

(University of Darmstadt – Germany)



Balancing machine with PeHD PE100 pipes with abrasive solid (60%) and water (40%) on the inside. Linear motion



Abrasion diagram (mm) of PE100 pipe according to the cycles of balancing linear motion

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FLOW CHANGE OF MOTION

(turbulent motion)

In a stream of linear motion, the mixture of aggregates produces a formation of a granular bed, which causes the abrasion of the pipe leading to problems of material durability (demonstrated by abrasion tests conducted according to standard EN 295-3). To reduce this problem, Kiasma srl proposes **FLOW CHANGE OF MOTION**, wich create a turbulent mixture of water-iner t and push it uniformly along the circumference of the pipe. In this way the entire inner thickness of the pipe is subject to a uniform abrasion with benefits in terms of longevity of use.

Flow Change of motion on the inside of the PeHD and rubber pipes

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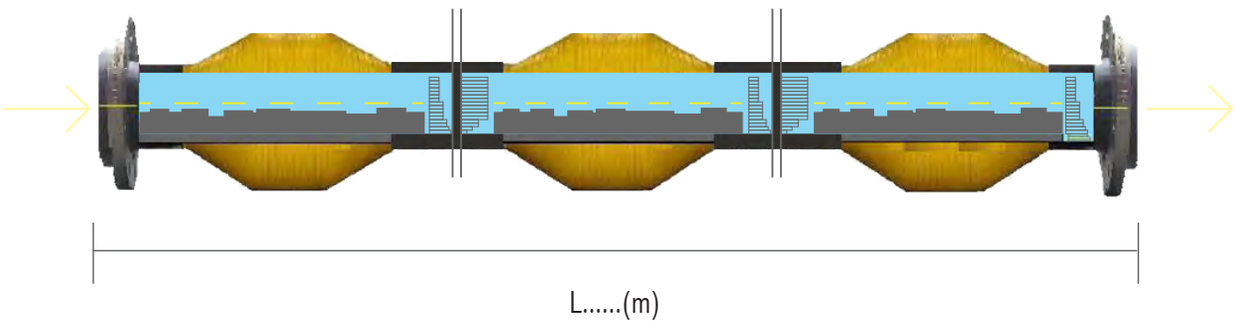
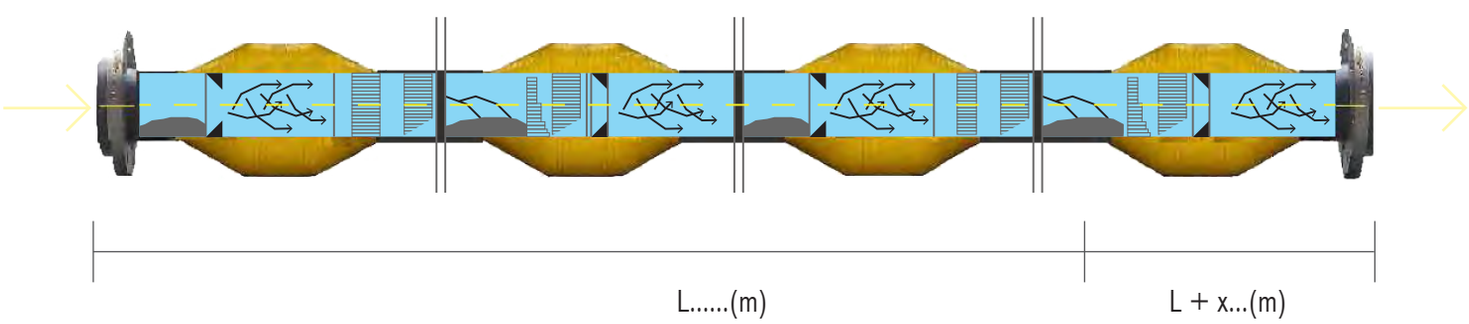
LINEAR MOTION

PeHD and Rubber floating pipe

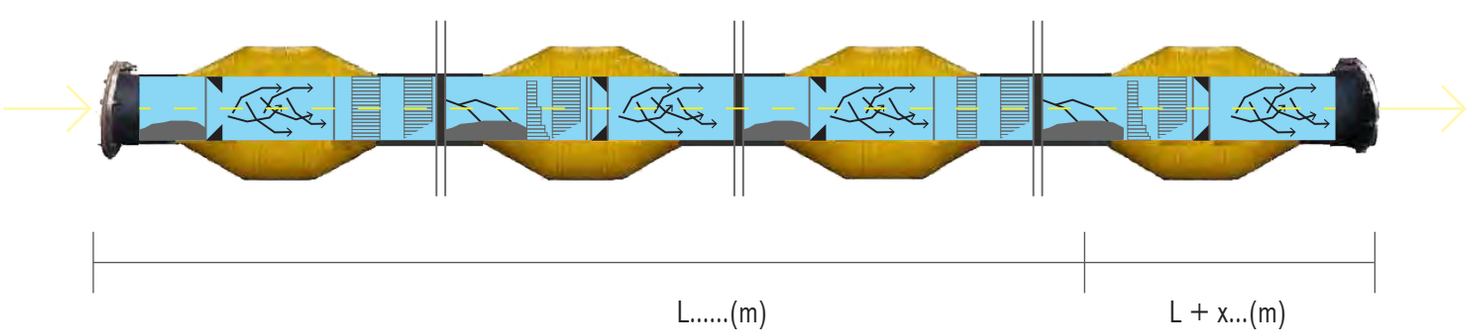


TURBULENT MOTION

PeHD floating pipe



Rubber floating pipe



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MOTION OF THE DREDGING MIXTURE TROUGH THE PIPE

During the dredging procedure, a mixture of water and inert flow trough the pipe, causing the decrease of the booster pump pressure - due to the deposition of transported material on the bottom of the duct (generally sands and gravels). The sedimentation of the inert reduces the liquid section, so the flow must dissipate more energy to transport the same amount of the material.

