

LAMPIRAN

Data interval kerusakan komponen Filter

Tanggal	Interval Waktu
13 Desember 2018	-
14 Januari 2019	32
20 Februari 2019	37
13 Maret 2019	21
18 April 2019	36
23 Mei 2019	35
20 Juni 2019	28
21 Juli 2019	31
20 Agustus 2019	30
27 September 2019	38
09 November 2019	43
13 Desember 2019	34

Data interval kerusakan komponen
Restrictor Tubing

Tanggal	Interval Waktu
04 Desember 2018	-
21 Januari 2019	48
01 Maret 2019	39
12 April 2019	42
12 Mei 2019	31
03 Juli 2029	51
07 Agustus 2019	35
23 September 2019	47
07 November 2019	45

Waktu perbaikan kerusakan komponen Filter

Tanggal	Mulai (jam)	Selesai (jam)	Total perbaikan (jam)
14 Januari 2019	08.05	12.05	4
20 Februari 2019	10.15	15.15	5
13 Maret 2019	14.30	17.30	3
18 April 2019	09.15	15.15	6
23 Mei 2019	08.20	14.20	6
20 Juni 2019	10.45	13.45	3
21 Juli 2019	14.35	19.35	5
20 Agustus 2019	11.40	16.40	5
27 September 2019	08.30	14.30	6
09 November 2019	10.10	17.10	7
13 Desember 2019	09.45	13.45	4

Waktu perbaikan kerusakan komponen *Restrictor Tubing*

Tanggal	Mulai (jam)	Selesai (jam)	Total perbaikan (jam)
21 Januari 2019	09.55	14.55	5
01 Maret 2019	11.30	14.30	3
12 April 2019	12.25	16.25	4
12 Mei 2019	08.40	11.40	3
03 Juli 2029	13.00	18.00	5
07 Agustus 2019	09.25	14.25	5
23 September 2019	10.25	14.25	4
07 November 2019	08.15	12.15	4

Tabel Hasil Perhitungan Interval Waktu Penggantian Komponen Filter
metode *age replacement*

tp	$(t/\alpha)^\beta$	$R_{tp} = \frac{1 - \exp(-t/\alpha)^\beta}{\beta}$	$F_{tp} = (1 - R_{tp})$	$(C_p \cdot R_{tp}) + C_f \cdot (1 - R_{tp})$	$(M_{tp} + T_f) \cdot (1 - R_{tp})$	$(tp + T_p) \cdot R_{tp} + M_{tp} + T_f \cdot (1 - R_{tp})$	$C_t(p)$
1	4,0698E-10	1,0000	0,0000	1305000,0003	33,0848	34,3348	38008,0880
2	2,6975E-08	1,0000	0,0000	1305000,0202	33,0848	35,3348	36932,4326
3	3,1361E-07	1,0000	0,0000	1305000,2352	33,0848	36,3348	35915,9913
4	1,7879E-06	1,0000	0,0000	1305001,3409	33,0848	37,3348	34954,0284
5	6,8974E-06	1,0000	0,0000	1305005,1731	33,0848	38,3348	34042,3414
6	2,0786E-05	1,0000	0,0000	1305015,5894	33,0848	39,3347	33177,2262
7	5,2824E-05	0,9999	0,0001	1305039,6171	33,0848	40,3344	32355,4604
8	0,0001	0,9999	0,0001	1305088,8686	33,0849	41,3339	31574,3025
9	0,0002	0,9998	0,0002	1305181,2256	33,0849	42,3327	30831,5042
10	0,0005	0,9995	0,0005	1305342,7898	33,0851	43,3304	30125,3356
11	0,0008	0,9992	0,0008	1305610,0934	33,0853	44,3262	29454,6214
12	0,0014	0,9986	0,0014	1306032,5549	33,0857	45,3188	28818,7852
13	0,0022	0,9978	0,0022	1306675,1532	33,0862	46,3066	28217,9038
14	0,0035	0,9965	0,0035	1307621,2774	33,0870	47,2872	27652,7665
15	0,0053	0,9947	0,0053	1308975,6809	33,0881	48,2573	27124,9418
16	0,0079	0,9922	0,0078	1310867,4344	33,0897	49,2126	26636,8475
17	0,0113	0,9887	0,0113	1313452,7231	33,0918	50,1474	26191,8259
18	0,0160	0,9841	0,0159	1316917,2720	33,0947	51,0547	25794,2208
19	0,0222	0,9780	0,0220	1321478,1042	33,0985	51,9256	25449,4571
20	0,0303	0,9702	0,0298	1327384,2469	33,1035	52,7491	25164,1231
21	0,0407	0,9601	0,0399	1334915,8963	33,1097	53,5121	24946,0522
22	0,0539	0,9475	0,0525	1344381,4481	33,1176	54,1993	24804,4066
23	0,0706	0,9319	0,0681	1356111,7091	33,1274	54,7929	24749,7583
24	0,0913	0,9127	0,0873	1370450,5470	33,1393	55,2731	24794,1661
25	0,1169	0,8897	0,1103	1387741,2477	33,1537	55,6181	24951,2405
26	0,1482	0,8623	0,1377	1408307,9716	33,1709	55,8051	25236,1838
27	0,1862	0,8301	0,1699	1432431,9866	33,1910	55,8110	25665,7821
28	0,2321	0,7929	0,2071	1460322,8530	33,2142	55,6137	26258,3110
29	0,2869	0,7506	0,2494	1492085,4950	33,2407	55,1944	27033,2927
30	0,3523	0,7031	0,2969	1527685,1112	33,2704	54,5387	28011,0109
31	0,4296	0,6508	0,3492	1566913,1164	33,3031	53,6400	29211,6475
32	0,5206	0,5942	0,4058	1609358,6205	33,3384	52,5010	30653,8609
33	0,6271	0,5341	0,4659	1654391,0843	33,3760	51,1363	32352,5864
34	0,7512	0,4718	0,5282	1701160,3781	33,4149	49,5736	34315,8483
35	0,8952	0,4085	0,5915	1748620,0416	33,4545	47,8543	36540,4702

