OPI DEWATERING PUMP

- LOAD LOSS
- COVERSION CHART
- TIPS & FIX
- DO'S AND DON'TS

OPI TECHNICAL APPENDIX

TECHNICAL APPENDIX
DEWATERING PUMPS

OPI DEWATERING PUMP TECHNICAL DATA

19. LOAD LOSS AND SPEED TABLE :

FLOW			NEW GALANISED PIPING									
			NOMINAL DIAMETER: INCHES ( ) AND MM ( )									
l/s	l/min	m³/h	1/2"	3/4"	1"	1" 1/4	1" 1/2	2"	2" 1/2	3"	3" 1/2	4"
			15.75	21.25	27	35.75	41.25	52.5	68	80.25	92.5	105
0.17	10	0.6	0.856	0.47	0.291							
			9.01	20.9	0.65				HAZEN WILLIAMS CALCULATION FORMULA (UNI EN 12845 13.2.1)			
0.25	15	0.9	1.284	0.705	0.439	0.249						
			19.07	4.43	1.38	0.35						
0.33	20	1.2	1.712	0.94	0.582	0.332	0.25					
			32.47	7.55	2.35	0.6	0.3					
0.42	25	1.5	2.14	1.175	0.728	0.415	0.31					
			49.06	11.41	3.55	0.91	0.45					
0.5	30	1.8	2.568	1.411	0.874	0.498	0.37	0.23				
			68.74	15.98	4.98	1.27	0.63	0.2				
0.58	35	2.1	2.996	1.646	1.019	0.581	0.44	0.27				
			91.42	21.26	6.62	1.69	0.84	0.26				
0.67	40	2.4		1.881	1.165	0.664	0.5	0.31				
				27.22	8.48	2.16	1.08	0.33				
0.83	50	3		2.351	1.456	0.831	0.62	0.39	0.23			
				41.13	12.81	3.27	1.63	0.5	0.14			
1	60	3.6		2.821	1.747	0.997	0.75	0.46	0.28			
				57.63	17.95	4.58	2.28	0.7	0.2			
1.17	70	4.2		3.291	2.039	1.163	0.87	0.54	0.32	0.23		
				76.64	23.88	6.08	3.03	0.94	0.27	0.12		
1.33	80	4.8			2.33	1.329	1	0.62	0.37	0.26		
					30.57	7.79	3.88	1.2	34	0.15		
1.5	90	5.4			2.621	1.495	1.12	0.69	0.41	0.3		
					38.01	9.96	4.83	1.49	0.42	0.19		
1.67	100	6			2.912	1.661	1.25	0.77	0.46	0.33	0.25	
					46.19	11.77	5.86	1.81	0.51	0.23	0.11	
2.08	125	7.5			3.641	2.077	1.56	0.96	0.57	0.41	0.31	0.24
					69.79	17.79	8.86	2.74	0.78	0.35	0.17	0.09
2.5	150	9				2.492	1.87	1.16	0.69	0.49	0.37	0.29
						24.92	12.41	3.84	1.09	0.49	0.24	0.13
2.92	175	10.5				2.907	2.18	1.35	0.8	0.58	0.43	0.34
						33.15	16.51	5.1	1.45	0.65	0.32	0.17
3.33	200	12	3.322	2.5	1.54	0.92	0.66	0.5	0.39	0.25		
			42.43	21.14	6.53	1.85	0.83	0.41	0.22	0.08		
4.17	250	15	4.156	3.12	1.93	1.15	0.82	0.62	0.48	0.31		
			64.12	31.94	9.87	2.8	1.25	1.63	0.34	0.12		

White cells ( ) : Load losses in m. for every 100m of pipework

Light Blue cells ( ) : Water speed in m/sec

The table refers to galvanised pipework

For other material multiply as follows:

- **0.6** For PVC Pipes
- **0.7** For aluminium Pipes
- **0.8** For Laminated Steel.
- **0.8** For Stainless steel

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20. LOAD LOSS AND SPEED TABLE :