Type of inert to be transported trough the dredge pipe

Inert pseudo / homogeneous: mixture of silt-clay where the particles are suspended

Heterogeneous partially stratified: mixture of fine and medium sand where the majority of particles is suspended and only a small part forms a bed on the bottom of the pipe

Heterogeneous moderately stratified: mixture of coarse sand or fine gravel where the biggest part of solid particles is deposited on the bottom of the pipe

Fully stratified with formation of erosive bed: mixtures of media/coarse gravel where the biggest part of particles travel over a granular bed with shorts rolls

Fully stratified: mixture of coarse gravel or pebbles that travels internally on the deposit bed

Knowing the type of mixture that flows trough a pipe, the following can be determined:

The necessary pressure to the pipe (bar)

The length of the discharge line (L/m)

The punctual pressure drop along the discharge line (Bar)

The diameter for the discharge pipe (ID)

The solid flow rate (m3/h)

The velocity of the mixture (Vm)

The critical velocity of deposit (V crit)

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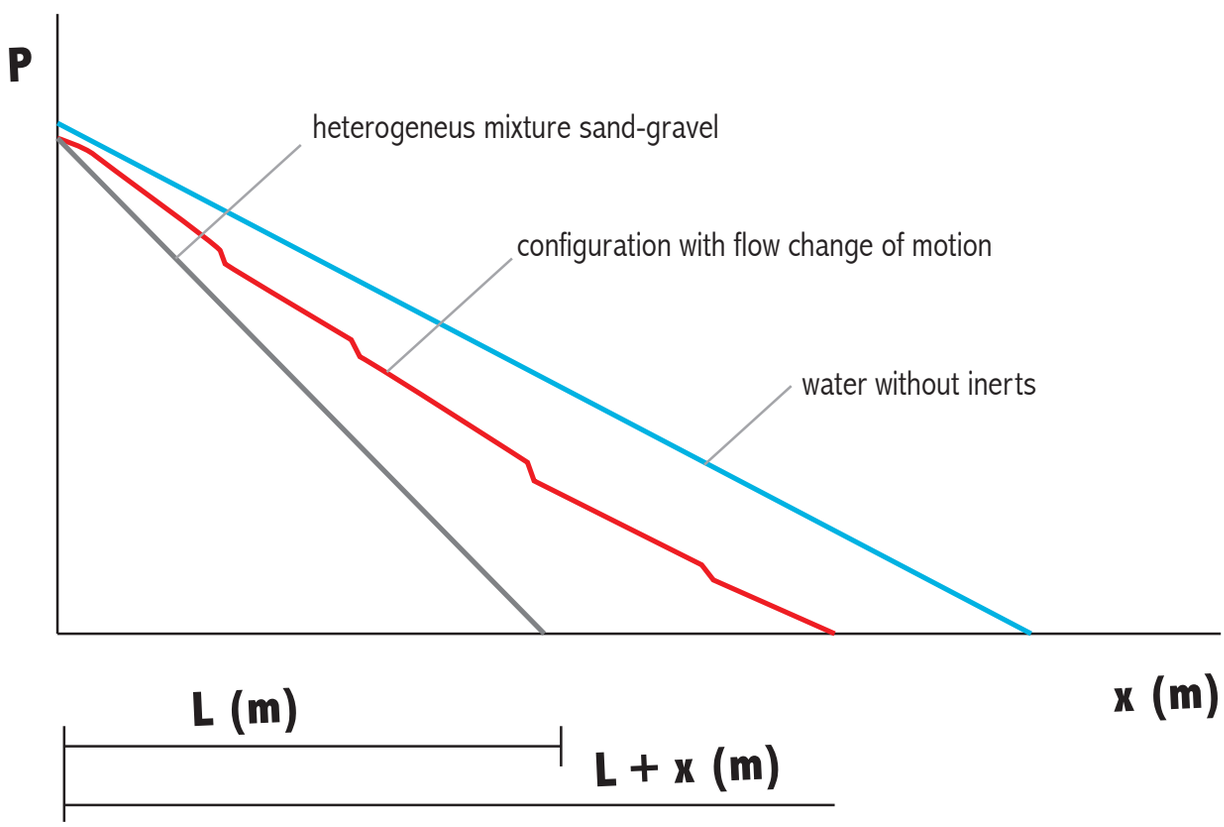
BENEFITS USING THE FLOW CHANGE OF MOTION (TURBULENT MOTION)

With the application of the flow change of motion (in steel /HDPE / rubber pipes), a localized pressure drop is being formed - the flow becomes similar to homogeneous Newtonian fluids, thus reducing the demand for pump pressure and allowing the lengthening of the discharge line (minor use of booster).