Tabel Hasil Perhitungan Interval Waktu Penggantian Komponen *Restrictor Tubing* metode *age replacement*

tp	$(t/\alpha)^\beta$	$R_{tp} = \frac{1}{\exp((t/\alpha)^\beta)}$	$F_{tp} = (1 - R_{tp})$	$(C_p \cdot R_{tp}) + C_f \cdot (1 - R_{tp})$	$(M_{tp} + T_f) \cdot (1 - R_{tp})$	$(tp + T_p) \cdot R_{tp} + M_{tp} + T_f \cdot (1 - R_{tp})$	$C(tp)$
1	2,1565E-11	1,0000	0,0000	846000,0000	42,0958	43,3458	19517,4479
2	1,8780E-09	1,0000	0,0000	846000,0009	42,0958	44,3458	19077,3288
3	2,5615E-08	1,0000	0,0000	846000,0128	42,0958	45,3458	18656,6216
4	1,6355E-07	1,0000	0,0000	846000,0818	42,0958	46,3458	18254,0708
5	6,8891E-07	1,0000	0,0000	846000,3445	42,0958	47,3458	17868,5287
6	2,2307E-06	1,0000	0,0000	846001,1153	42,0958	48,3458	17498,9463
7	6,0238E-06	1,0000	0,0000	846003,0119	42,0958	49,3458	17144,3659
8	1,4243E-05	1,0000	0,0000	846007,1213	42,0958	50,3458	16803,9149
9	3,0425E-05	1,0000	0,0000	846015,2125	42,0958	51,3458	16476,8019
10	5,9995E-05	0,9999	0,0001	846029,9967	42,0959	52,3458	16162,3139
11	0,0001	0,9999	0,0001	846055,4386	42,0959	53,3459	15859,8147
12	0,0002	0,9998	0,0002	846097,1220	42,0959	54,3459	15568,7446
13	0,0003	0,9997	0,0003	846162,6707	42,0960	55,3459	15288,6208
14	0,0005	0,9995	0,0005	846262,2264	42,0961	56,3460	15019,0394
15	0,0008	0,9992	0,0008	846408,9846	42,0962	57,3460	14759,6774
16	0,0012	0,9988	0,0012	846619,7877	42,0965	58,3461	14510,2962
17	0,0018	0,9982	0,0018	846915,7731	42,0967	59,3463	14270,7453
18	0,0026	0,9974	0,0026	847323,0711	42,0972	60,3465	14040,9663
19	0,0038	0,9963	0,0037	847873,5466	42,0977	61,3468	13820,9978
20	0,0052	0,9948	0,0052	848605,5707	42,0984	62,3471	13610,9796
21	0,0072	0,9929	0,0071	849564,8064	42,0994	63,3476	13411,1572
22	0,0097	0,9904	0,0096	850804,9823	42,1006	64,3482	13221,8856
23	0,0129	0,9872	0,0128	852388,6227	42,1022	65,3490	13043,6317
24	0,0169	0,9832	0,0168	854387,6877	42,1042	66,3500	12876,9761
25	0,0220	0,9782	0,0218	856884,0674	42,1067	67,3513	12722,6113
26	0,0283	0,9721	0,0279	859969,8563	42,1098	68,3528	12581,3376
27	0,0361	0,9645	0,0355	863747,3201	42,1136	69,3547	12454,0552
28	0,0457	0,9553	0,0447	868328,4455	42,1182	70,3570	12341,7500
29	0,0573	0,9443	0,0557	873833,9511	42,1237	71,3597	12245,4742
30	0,0713	0,9312	0,0688	880391,6189	42,1302	72,3630	12166,3183
31	0,0880	0,9157	0,0843	888133,7974	42,1380	73,3669	12105,3748
32	0,1080	0,8976	0,1024	897193,9290	42,1470	74,3714	12063,6910
33	0,1317	0,8766	0,1234	907701,9677	42,1575	75,3767	12042,2118
34	0,1596	0,8524	0,1476	919778,5880	42,1696	76,3827	12041,7103
35	0,1924	0,8249	0,1751	933528,1512	42,1834	77,3896	12062,7088
36	0,2307	0,7939	0,2061	949030,4891	42,1989	78,3973	12105,3905
37	0,2753	0,7593	0,2407	966331,7026	42,2162	79,4060	12169,5053