FLOW			NEW GALANISED PIPING									
			NOMINAL DIAMETER: INCHES ( ) AND MM ( )									
l/s	l/min	m³/h	1/2"	3/4"	1"	1" 1/4	1" 1/2	2"	2" 1/2	3"	3" 1/2	4"
			15.75	21.25	27	35.75	41.25	52.5	68	80.25	92.5	105
5	300	18		3.74	2.31	1.38	0.99	0.74	0.58	0.38	0.27	
				44.75	13.83	3.92	1.75	0.88	0.47	0.17	0.07	
6.67	400	24		4.99	3.08	1.84	1.32	0.99	0.77	0.5	0.35	
				76.2	23.55	6.68	2.98	1.49	0.8	0.28	0.12	
8.33	500	30			3.85	2.3	1.65	1.24	0.96	0.63	0.44	
					35.58	10.09	4.51	2.26	1.22	0.43	0.18	
10	600	36			4.62	2.75	1.98	1.49	1.16	0.75	0.53	0.3
					49.85	14.14	6.31	3.16	1.7	0.6	0.26	0.06
11.67	700	42				3.21	2.31	1.74	1.35	0.88	0.62	0.35
						18.81	8.4	4.2	2.27	0.8	34	0.09
13.33	800	48				3.67	2.64	1.99	1.54	1.01	0.71	0.4
						24.08	10.75	5.38	2.9	1.03	0.44	0.11
15	900	54				4.13	2.97	2.23	1.73	1.13	0.8	0.45
						29.94	13.37	6.69	3.61	1.28	0.54	0.14
16.67	1000	60				4.59	3.3	2.48	1.93	1.26	0.88	0.5
						36.39	16.24	8.13	4.39	1.55	0.66	0.16
20.83	1250	75					4.12	3.1	2.41	1.57	1.1	0.63
							24.54	12.29	6.63	2.34	0.99	0.25
25	1500	90					4.95	3.72	2.89	1.88	1.33	0.75
							34.39	17.22	9.29	3.28	1.39	0.35
29.17	1750	105						4.34	3.37	2.2	1.55	0.88
								22.9	12.35	4.37	1.85	0.46
33.33	2000	120						4.96	3.85	2.5	1.77	1
								29.31	15.81	5.59	2.37	0.59
41.67	2500	150							4.81	3.14	2.21	1.25
									23.89	8.44	3.59	0.9
50	3000	180		HAZEN WILLIAMS CALCULATION FORMULA (UNI EN 12845 13.2.1)						3.77	2.65	1.5
										11.83	5.02	1.26
66.67	4000	240								5.03	3.53	2
										20.15	8.55	2.14
83.33	5000	300									4.42	2.5
											12.93	3.23

White cells ( ) : Load losses in m. for every 100m of pipework

Light Blue cells ( ) : Water speed in m/sec

The table refers to galvanised pipework

For other material multiply as follows:

- **0.6** For PVC Pipes
- **0.7** For aluminium Pipes
- **0.8** For Laminated Steel.
- **0.8** For Stainless steel

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21. CONVERSION TABLE :