Pressure diagram/lenght of dredge pipe

The graph shows the line of pressure according to the type of flow

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SELF-SINKING PeHD DREDGE PIPELINES

PeHD pipe 200-200mm with **reinforced concrete box**, located in one or more points of the pipe, not effecting its flexibility
Even in the presence of bending that the pump can create, the trunk of CLS is not detached from the pipe internal armature. The PEHD pipe with the CLS box capped at the ends and with air inside, is designed to float. For the recovery of the pipe, once unbolt the flanges and the pipe filled the air, it rises to the surface due to buoyancy studied.

HDPE pipe with double PMP ml. 12

HDPE pipe with single PMP ml. 12

Calculations of buoyancy and sinking of the pehd pipe

Ø external pipe	Ø internal pipe	archimede buoyancy with air	archimede buoyancy with water	Pressure rating	weight of the pipe	lenght pipe	weight of the pipe	weight of the acessories	K (10% push Arc.)	permissible weight CLS	density CLS	volume cls	lenght cls	lenght and height cls
mm	mm	kg	kg	PN bar	Kg/ml	m	kg	kg	kg	kg	kg/dm3	dm3	m	cm
250	**220.4**	284.71	67.59	10	11.07	5.8	64.206	19	28.5	173.03	2.2	78.65	3.8	26.42
250	**220.4**	579.23	137.50	10	11.07	11.8	130.626	19	57.9	371.68	2.2	168.95	9.8	25.75
250	**204.6**	284.71	99.88	16	16.36	5.8	94.888	22	28.5	139.35	2.2	63.34	3.8	25.64
250	**204.6**	579.23	203.21	16	16.36	11.8	193.048	22	57.9	306.26	2.2	139.21	9.8	25.16
315	**277.6**	452.00	107.51	10	17.61	5.8	102.138	27	45.2	277.66	2.2	126.21	3.8	33.34
315	**277.6**	919.59	218.73	10	17.61	11.8	207.798	27	92.0	592.83	2.2	269.47	9.8	32.47
315	**257.8**	452.00	158.43	16	25.95	5.8	150.51	32	45.2	224.29	2.2	101.95	3.8	32.37
315	**257.8**	919.59	322.33	16	25.95	11.8	306.21	32	92.0	489.42	2.2	222.46	9.8	31.72
355	**312.8**	574.08	137.00	10	22.44	5.8	130.152	36	57.4	350.52	2.2	159.33	3.8	37.54
355	**312.8**	1167.96	278.73	10	22.44	11.8	264.792	36	116.8	750.37	2.2	341.08	9.8	36.58
355	**290.6**	574.08	201.17	16	32.95	5.8	191.11	46	57.4	279.56	2.2	127.07	3.8	36.39
355	**290.6**	1167.96	409.27	16	32.95	11.8	388.81	46	116.8	616.36	2.2	280.16	9.8	35.72
400	**352.6**	728.85	172.90	10	28.32	5.8	164.256	44	72.9	447.71	2.2	203.50	3.8	42.33
400	**352.6**	1482.83	351.76	10	28.32	11.8	334.176	44	148.3	956.37	2.2	434.71	9.8	41.23
400	**365.7**	728.85	255.38	16	41.83	5.8	242.614	53	72.9	360.35	2.2	163.80	3.8	41.08
400	**365.7**	1482.83	519.57	16	41.83	11.8	493.594	53	148.3	787.95	2.2	358.16	9.8	40.28
450	**396.6**	922.45	219.00	10	35.87	5.8	208.046	49	92.2	573.16	2.2	260.53	3.8	47.71
450	**396.6**	1876.71	445.54	10	35.87	11.8	423.266	49	187.7	1216.77	2.2	553.08	9.8	46.42
450	**368.2**	922.45	323.33	16	52.96	5.8	307.168	66	92.2	457.04	2.2	207.74	3.8	46.23
450	**368.2**	1876.71	657.82	16	52.96	11.8	624.928	66	187.7	998.11	2.2	453.69	9.8	45.31
500	**440.6**	1138.83	270.65	10	44.33	5.8	257.114	63	113.9	704.83	2.2	320.38	3.8	52.98
500	**440.6**	2316.92	550.63	10	44.33	11.8	523.094	63	231.7	1499.14	2.2	681.43	9.8	51.56
500	**409.2**	1138.83	398.98	16	65.35	5.8	379.03	99	113.9	546.91	2.2	248.60	3.8	51.16
500	**409.2**	2316.92	811.72	16	65.35	11.8	771.13	99	231.7	1215.10	2.2	552.32	9.8	50.27
560	**493.6**	1428.55	339.03	10	55.53	5.8	322.074	92	142.9	871.62	2.2	396.19	3.8	59.21
560	**493.6**	2906.35	689.74	10	55.53	11.8	655.254	92	290.6	1868.46	2.2	849.30	9.8	57.70
560	**458.4**	1428.55	499.84	16	81.87	5.8	474.846	145	142.9	665.84	2.2	302.66	3.8	57.09
560	**458.4**	2906.35	1016.91	16	81.87	11.8	966.066	145	290.6	1504.65	2.2	683.93	9.8	56.22
630	**555.2**	1808.00	429.38	10	70.33	5.8	407.914	76	180.8	1143.29	2.2	519.68	3.8	66.97
630	**555.2**	3678.35	873.57	10	70.33	11.8	829.894	76	367.8	2404.62	2.2	1093.01	9.8	65.06
630	**514.5**	1808.00	633.30	16	103.73	5.8	601.634	145	180.8	880.57	2.2	400.26	3.8	64.58
630	**514.5**	3678.35	1288.44	16	103.73	11.8	1224.014	145	367.8	1941.50	2.2	882.50	9.8	63.39
710	**625.8**	2296.33	545.63	10	89.37	5.8	518.346	87	229.6	1461.35	2.2	664.25	3.8	75.55
710	**625.8**	4671.85	1110.07	10	89.37	11.8	1054.566	87	467.2	3063.10	2.2	1392.32	9.8	73.35
800	**705.2**	2915.40	691.91	10	113.33	5.8	657.314	149	291.5	1817.54	2.2	826.16	3.8	84.86
800	**705.2**	5931.33	1407.68	10	113.33	11.8	1337.294	149	593.1	3851.90	2.2	1750.86	9.8	82.54
900	**793.4**	3689.80	691.91	10	113.33	5.8	657.314	171	369.0	2492.51	2.2	1132.96	3.8	96.66
900	**793.4**	7506.84	1407.68	10	113.33	11.8	1337.294	171	750.7	5247.86	2.2	2385.39	9.8	93.79
1000	**881.4**	4555.31	691.91	10	113.33	5.8	657.314	203	455.5	3239.46	2.2	1472.48	3.8	108.30
1000	**881.4**	9267.70	1407.68	10	113.33	11.8	1337.294	203	926.8	6800.63	2.2	3091.20	9.8	104.92

