

Supplementary Materials: Article

Improved Planning of Energy Recovery in Water Systems Using a New Analytic Approach to Performance Curves

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Annex01 Used PATs

Table S1. Experimental database PATs.

Pump Model	D (mm)	n (rpm)	Q _{i,BEP} (l/s)	H _{i,BEP} (m w.c.)	η _t	Reference
No defined	225	1500	19.93	25.80	0.73	[1]
No defined	258	1500	50.23	47.37	0.77	[1]
No defined	206	1500	33.00	20.66	0.81	[1]
No defined	174	1450	23.55	14.42	0.72	[1]
No defined	264	1450	88.93	27.80	0.84	[1]
No defined	200	1450	45.43	14.72	0.80	[1]
No defined	139	1450	17.85	8.74	0.76	[1]
No defined	165	1450	44.94	9.32	0.74	[1]
No defined	224	1450	130.38	14.64	0.76	[1]
No defined	250	1450	12.48	36.49	0.64	[2]
No defined	250	1450	37.68	39.78	0.73	[2]
No defined	250	1450	84.66	31.31	0.74	[2]
No defined	250	1450	123.05	23.45	0.78	[2]
KSB_Etanorm 050-032-250	260	1520	8.32	72.96	0.32	[3]
KSB_Etanorm 050-032-200	209	1520	6.03	33.73	0.51	[3]
KSB_Etanorm 065-040-200	209	1520	10.21	32.80	0.56	[3]
KSB_Etanorm 050-032-160	176	1520	5.55	20.95	0.61	[3]
KSB_Etanorm 065-050-250	260	1520	16.26	37.93	0.64	[3]
KSB_Etanorm 065-050-125	142	1520	16.07	8.56	0.78	[3]
KSB_065-040-335	330	1450	13.08	93.28	0.43	[4]
KSB_065-040-315	326	1450	14.11	110.80	0.35	[4]
KSB_065-040-250	260	1450	10.65	43.66	0.51	[4]
KSB_065-040-200	209	1450	9.72	25.50	0.59	[4]
KSB_065-050-160	174	1450	15.28	13.10	0.73	[4]
KSB_100-080-220	219	1450	36.52	22.40	0.78	[4]
KSB_80-200	198	1450	31.22	17.60	0.76	[4]
KSB_125-100-200	219	1450	50.00	18.80	0.84	[4]
No defined	224	1450	84.33	13.30	0.84	[4]

No defined	185	1450	43.63	7.82	0.70	[4]
No defined	No Defined	1450	26.02	38.00	0.65	[4]
No defined	No Defined	1450	40.28	33.20	0.73	[4]
KSB_Etanorm 050-032-125	139	1020	3.72	4.66	0.61	
KSB_Etaline 100-100-125	141	3000	49.25	29.50	0.72	
KSB_150-150-250	269	1489	99.73	32.15	0.83	
No defined	269	1450	45.70	24.44	0.84	[5]
No defined	219	1450	50.20	17.38	0.85	[5]
No defined	185	1450	59.60	12.90	0.71	[5]
No defined	224	1050	94.90	8.44	0.75	[5]
SPP_Unistream 65/16	174	1200	17.33	8.99	0.78	[6]
KSB_RDL200-340A	350	1500	124.50	44.82	0.84	[6]
Ingersoll-Rand_	No Defined	401.6	2.10	2.41	0.56	[6]
Ingersoll-Rand_	686	730	1744.00	13.16	0.86	[6]
Ingersoll-Rand_	686	725	2073.00	13.18	0.85	[6]
De Laval_L10/8	505	837	112.00	30.30	0.81	[6]
No defined	250	1100	23.16	11.75	0.76	[7]
No defined	225	1100	21.94	11.71	0.71	[7]
No defined	200	1200	24.46	12.41	0.60	[7]
Sulzer_APP22-80	255	1200	28.31	15.81	0.72	[8]
Sulzer_A22-80	265	800	28.88	8.95	0.79	[8]
Sulzer_A11_50	210	1200	16.03	16.93	0.71	[8]
No defined	180	1485	10.67	11.09	0.74	[9]
No defined	158	1500	19.42	13.60	0.64	[10]
No defined	132	1500	19.66	9.24	0.72	[10]
No defined	260	1000	16.73	16.62	0.63	[11]
No defined	214	1000	16.08	10.93	0.71	[11]
No defined	174	1000	14.52	6.82	0.70	[11]
No defined	141	1000	17.04	3.19	0.74	[11]
No defined	300	1450	255.21	24.00	0.80	[12]
No defined	165	2900	8.07	74.23	0.61	[13]
No defined	190	2900	50.00	61.00	0.66	[14]
No defined	200	2900	21.00	67.00	0.74	[14]
No defined	120	1450	22.00	4.60	0.49	[14]
No defined	255	1500	26.45	39.17	0.63	[15]
No defined	235	1500	23.93	32.40	0.60	[15]
No defined	215	1500	26.01	37.52	0.59	[15]
No defined	177	2000	47.30	19.40	0.73	[6]
KSB_Etanorm 65-315	325	3000	49.53	221.20	0.69	[6]
KSB_Movi 50/60	180	2000	10.51	29.96	0.71	[6]
KSB_Etanorm 100-200	215	2900	114.00	66.96	0.83	[6]
KSB_Etanorm 100-250	262	1475	51.48	28.60	0.80	[6]