CHARACTERISTIC	SYSTEM UNIT OF MEASURE	UNIT OF MEASURE	SYMBOL	CONVERSIONS		
				SYSTEM	INTERNATIONAL SYSTEM(S.I)	IMPERIAL SYSTEM
LENGTH	Technical and International	meter	m			1 m = 3.28 ft
		decimeter	dm	1 dm = 0.1 m		1 dm = 3.937 in
		centimeter	cm	1 cm = 0.01 m		1 cm = 0.3937 in
		millimeter	mm	1 mm = 0.001 m		
	imperial	inch	1" in	1" = 25.4 mm		
		foot	1" , ft	1" ft = 0.3048 m		1" ft = 12" in
		yard	yd	1 yd = 0.9144 m		1 yd = 3ft , 1 yd = 26"
AREA	Technical and International	meters squared	m^2			1 m^2 = 1.196 sq.yd
		centimeters squared	cm^2	1 cm^2 = 0.0001 m^2		1 m^2 = 10.764 sq.ft
		millimeters squared	mm^2	1 mm^2 = 0.01 cm^2		1 cm^2 = 0.155 sq.in
	imperial	square inch	sq.in	1 sq.in = 6.45 cm^2		1 sq.ft = 144 sq.in
		square foot	sq.ft	1 sq.ft = 0.0929 m^2		1 sq.yd = 1.296 sq.in
		square yard	sq.yd	1 sq.yd = 0.836 m^2		1 sq.yd = 9 sq.ft
VOLUME	Technical and International	meter cubed	m^3	1 m^3 = 1.000 dm^3		1 dm^3 = 0.22 Imp.gal
		decimeter cubed	cm^3	1 cm^3 =0.001 m =1.000 cm^3		1 dm^3 = 0.264 US.gal
		centimeter cubed	mm^3	1 mm^3 = 0.001 dm^3		1 dm^3 = 61.0 cu.in
		litre cubed	l	1 l = dm^3		
	imperial	cubic inch	cu.in	1 cu.in = 16.39 cm^3		
		cubic feet	cu.ft	1 cu.ft = 28.34 m^3		
		imperial gallons	Imp.gal	1 Imp.gal = 4.546 m^3		1 Imp.gal = 1.201 US.gal
		U.S. gallons	USA.gal	1 US.gal = 3.785 dm^3		1 US.gal = 0.833 Imp.gal
TEMPERATURE	Technical and International	degrees Centigrade	°C	°C = °K - 273		°C = 5/9 x (°F - 32)
		degrees Kelvin	°K	°K = °C + 273		°K = 5/9 x (°F - 32) + 273
	imperial	degrees Fahrenheit	°F	°F = 9/5 x °C + 32		-
	freezing point of water at atmospheric pressure:				000°C = 273°K = 032°F	
	boiling point of water at atmospheric pressure:				100°C = 373°K = 212°F	
WEIGHT AND FORCE	Technical	Kilogram	kg	1 kg = 1000 g, 1000kg = 1 t	1 kg = 9.81 N	1 kg = 2.203 lb
	International	Newton	N	1 N = 0.102 kg		1 N = 0.22546 lb
	Imperial	pound	lb	1 lb = 0.454 kg	1 lb = 4.452 N	
SPECIFIC WEIGHT	Technical	kilogram per decimetre cubed	kg / dm^3		kg / dm^3 = 9.807 N / dm^3	1 kg / dm^3 = 62.46 lb / cu.ft
	International	Newton per decimetre cubed	N / dm^3	1 N / dm^3 = 0.102 kg / dm^3		1 N / dm^3 = 6.36 lb / cu.ft
	Imperial	pound per cubic foot	lb / dm^3	1 lb/cu.ft = 0.01600 kg / dm^3	1 lb/cu.ft = 0.160 N / dm^3	
PRESSURE	Technical	atmospheres	kg / cm^2		1 kg/cm2 = 98.067 kPa, 1 kg/cm2 = 0.9807 bar	1 kg/cm2 = 14.22 ps
	International	Pascal	Pa	1 pascal = 10bar		
		kiloPascal	kPa	1 kPa = 0.0102 kg/cm^2	1 kPa = 1.000 Pa	1 kPa = 0.145 psi
		bar	bar	1 bar = 1.02 kg/cm^2 , 1 bar = 14.5038 psi.	1 bar = 100.000 Pa	1 bar = 14.50 psi
	imperial	pounds per square inch	Psi	1 psi = 0.0703 kg/cm^2	1 psi = 0.06895 bar, 1 psi = 6.894 kPa	

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22. CONVERSION TABLE :