KIASMA S.r.l. reserves the right to make changes after evaluation by the Technical Department

PeHD pipes manufactured till the max wall thickness of 60mm

KGP PeHD DREDGE PIPES WITH FUL INTEGRATED FLOAT

PeHD floating pipe, 200-1200 mm, coated by an insulating polyurethane rigid foam along the entire length. Free from Freon and with a PE outer sheat. Once given the waste density and known the weights of the system, the appropriate resin chamber guarantees the buoyancy of the pipe.

Properties:

The transport and storage in the site is optimized because the sheats of the floats are reduced in height

Free from labor installation costs of the traditional floating

The buoyancy of the pipe is studied as a function of Archimedes buoyancy.

The flexibility of the pipe remains unchanged

Exempt from repair costs and replacements of the floats

Elimination of operating costs of the traditional floats

All the pipes are produced according to the abrasion calculation

It is a very cost effective system

the liners of the floats can be produced in red, yellow or orange

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T 0039 422 97620 / F 0039 422 487447 www.kiasmasrl.it - kiasma@kiasmasrl.it

DIMENSIONAL DATA CHART OF FULLY FLOATING PeHD PIPES

PIPE BASIC DATA					FLOATS BASIC DATA			STATIC DATA AT FULL LOAD CAPACITY			
Ø external pipe	**Ø internal pipe**	**Pressure rating of the pipe**	**Wall thick-ness of the pipe**	**Lenght of the pipe**	**Nominal diameter of the pipe**	**Lenght of the pipe**	**Number of the pipe**	**Inerts specific weight (gravity)**	**System weight**	**Archimedes buoyancy**	**Positive buoyancy**
mm	mm		mm	m	mm	mm		kg/dm3	kg	kg	kg
200	176.2	PN 10	11.9	5.8	350	4000	1.000	2.2	382	454	72
200	176.2	PN 10	11.9	11.8	350	7000	1.000	2.2	756	837	81
200	163.6	PN 16	18.2	5.8	350	4000	1.000	2.2	358	454	96
200	163.6	PN 16	18.2	11.8	350	6500	1.000	2.2	705	805	100
225	198.2	PN 10	13.4	5.8	350	4500	1.000	2.2	473	494	21
225	198.2	PN 10	13.4	11.8	350	9000	1.000	2.2	947	987	40
225	184	PN 16	20.5	5.8	350	4400	1.000	2.2	443	488	45
225	184	PN 16	20.5	11.8	350	9000	1.000	2.2	886	987	101
250	220.4	PN 10	14.8	5.8	600	1000	1.000	2.2	587	614	27
250	220.4	PN 10	14.8	11.8	600	2500	1.000	2.2	1175	1259	84
250	204.6	PN 16	22.7	5.8	600	1000	1.000	2.2	551	614	62
250	204.6	PN 16	22.7	11.8	600	2000	1.000	2.2	1092	1142	50
315	277.6	PN 10	18.7	5.8	600	2500	1.000	2.2	932	1034	101
315	277.6	PN 10	18.7	11.8	600	4500	1.000	2.2	1856	1911	55
315	257.8	PN 16	28.6	5.8	600	2000	1.000	2.2	869	931	62
315	257.8	PN 16	28.6	11.8	600	4000	1.000	2.2	1730	1809	79
355	312.8	PN 10	21.1	5.8	600	3500	1.000	2.2	1183	1272	89
355	312.8	PN 10	21.1	11.8	600	6500	1.000	2.2	2358	2417	59
355	290.6	PN 16	32.2	5.8	600	3000	1.000	2.2	1110	1180	70
355	290.6	PN 16	32.2	11.8	600	5500	1.000	2.2	2199	2233	34
400	352.6	PN 10	23.7	5.8	750	2200	1.000	2.2	1497	1556	59
400	352.6	PN 10	23.7	11.8	750	4500	1.000	2.2	2991	3037	46
400	365.7	PN 16	36.3	5.8	750	2000	1.000	2.2	1403	1492	90