KSB_Etanorm 100-200	219	1050	40.51	10.27	0.82	[6]
KSB_Etanorm 100-160	185	1250	55.00	11.24	0.74	[6]
KSB_Etanorm 150-200	224	1450	138.00	17.62	0.76	[6]
TKL_50-32-200	181	3000	10.07	177.10	0.44	[6]
TKL_65-50-160	160	3000	14.14	64.74	0.70	[6]
TKL_80-65-125	125	3000	28.51	28.70	0.80	[6]
Hidrostal_125-315	356	1800	108.20	77.32	0.77	[6]
HIDROSTAL_E8K-HD	No Defined	1750	170.80	16.32	0.80	[6]
JYOTI_	No Defined	3000	17.10	44.52	0.61	[6]
JYOTI_	No Defined	1450	53.39	8.94	0.65	[6]
SULZER_HPH25	No Defined	664.4	1.41	1.49	0.85	[6]
Bingham-Willamette_	No Defined	734.6	1.35	1.66	0.71	[6]
Escher Wyss_	No Defined	813.8	1.10	0.92	0.86	[6]
KSB_DIN1944	315	1510	83.21	46.47	0.75	[6]
Ingersoll-Rand_	284	1750	50.46	48.47	0.74	[6]
No defined	200	2000	32.49	49.17	0.64	[6]
RÜTSCHI_NCP8-250	250	1000	11.78	21.59	0.66	[6]
GILKES_EM132	101.4	2500	2.70	27.32	0.56	[6]
SMIT035_3L2	246	1450	24.60	23.00	0.58	[6]
Voith_Old standard pump	312	700	50.00	6.27	0.85	[6]
Byron Jackson_Old standard pump	No Defined	3100	24.91	69.43	0.67	[6]
Byron Jackson_Old Standard Pump	340	2500	267.30	128.70	0.91	[6]
Byron Jackson_	No Defined	1933	224.60	90.92	0.87	[6]
Byron Jackson_Old standard pump	340	2500	268.30	116.20	0.90	[6]
Hitachi_Scale 1:4.11	350	2940	369.40	182.00	0.89	[6]
Hitachi_Scale 1:8.2	409	1607	424.40	23.20	0.79	[6]
Hitachi_Scale 1:8.2	409	1507	413.80	10.70	0.78	[6]
No defined	273	857	51.85	9.15	0.74	[6]
No defined	No Defined	4500	306.20	127.45	0.89	[6]
No defined	No Defined	482	1419.00	6.53	0.69	[6]
KSB_Etanorm 50-315	320	920	12.19	27.98	0.52	[6]
KSB_Etanorm 100-315	334	1500	69.39	49.01	0.81	[6]
KSB_Etanorm 100-200	219	1500	56.15	22.11	0.78	[6]
No defined	No Defined	866.8	1.31	1.27	0.86	[6]
Peerless_Old Standard Pump(10MH)	210	1173	90.40	3.48	0.79	[6]
Peerless_Old Standard Pump(10PL)	203	609.2	51.73	0.54	0.76	[6]
No defined	No Defined	1060	14.16	8.04	0.80	[6]
Byron-Jackson_Standard Pump (54RXM)	1372	592	2940.00	40.75	0.73	[6]
Worthington-Simpson_Standard Pump (6L2)	318	1510	48.15	40.84	0.78	[6]