38	0,3269	0,7211	0,2789	985434,3459	42,2353	80,4155	12254,2763
39	0,3865	0,6794	0,3206	1006287,5767	42,2561	81,4260	12358,3117
40	0,4550	0,6344	0,3656	1028778,0842	42,2786	82,4372	12479,5339
41	0,5335	0,5866	0,4134	1052722,8281	42,3026	83,4492	12615,1350
42	0,6231	0,5363	0,4637	1077864,8031	42,3277	84,4618	12761,5711
43	0,7251	0,4843	0,5157	1103873,1256	42,3537	85,4748	12914,6081
44	0,8409	0,4313	0,5687	1130348,6606	42,3802	86,4880	13069,4268
45	0,9720	0,3783	0,6217	1156836,1188	42,4067	87,5012	13220,7955

Tabel Z Distribusi Normal

Table of Standard Normal Probabilities

Z	F(Z)	Z	F(Z)	Z	F(Z)	Z	F(Z)
-3.00	0.0013	-1.48	0.0694	0.04	0.5160	1.56	0.9406
-2.96	0.0015	-1.44	0.0749	0.08	0.5319	1.60	0.9452
-2.92	0.0018	-1.40	0.0808	0.12	0.5478	1.64	0.9495
-2.88	0.0020	-1.36	0.0869	0.16	0.5636	1.68	0.9535
-2.84	0.0023	-1.32	0.0934	0.20	0.5793	1.72	0.9573
-2.80	0.0026	-1.28	0.1003	0.24	0.5948	1.76	0.9608
-2.76	0.0029	-1.24	0.1075	0.28	0.6103	1.80	0.9641
-2.72	0.0033	-1.20	0.1151	0.32	0.6255	1.84	0.9671
-2.68	0.0037	-1.16	0.1230	0.36	0.6406	1.88	0.9699
-2.64	0.0041	-1.12	0.1314	0.40	0.6554	1.92	0.9726
-2.60	0.0047	-1.08	0.1401	0.44	0.6700	1.96	0.9750
-2.56	0.0052	-1.04	0.1492	0.48	0.6844	2.00	0.9772
-2.52	0.0059	-1.00	0.1587	0.52	0.6985	2.04	0.9793
-2.48	0.0066	-0.96	0.1685	0.56	0.7123	2.08	0.9812
-2.44	0.0073	-0.92	0.1788	0.60	0.7257	2.12	0.9830
-2.40	0.0082	-0.88	0.1894	0.64	0.7389	2.16	0.9846
-2.36	0.0091	-0.84	0.2005	0.68	0.7517	2.20	0.9861
-2.32	0.0102	-0.80	0.2119	0.72	0.7642	2.24	0.9875
-2.28	0.0113	-0.76	0.2236	0.76	0.7764	2.28	0.9887
-2.24	0.0125	-0.72	0.2358	0.80	0.7881	2.32	0.9898
-2.20	0.0139	-0.68	0.2483	0.84	0.7995	2.36	0.9909
-2.16	0.0154	-0.64	0.2611	0.88	0.8106	2.40	0.9918
-2.12	0.0170	-0.60	0.2743	0.92	0.8212	2.44	0.9927
-2.08	0.0188	-0.56	0.2877	0.96	0.8315	2.48	0.9934
-2.04	0.0207	-0.52	0.3015	1.00	0.8413	2.52	0.9941
-2.00	0.0228	-0.48	0.3156	1.04	0.8508	2.56	0.9948
-1.96	0.0250	-0.44	0.3300	1.08	0.8599	2.60	0.9953
-1.92	0.0274	-0.40	0.3446	1.12	0.8686	2.64	0.9959
-1.88	0.0301	-0.36	0.3594	1.16	0.8770	2.68	0.9963
-1.84	0.0329	-0.32	0.3745	1.20	0.8849	2.72	0.9967
-1.80	0.0359	-0.28	0.3897	1.24	0.8925	2.76	0.9971
-1.76	0.0392	-0.24	0.4052	1.28	0.8997	2.80	0.9974
-1.72	0.0427	-0.20	0.4207	1.32	0.9066	2.84	0.9977
-1.68	0.0465	-0.16	0.4364	1.36	0.9131	2.88	0.9980
-1.64	0.0505	-0.12	0.4522	1.40	0.9192	2.92	0.9982
-1.60	0.0548	-0.08	0.4681	1.44	0.9251	2.96	0.9985
-1.56	0.0594	-0.04	0.4840	1.48	0.9306	3.00	0.9987
-1.52	0.0643	0.00	0.5000	1.52	0.9357		