400	365.7	PN 16	36.3	11.8	750	4000	1.000	2.2	2788	2879	90
450	396.6	PN 10	26.7	5.8	750	3200	1.000	2.2	1885	1928	44
450	396.6	PN 10	26.7	11.8	750	6500	1.000	2.2	3776	3816	40
450	368.2	PN 16	40.9	5.8	750	3000	1.000	2.2	1773	1872	99
450	368.2	PN 16	40.9	11.8	750	5500	1.000	2.2	3520	3533	13
500	440.6	PN 10	29.7	5.8	750	4700	1.000	2.2	2328	2365	37
500	440.6	PN 10	29.7	11.8	750	9500	1.000	2.2	4665	4722	57
500	409.2	PN 16	45.4	5.8	750	4400	1.000	2.2	2205	2292	86
500	409.2	PN 16	45.4	11.8	750	8500	1.000	2.2	4372	4476	104
560	493.6	PN 10	33.2	5.8	1070	1800	1.000	2.2	2935	2995	60
560	493.6	PN 10	33.2	11.8	1070	4000	1.000	2.2	5864	5909	46
560	458.4	PN 16	50.8	5.8	1070	1500	1.000	2.2	2782	2799	17
560	458.4	PN 16	50.8	11.8	1070	3500	1.000	2.2	5502	5583	81
630	555.2	PN 10	37.4	5.8	1070	2700	1.000	2.2	3667	3698	31
630	555.2	PN 10	37.4	11.8	1070	5800	1.000	2.2	7374	7390	17
630	514.5	PN 16	57.72	5.8	1070	2500	1.000	2.2	3478	3581	103
630	514.5	PN 16	57.72	11.8	1070	5100	1.000	2.2	6906	6979	73
710	625.8	PN 10	42.1	5.8	1070	4400	1.000	2.2	4651	4722	71
710	625.8	PN 10	42.1	11.8	1070	9000	1.000	2.2	9359	9413	54
800	705.2	PN 10	47.4	5.8	1500	1600	1.000	2.2	5942	5975	34
800	705.2	PN 10	47.4	11.8	1500	4000	1.000	2.2	11925	12026	101
900	793.4	PN 10	53.3	5.8	1500	2700	1.000	2.2	7501	7537	36
900	793.4	PN 10	53.3	11.8	1500	6100	1.000	2.2	15075	15200	125
1000	881.4	PN 10	59.3	5.8	1500	4400	1.000	2.2	9260	9442	182
1000	881.4	PN 10	59.3	11.8	1500	9000	1.000	2.2	18594	18671	77

PeHD pipes manufactured till the max wall thickness of 60mm

KIASMA S.r.l. reserves the right to make changes after evaluation by the Technical Department

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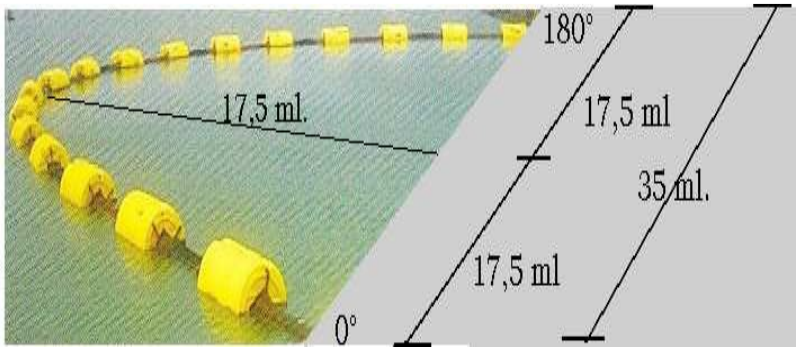
FLANGED JOINTS IN PEHD, FOR PIPELINES FLOATING IN DEEP SEAS – OCEANS

We all know that the steel ducts by their nature are not flexible. To absorb the stresses, due to the movements of the oceans and waves, there is a need to use the ball joints-connections. On a large diameter pipes, from the OD500 to OD1200mm, the pipe connections through ball joints creates higher operating costs. Very often the of work for ball joints, creating losses of material and consequent required angles loss of pressure in the discharge line The losses of line pressure must be compensated by imposing a higher pump power and hence a greater fuel consumption

Flexibility of Polyethylene:

The high flexibility of the polyethylene (HDPE) and its ability to resume its original shape after deformation, making it suitable to absorb vibrations, shocks, stresses due to movement and therefore suitable to be installed in unstable areas.



Ex: PeHD pipe OD500 ≥ 35 dn-OD

Maximum permissible curvature of polyethylene pipes:

In many application conditions, the high flexibility of HDPE pipes allows to adapt the pipeline without any use of curves provided that the radius of curvature is greater than a threshold value that depends of SDR.

The minimum radius of curvatures at a temperature of 20°C are shown in the below table.