Worthington-Simpson_Standard Pump(6L1)	216	1525	64.90	24.64	0.75	[6]
No defined	280	1550	120.50	34.00	0.78	[6]
Worthington-Simpson_Standard Pump (25WB125)	134	3100	3.75	55.86	0.47	[6]
Flygt_Standard Pump(BS2102HT)	184	3000	18.68	40.31	0.52	[6]
Flygt_Standard Pump(BS2102MT)	140	3000	44.79	27.12	0.67	[6]
Layne and Bowler_Standard Pump	No Defined	2070	1.28	1.29	0.77	[6]
Worthington-Simpson_Standard Pump(1CH52)	127	3550	11.53	61.40	0.65	[6]
Pumpiran_Etanorm 40-125	139	1200	5.10	11.99	0.54	[16]
KSB_Etanorm 200-150-400	419	1000	90.57	28.69	0.90	[17]
Standart Pompa_150/315_PaT-NT/V8-6-13	328	750	71.39	14.35	0.67	[18]
No defined	193	1450	21.00	14.70	0.76	[19]
Lowara_FHE 80-200/220	189	2900	60.33	72.29	0.61	[20]
Lowara_92SV1G75T	146	2900	30.83	32.24	0.66	[20]
Lowara_92SV2G150T	146	2900	30.09	57.21	0.72	[20]
Besple_GDD80-20	258	1450	19.44	30.50	0.70	[21]
No defined	203	1480	22.22	19.80	0.76	[21]
Besple_GDD100-21	140	2900	25.14	36.60	0.76	[21]
KSB_Movitec-VF-90-1	No Defined	3000	31.40	37.10	0.75	[22]
No defined	193	1500	12.27	87.49	0.69	[23]
No defined	193	1450	21.29	14.71	0.76	[24]
Grundfos_NK40-160/158	158	3000	18.00	51.42	0.72	[25]
Grundfos_NK40-125/127	127	3000	18.10	30.46	0.69	[25]
Grundfos_NK65-125/127	127	3000	39.10	25.19	0.69	[25]
Pedrollo_FG 32/160B	155	1450	4.99	18.62	0.40	[26]
No defined	200	1750	28.67	37.59	0.64	[27]
Southern_Cross_50x32-160-L	No Defined	1470	5.70	23.10	--	[28]
Southern_Cross_50x32-160-M	No Defined	1470	4.90	19.10	--	[28]
Southern_Cross_50x32-160-S	No Defined	1470	5.00	16.70	--	[28]
Southern_Cross_65x50-160-L	No Defined	1470	9.00	18.30	--	[28]
Southern_Cross_65x50-160-M	No Defined	1470	7.80	16.80	--	[28]
Southern_Cross_65x50-160-S	No Defined	1470	7.20	14.30	--	[28]
Southern_Cross_80x65-160-L	No Defined	1491	13.40	15.50	--	[28]
Southern_Cross_80x65-160-M	No Defined	1491	11.00	13.10	--	[28]
Southern_Cross_80x65-160-S	No Defined	1491	10.60	11.60	--	[28]
Southern_Cross_80x50-200-L	No Defined	1491	15.00	27.90	--	[28]
Southern_Cross_80x50-200-M	No Defined	1491	14.00	22.70	--	[28]
Southern_Cross_80x50-200S	No Defined	1491	12.60	17.30	--	[28]
Southern_Cross_100x80-160-L	No Defined	1491	24.90	15.10	--	[28]

Southern_Cross_100x80–160-M	No Defined	1491	22.80	10.80	--	[28]
Southern_Cross_100x80–160-S	No Defined	1491	21.80	8.60	--	[28]
Southern_Cross_100x65–200-L	No Defined	1491	26.10	24.50	--	[28]
Southern_Cross_100x65–200-M	No Defined	1491	23.30	19.70	--	[28]
Southern_Cross_100x65–200-S	No Defined	1491	21.50	16.70	--	[28]
Southern_Cross_100x65–250-L	No Defined	1523	28.20	39.20	--	[28]
Southern_Cross_100x65–250-M	No Defined	1523	26.60	32.00	--	[28]
Southern_Cross_100x65–250-S	No Defined	1523	24.50	26.50	--	[28]
Southern_Cross_125x100–200-L	No Defined	1512	50.00	21.40	--	[28]
Southern_Cross_125x100–200-M	No Defined	1512	46.50	15.60	--	[28]
Southern_Cross_125x100–200-S	No Defined	1512	42.30	13.10	--	[28]
Southern_Cross_125x100–250-L	No Defined	1523	54.70	37.50	--	[28]
Southern_Cross_125x100–250-M	No Defined	1523	49.60	30.10	--	[28]
Southern_Cross_125x100–250-S	No Defined	1523	46.50	22.90	--	[28]
Southern_Cross_150x125–250-L	No Defined	1523	89.60	32.50	--	[28]
Southern_Cross_150x125–250-M	No Defined	1523	93.80	25.80	--	[28]
Southern_Cross_150x125–250-S	No Defined	1523	69.00	20.00	--	[28]
ISH Pumps_META series pump	132	1500	6.00	13.50	0.48	[29]
KSB_Omega 125-290A	301	1520	95.83	35.00	0.81	[30]
KSB_Omega 250-370A	389	1020	302.78	30.00	0.85	[30]
No defined	255	1500	25.00	35.00	0.66	[31]
No defined	242	2900	11.11	117.20	0.69	[32]
No defined	300	750	145.68	3.41	0.65	[33]
Kitlodkar_MF 17.5/20	236	1450	126.00	12.49	0.83	[34]
KSB_Omega 350-510A	518	760	484.98	23.13	0.89	[35]
No defined	No Defined	2900	24.58	87.00	0.65	[36]
Pump_Iran_100-250	259	1450	50.00	29.36	0.75	[37]
No defined	250	1000	17.85	13.87	0.77	[38]
No defined	No Defined	1000	320.00	26.17	--	[39]
Calgon_HES 40-200	182	1500	13.52	30.00	0.39	[40]
No defined	200	1500	20.08	20.82	0.64	[41]
No defined	400	600	106.00	9.00	0.87	[42]
KSB_	No Defined	1515	27.00	90.00	0.74	[43]
No defined	312	1450	13.89	51.80	0.60	[44]

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