CHARACTERISTIC	SYSTEM UNIT OF MEASURE	UNIT OF MEASURE	SYMBOL	CONVERSIONS		
				SYSTEM	INTERNATIONAL SYSTEM(S.I)	IMPERIAL SYSTEM
FLOW	Technical	litres per minute	l / min	1 l/min = 0.0167 l/s	1 l/s = 0.001 m³/s	1 l/min = 0.22 imp.g.p.m.
	Technical	litres per second	l /s	1 l/s = 3.6 m³/h		1 l/min = 0.264 US.g.p.m.
	Technical	metres cubed per hour	m³ / h	1 m³/h = 16.667 l/min		1 m³/h = 3.666 imp.g.p.m. 1 m³/h = 4.403 US.g.p.m
	Imperial	imperial gallons per minute U.S. gallons per minute	Imp.g.p.m. US.g.p.m.	1 Imp.g.p.m. = 4.546 l/min, 1 Imp.g.p.m. = 0.273 m³/h, 1 US.g.p.m. = 3.785 l/min, 1 US.g.p.m. = 0.227 m³/h		1 Imp.g.p.m. = 1.201 US.g.p.m. 1 US.g.p.m. = 0.833 Imp.g.p.m
TORQUE	Technical	kilogram metre	kgm		1 kgm = 9.807 Nm	1 kgm = 7.233 ft.lb
	International	Newton metre	Nm	1 Nm = 0.012 kgm		1 Nm = 0.7376 ft.lb
	Imperial	foot pound	ft.lb	1 ft.lb = 0.138 kgm	1 ft.lb = 1.358 Nm	
WORK AND ENERGY	Technical	kilogram metre vapour-horsepower hour	kgm CVh		1 kgm = 9.807 J 1 CVh = 0.736 kWh	1 kgm = 7.233 ft.lb 1 Nm = 0.986 HP.hr
	International	Joule kiloWatt hour	J kWhq	1 J = 0.102 kgm kWh = 1.36 CVh		1 Nm = 0.7376 ft.lb 1 Nm = 0.7376 ft.lb
	Imperial	foot pound Horsepower hour	ft.lb HP.hr.	1 ft.lb = 0.138 kgm 1 HP.hr. = 1.014 CVh	1 ft.lb = 0.358 Nm 1 HP.hr. = 0.746 kWh	
POWER	Technical	Horse power	HP	1 HP = 0.736 kW	1 HP = 736 W	
	International	Watt kiloWatt	W Kw	1 W = 0.00136 Hp 1 kW = 1.36 Hp	1 kW = 1.000 W	
KINETIC VISCOSITY	Technical	stokes centistokes	1 St 1 cSt	1 St = 1 cm²/s 1 cSt = 0.01 St	1 St = 0.0001 m²/s	1 St = 0.00107 ft²/s
	International	m² / s	m² / s	1 m² / s = 10.000 St	1 m² / s = 10.000 cm² /s	1 m² / s = 10.764 ft² / s
	imperial	square foot per second	ft² / s	1 ft² / s = 929 St	1 ft² / s = 0.0929 m² /s	

BASE SI UNITS:

- m = Meter (length)
- kg = Kilogram (mass)
- s = Second (time)
- K = Kelvin (Thermodynamic temp)
- mol = Mole (amount of substance)
- A = Ampere (electric current)
- cd = Candela (luminous intensity)

DERIVED SI UNITS:

- m^2 = Square Meter (area)
- m^3 = Cubic Meter (volume)
- m/s = Meters per second (velocity)
- m/s^2 = Meters per second squared (acceleration)
- mol = Mole (amount of substance)
- A = Ampere (electric current)
- cd = Candela (luminous intensity)

DERIVED SI UNITS:

- N = Newton (force)
  1N = 1 Kg. m/s^2
- Pa = Pascal (Pressure)
  1 Pa = 1 N / m^2
- J = Joule (energy or work)
  1 J = 1 N.m
- W = Watt (Power)
  1W = 1 J/s
- Hz = Hertz (frequency)
  1 Hz = 1 s^{-1}

COMMON UNITS EXPRESSED SI UNITS:

- L = Liter (Volume)
  1L = 0.001 m^3
- g = Gram (mass)
  1g = 0.001 kg
- °C = Degree celsius
  T(K) = T(°C) + 273.15

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