



	A	B	C	D	E	F	G	H	I
1			Version 0.0.7 EN			http://www.ing-goebel.com			
2	Calculation: 1x Elektrolysis-Shaft 50 m.								
3	Stand 10. Januar 2021 / Dipl.-Ing. Volker Goebel / Architect CH / Industry-Planner								
4	Diameter outside 12 meters - inside 11 meters - Depth - 50 meters (Gen. 01)								
5	Inner-Space-Capacity : 4.538 m3 / XS amount of hydrogen and oxigen								
6	Based on : Draft-Plan 2020-2021 ArchiCAD - net build time 0,5 yrs - from building permit								
7									
8									
9		Type of Cost	Amount etc.	Offer from	Factor	Sum	Remarks	dwg	
10									
11		Planning and CAD	2020-2021	Ing. Goebel	50.000 €	50.000 €	ing-goebel.com	yes	
12		Building-Land	16.500 m2	Raffinery Heide		0 €	they own it	yes	
13		Electric-Power	1 x	provided by site		0 €	5 kV Power	yes	
14		Water-Supply	1 x	provided by site		0 €	10 bar DN 530	yes	
15		Base-Foundation	1 x	120 m3	1.000 €/m3	120.000 €	concrete 0,3-0,6 m	yes	
16		Electric-Install.	Cabels, Controls	Electric Company	6 areas	600.000 €	über 6 Monate		
17		Approval fees		Heide / Town		6.000 €	fee for building p.		
18		Excavation D=12 m	1 round hole	with digger	10.000.000 €	10.000.000 €	Digging and Wall	yes	
19		Shot-crete shaft wall	14 m2 x 50 m	700 m3	600 €/m3	420.000 €	reinforced with steel fibers	yes	
20		Truck-Crane	6 month	local supplier	1.150 €/day	57.500 €	50 tons 1x 200 tons		
21		Wall in the middle	50 m x 11 m	local company	1.000 €/m3	165.000 €	Thick 0,3 m in C25		
22		Sheet-Metal-Anodes	24 elements	0,114 m2 x 15,1 m	25.000 €/p.	600.000 €	13,5 t/p. in 3 mm	yes	
23		Holder with D&S	120 elements	local supplier	350 €/p.	42.000 €	5 mm, assembled		
24		Sheet-Metal-Cathodes	24 elements	0,114 m2 x 15,1 m	25.000 €/p.	600.000 €	13,5 t./p. in 3 mm	yes	
25		Shaft-Completion	10 craftsmen	3 month	5.000 €	150.000 €	Assembly A C T		
26		Tubes DN 120	180 meters	37,4 kg / meter	6.732 kg	33.660 €	PN 16 to PN 150	yes	
27		Tubes DN 200	1.100 meters	26,4 kg / meter	29.040 kg	145.200 €	PN 16 bar	yes	
28		Flanges	160 x	4 kg / piece	640 kg	3.200 €	PN 16 to PN 150		
29		T-Valves	80 x	7 kg / piece	560 kg	8.400 €	to PN 150		
30		Isolated E-Cables	440 meters	8 kg / meter	3.520 kg	19.360 €	Copper, isolated	yes	
31		New Lid D = 12,6 m	1 x	casted steel	370 N/mm2	1.500.000 €	delivery time 6 m.	yes	
32		Basic Flange 12,6	1 x	casted steel	370 N/mm2	750.000 €	delivery time 6 m.		
33		Expl. Prev.-Wall	20 m2 x 14 m	280 m3	1.000 €/m3	280.000 €	C25 reinforced	yes	
34		Unforeseen	5%	Geology ? Winter ?		777.516 €	Offer-Risk-Gain		
35		Sum / Date	January 2021	Version 7 EN		16.327.836 €	Offer by Ing. Goebel		
36									
37									
38		Calculations : here for 50 m. / 700 m. / 1.100 m				16,4 Mio. EUR			
39									
40		open inner shaft volume	4.538 m3			net / free Heide			
41		surface of anodes and cathodes	8.238 m2			Draft, Implementation, Build-S.-Surv.			
42									
43		testing, verification, optimisation electrolysis shaft				Construction pit embankment/sprue			
44		3 Rings of Anodes-Cathodes over each other - tests				Tubbings & shotcrete = concrete wall			
45		Elektrolysis and Synthesis possible in this one shaft				Back-pouring of the round conc.-wall			
46		but the very long shafts are more efficient per KW				Test-Vessel for H2/O and Methanol			
47									
48									
49		Order placed by : Name, Location, Date			Order accepted by : Name, Location, Date				
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