Table: Minimum radius of curvature eligible at 20°C

SDR	PN	Minimum radius of curvature
7,4 – 17	25-16-10	≥ 25 dn - OD
21-26	6	≥ 35 dn - OD

At the temperature of 0°C the minimum radius of curvature must be doubled.

If the ray path involves smaller curvatures of those eligibles, it is necessary to provide the use of fittings.

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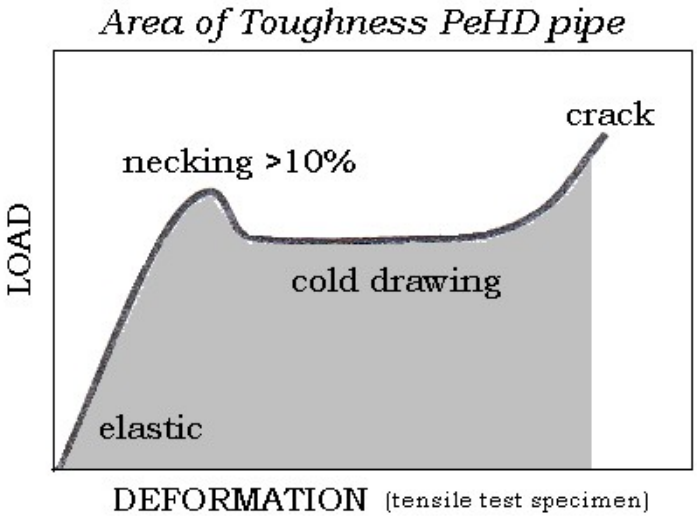
Elastic modulus of polyethylene - Toughness

- Short term Es MPa 1000
  Long term El MPa 160

Behaviour:

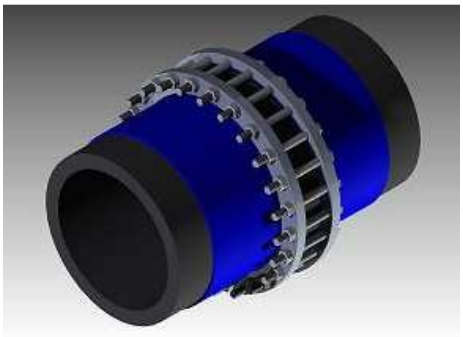
-To eligible deformation the behaviour is elastic
-For more than 10% deformation occurs yielding the material with formation of a necking
-With the necking occurs in the material orientation (Cold drawing)
-The high orientation leads to the break (crack)



The area of the Toughness of HDPE pipe to deform without risk is closely linked to Flexibility.

Joining pipes to large diameter sea / ocean:

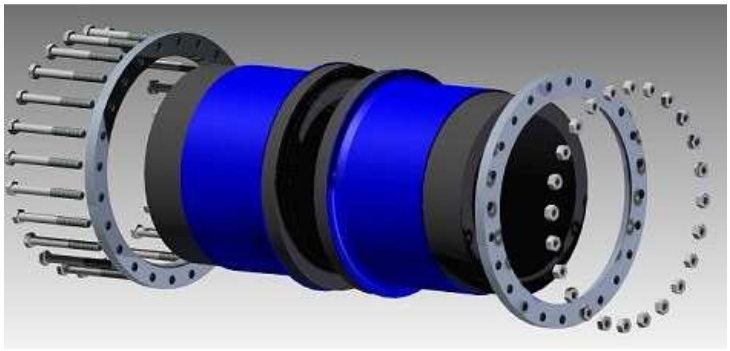
On large pipe diameters, from OD1200 to OD500 mm, Kiasma Srl offers flanged joints between pipes, whit a collar HDPE Steel Coated. that ensures grip even in the presence of high stress due to movement of the waves of the sea / ocean and absorbs the tensile forces to which the transaction is subject to the pipe flanges.



Junction: "Flange to Flange"

Collar (with inside changer flow) in HDPE, with spigot L500-600mm, coated throughout its length and forged steel flange with anticorrosive coating PPA 571 5-8 mm thick.

The collar-length 500-600mm HDPE distributes the load stress of flange along the HDPE pipe.
Respect for welding UNI 10520 T / T between HDPE pipe and collar regulates compliance with the values of pressure seal (Bar-Pascal) and that the values of traction.



Coated steel collar

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The formation of waves is caused by the wind pushing on the sea surface. It is not the mass of water that moves (as in ocean currents), but what is transmitted are the fluctuations and the energy connected. The shape of the wave depends on wind speed, sea space and time.