Tabel Distribusi F

df untuk penyebut (N2)	df untuk pembilang (N1)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	161	199	216	225	230	234	237	239	241	242	243	244	245	245	246
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.40	19.41	19.42	19.42	19.43
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.76	8.74	8.73	8.71	8.70
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.94	5.91	5.89	5.87	5.86
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.70	4.68	4.66	4.64	4.62
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.03	4.00	3.98	3.96	3.94
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.60	3.57	3.55	3.53	3.51
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.31	3.28	3.26	3.24	3.22
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.10	3.07	3.05	3.03	3.01
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.94	2.91	2.89	2.86	2.85
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.82	2.79	2.76	2.74	2.72
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.72	2.69	2.66	2.64	2.62
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.63	2.60	2.58	2.55	2.53
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.57	2.53	2.51	2.48	2.46
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.51	2.48	2.45	2.42	2.40
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.46	2.42	2.40	2.37	2.35
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.41	2.38	2.35	2.33	2.31
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.37	2.34	2.31	2.29	2.27
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.34	2.31	2.28	2.26	2.23
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.31	2.28	2.25	2.22	2.20
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.28	2.25	2.22	2.20	2.18
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.26	2.23	2.20	2.17	2.15
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.24	2.20	2.18	2.15	2.13
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.22	2.18	2.15	2.13	2.11
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.20	2.16	2.14	2.11	2.09
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.18	2.15	2.12	2.09	2.07
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.17	2.13	2.10	2.08	2.06
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.15	2.12	2.09	2.06	2.04
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.14	2.10	2.08	2.05	2.03
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.13	2.09	2.06	2.04	2.01
31	4.16	3.30	2.91	2.68	2.52	2.41	2.32	2.25	2.20	2.15	2.11	2.08	2.05	2.03	2.00
32	4.15	3.29	2.90	2.67	2.51	2.40	2.31	2.24	2.19	2.14	2.10	2.07	2.04	2.01	1.99
33	4.14	3.28	2.89	2.66	2.50	2.39	2.30	2.23	2.18	2.13	2.09	2.06	2.03	2.00	1.98
34	4.13	3.28	2.88	2.65	2.49	2.38	2.29	2.23	2.17	2.12	2.08	2.05	2.02	1.99	1.97
35	4.12	3.27	2.87	2.64	2.49	2.37	2.29	2.22	2.16	2.11	2.07	2.04	2.01	1.99	1.96
36	4.11	3.26	2.87	2.63	2.48	2.36	2.28	2.21	2.15	2.11	2.07	2.03	2.00	1.98	1.95
37	4.11	3.25	2.86	2.63	2.47	2.36	2.27	2.20	2.14	2.10	2.06	2.02	2.00	1.97	1.95
38	4.10	3.24	2.85	2.62	2.46	2.35	2.26	2.19	2.14	2.09	2.05	2.02	1.99	1.96	1.94
39	4.09	3.24	2.85	2.61	2.46	2.34	2.26	2.19	2.13	2.08	2.04	2.01	1.98	1.95	1.93
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.04	2.00	1.97	1.95	1.92
41	4.08	3.23	2.83	2.60	2.44	2.33	2.24	2.17	2.12	2.07	2.03	2.00	1.97	1.94	1.92
42	4.07	3.22	2.83	2.59	2.44	2.32	2.24	2.17	2.11	2.06	2.03	1.99	1.96	1.94	1.91
43	4.07	3.21	2.82	2.59	2.43	2.32	2.23	2.16	2.11	2.06	2.02	1.99	1.96	1.93	1.91
44	4.06	3.21	2.82	2.58	2.43	2.31	2.23	2.16	2.10	2.05	2.01	1.98	1.95	1.92	1.90
45	4.06	3.20	2.81	2.58	2.42	2.31	2.22	2.15	2.10	2.05	2.01	1.97	1.94	1.92	1.89