Usually the waves in seas reach heights of 4-5 meters

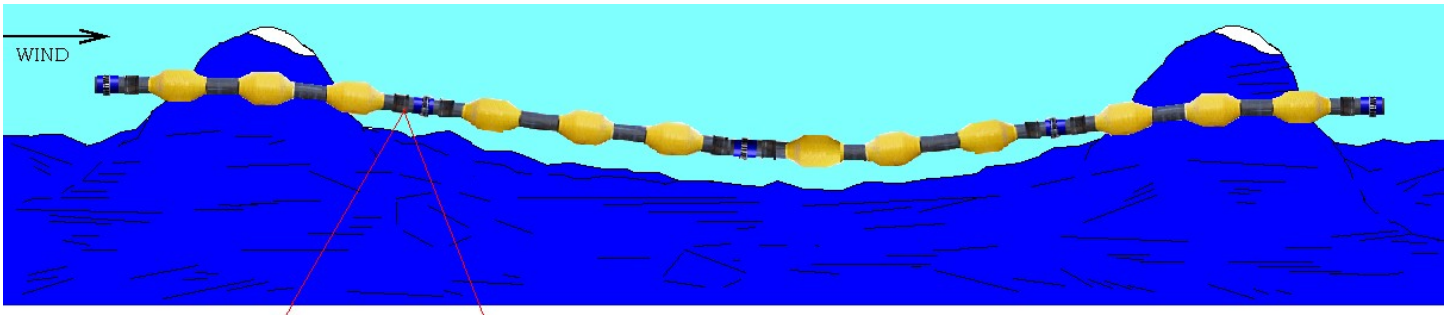
In the oceans, the waves can reach heights of 15-18 meters.

The 50% of world's population lives within 60 km of sea coast. The waves with their "up" and "down" into the sea, they work like a piston that pushes air. Although the wave motion is slow, the mass of water is always moving several tons. In the oceans, the buoyancy is much higher (long wave).

Comportment of a floating PeHD pipeline crossed by the waves:

The high flexibility of PEHD pipe and the area of toughness of PEHD to deform before crack, allows bend withstanding the radius, the length of wave and wave backwash.
(The radius of curvature of HDPE pipeline is successfully reduced when the conduct is in work and passing through by the power of pumped pressure).
Whether in case of work at sea (waves 4-5 meters), like in the case of work in the ocean (waves 15-18 meters), the floating conduct (dredging) naturally sinks for 30-40% of the height, of wave it self.
The"period" or distance between wave and wave in the sea, is an average of 50 meters, the arc of the conduct in PEHD exposed to the curvature is well below the radius of curvature " at risk", thus the tensile force at which the line is subjected (uniaxial tensile) is well below the value that determines the material failure.

KIASMA Srl proposes the connection pipe/pipe with a "Flanged PE HD collar- steel coated" which is made a doubled welding between pipe and collar. The values of resistance to"pull" in the area of the weld, is equal to or greater than the tensile values of an extruded PEHD pipe.



I° phase

II° phase

I° first phase:Welding Pipe/Pipe Normed Uni 10520

II° second phase: Welding PEHD Sleeve"Special"Normed Uni 10521

example of a radius of curvature of wave / wave and connecting flange tube / tube with double welding HDPE floating collar

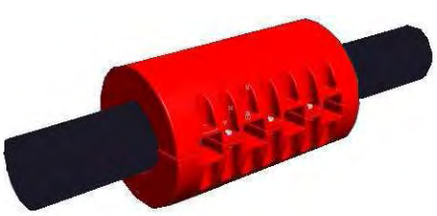
PlaniKIASMA FLOATS FOR SURFACE DREDGING

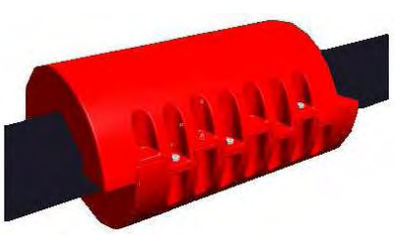
The PlaniKiasma dredging floats and floats for pipelines of surface are made in linear rotational polyethylene.

They are created from two half shells and linked together by a hinge with a Teflon rod at one side and by galvanized bolts on the other side.

01 / VERSATILITY OF PLANIKIASMA FLOAT

Every PlaniKiasma float can be used with two diameters of HDPE pipe, thanks to its polygonal profile made in the internal diameter of the float and its joggle-bolt junction.





PlaniKiasma float with a polygonal profile inside and a joggle bolt junction

PeHD pipe

De 250 mm - De 315 mm

De 355 mm - De 400 mm

De 450 mm - De 500 mm

Currently, the floats on the Italian and the European market are custom made for every diameter of HDPE pipe

02 / COST MANAGEMENT

The PlaniKiasma floats are about 50 cm longer in respect to other floats currently present on the market. Their greater property of buoyancy allows the purchase of a smaller number of floats with an equal length of the tube (Average savings of 30%).

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PeHD PIPE

De	tube thickness PN 16	tube lenght	tube weight	usefull section	wastewater density	wastewater weight	wastewater pipe weight
mm	mm	m	kg	mq		kg	kg
250	22,7	1	15	0,03	1,4	46	61
315	28,6	1	24	0,05	1,4	73	97
355	32,0	1	31	0,07	1,4	93	123
400	36,3	1	38	0,08	1,4	118	157
450	40,9	1	48	0,11	1,4	151	199
500	45,4	1	60	0,13	1,4	185	245

PlaniKIASMA FLOATS

De	tube lenght	external diameter	internal diameter	weight	buoyancy	1 float every	other float
mm	mm	mm	mm	kg	kg + bumper	m	m
250	1200	850	320	43	542 + 55	9,8	6,7
315	1200	850	320	43	542 + 55	6,2	5,2
355	1500	950	405	63	807 + 49	7,0	4,1
400	1500	950	405	63	807 + 49	5,5	3,6
450	1500	1100	505	83	1192 + 48	6,3	2,9
500	1500	1100	505	83	1192 + 48	5,0	3,2

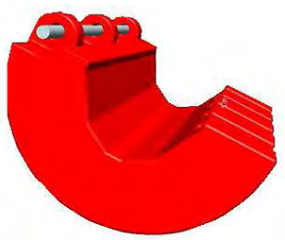
03 / BUMPERS

The bumpers for PlaniKiasma floats have their own buoyancy of 25 kg. They are made of linear rotational polyethylene and guarantee unsinkability in the events of shocks. They are mounted on the back side of hinge and in front bolts.

Bumper for PlaniKiasma floats

04 / MECHANICAL RESISTANCE OF PlaniKIASMA FLOATS

Due to continuity of the linear polyethylene thickness, which is rotationally obtained in the production process, the mechanical strength can be guaranteed in the areas of closing galvanized bolts.



Hinge zipper closure PlaniKiasma

05 / HINGES FOR PlaniKIASMA FLOATS

With the closing hinge system of the two shells around the pipe, the PlaniKiasma floats facilitate the installation work.

HDPE pipe assembly -
Float PlaniKiasma -
Front and rear bumpers

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PHOTO GALLERY
production system KGP
(patent TV2001A000053)

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production system KGP
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KIASMA S.r.l. / Via M. Adamello,31/H 31059 Zero Branco (TV) ITALY
T 0039 422 97620 / F 0039 422 487447 www.kiasmasrl.it - kiasma@kiasmasrl.it

PHOTO GALLERY
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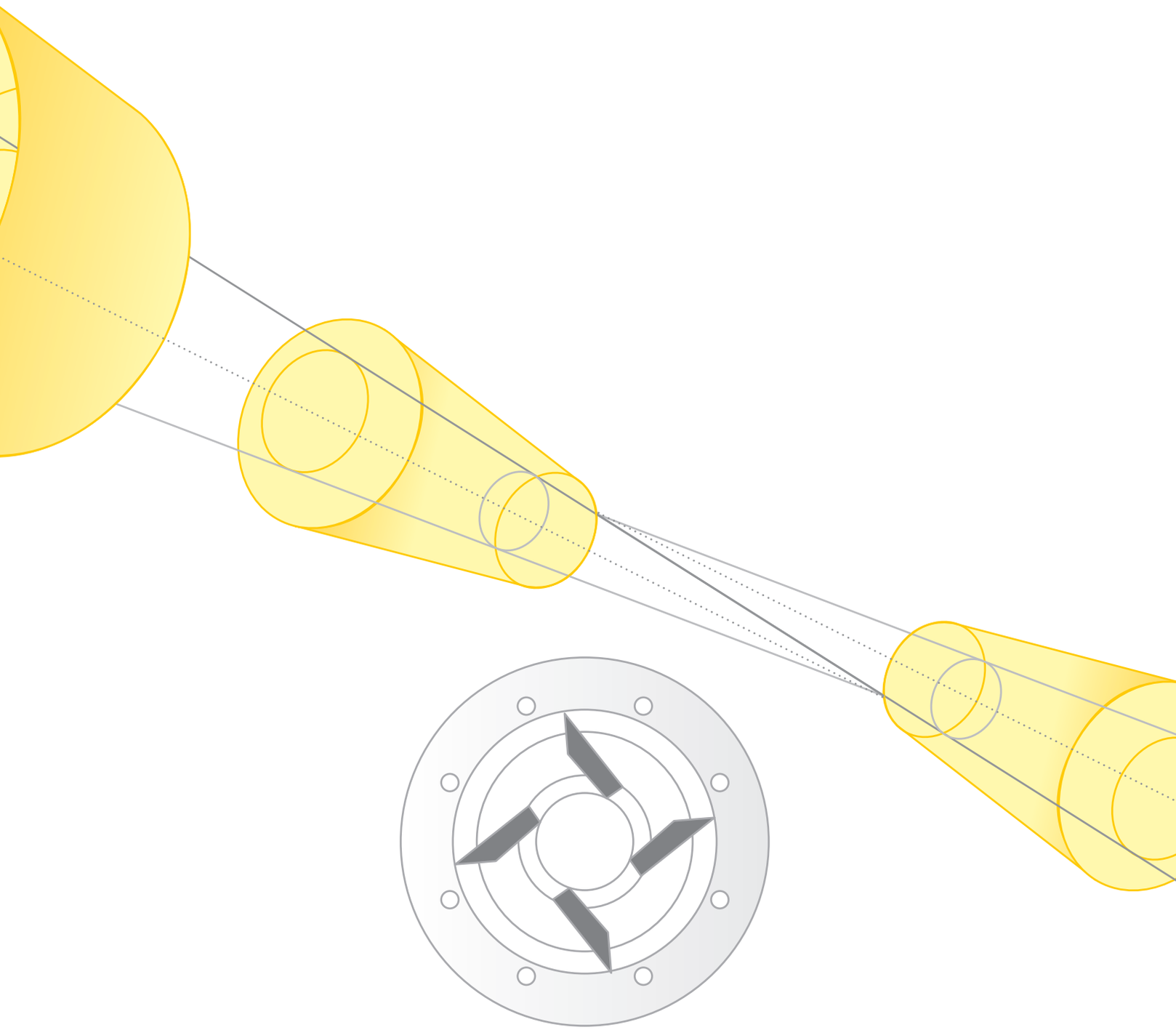

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