



TEST REPORT TUCHENG

Date: _____ Date of Receipt: _____

Report No.: _____ Quantity: _____ Page Order/Pages: (P1/4) Ref. No.: NIL

Report Title: _____ Item: Filter Element

Address: _____

Oil Filter Test Report

1. Sample description: 20034A Oil Filter

2. Test Condition

ISO 4548-12:2000		
Test Fluid	Type: MIL-H-5606 Conductivity: 1956 $\mu\text{S/m}$	Viscosity: 14.9 mm^2/s Temperature: 39.5 $^{\circ}\text{C}$
Test Dust	ISO 12013-A3	
Injection System	Dust added: 45 g Volume: 12 L Injection flowrate: 4 L/h	Injection grav. Initial: 0.45 mg/L Injection grav. Final: 3750 mg/L Injection grav. Average: 3750 mg/L
Test System	Flowrate: 25 L/min Volume: 15 L	Initial Cleanliness: 0.43 mg/L Base gravimetric Level: 10 mg/L Final gravimetric Level: 15 mg/L
Dilution System	Sensor Type: PAMAS 4132 Flowrate: 25 mL/min Upstream dilution ratio: 10.1 Downstream dilution ratio: 10.0	Sample time: 30 sec Sampling time: 18 min Total counts: 36

3. Test Results

3.1 Differential Pressure

Clean assy. Δp_1 : 360 hPa Final Net Δp_5 : 999 hPa							
Relative Net Differential Pressure ($\Delta p - \Delta p_1 / \Delta p_5$)	5	10	20	30	40	80	100
Assy ($\Delta p / \text{kPa}$)	407	440	517	602	660	954	999
Test Time (min)	5	7	10	11	12	17	18

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3.2 Filtration Efficiency

Size (μm(c))	>4	>5	>6	>7	>8	>9	>10	>11
E(%) Initial	-1.5	-1.1	0.6	3.5	6.1	9.1	12.3	17.2
E(%) Minimal	-7.0	-7.0	-5.0	-2.0	1.0	4.0	8.0	13.0
E(%) Average	2.9	2.5	3.4	5.8	8.3	10.5	13.7	17.3
Size (μm(c))	>12	>13	>14	>15	>16	>17	>18	>19
E(%) Initial	21.3	25.1	29.3	35.4	40.9	44.9	47.9	51.6
E(%) Minimal	17.0	20.0	23.0	27.0	31.0	33.0	34.0	35.0
E(%) Average	20.4	23.3	26.2	30.1	33.6	36.2	39.2	41.5
Size (μm(c))	>20	>21	>22	>23	>24	>25	>26	>27
E(%) Initial	53.4	54.8	55.7	57.4	58.1	60.0	59.0	61.0
E(%) Minimal	36.0	37.5	45.0	46.0	48.0	49.0	50.0	50.0
E(%) Average	43.6	45.6	46.7	48.5	49.6	51.1	51.7	53.3
Size (μm(c))	>28	>29	>30	>32	>35	>40	>45	>50
E(%) Initial	57.3	61.6	63.0	74.3	90.7	100	100.0	100.0
E(%) Minimal	51.0	53.0	55.0	65.2	78.0	80.0	97.0	94.0
E(%) Average	54.0	57.1	59.9	67.8	82.0	92.0	98.8	97.7

Efficiency (%)	50%	75%	90%	95%	99%
Initial Filter Rating	18.6 μm	32.1 μm	40.5 μm	42.8 μm	44.5 μm
Overall Filter Rating	24.3 μm	33.5 μm	39.0 μm	42.2 μm	>50 μm

3.3 Retention Capacity

Injected test dust :3.91 g	Non-retained mass :0.17 g	Retained capacity CR :3.74g
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TEST REPORT TUCHENG

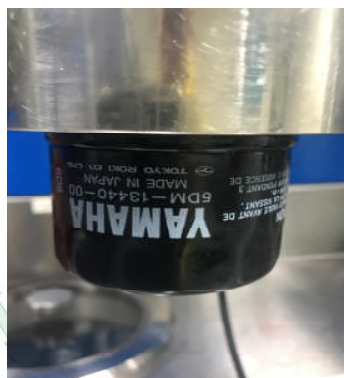
Date: _____ Date of Receipt: _____

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Report Title: _____ Item: Filter Element

Address: _____

Test Sample



Initial Filtration Efficiency								
Initial Pressure Drop: 360 hPa								
Size (μm(c))	> 4	> 5	> 6	> 7	> 8	> 9	> 10	> 11
Upstream	73,583	43,981	27,354	18,011	12,052	8,329	5,918	4,233
Downstream	74,048	44,094	26,971	17,237	11,224	7,510	5,145	3,474
E(%)	-0.6	-0.3	1.4	4.3	6.9	9.8	13.1	17.9
Size (μm(c))	> 12	> 13	> 14	> 15	> 16	> 17	> 18	> 19
Upstream	3,087	2,252	1,659	1,255	945	729	579	466
Downstream	2,408	1,671	1,162	804	553	398	299	223
E(%)	22.0	25.8	30.0	36.0	41.5	45.4	48.4	52.0
Size (μm(c))	> 20	> 21	> 22	> 23	> 24	> 25	> 26	> 27
Upstream	371	302	252	223	188	159	131	110
Downstream	171	135	111	94	78	63	53	42
E(%)	53.9	55.2	56.2	57.8	58.5	60.4	59.5	61.4
Size (μm(c))	> 28	> 29	> 30	> 32	> 35	> 40	> 45	> 50
Upstream	85	71	52	28	12	2	1	0
Downstream	36	27	19	7	1	0	0	0
E(%)	57.8	62.1	63.4	74.5	90.8	100.0	100.0	100.0

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Filtration Efficiency								
Time: 5 min Pressure Drop: 407 hPa								
Size (μm(c))	> 4	> 5	> 6	> 7	> 8	> 9	> 10	> 11
Upstream	130,809	78,875	49,108	32,315	21,562	14,758	10,391	7,294
Downstream	129,821	78,284	48,131	30,782	19,905	13,174	8,887	5,922
E(%)	0.8	0.8	2.0	4.8	7.7	10.7	14.5	18.8
Size (μm(c))	> 12	> 13	> 14	> 15	> 16	> 17	> 18	> 19
Upstream	5,198	3,704	2,682	1,982	1,478	1,109	869	693
Downstream	4,029	2,759	1,909	1,298	901	647	481	355
E(%)	22.5	25.5	28.8	34.5	39.1	41.7	44.6	48.7
Size (μm(c))	> 20	> 21	> 22	> 23	> 24	> 25	> 26	> 27
Upstream	552	447	373	324	279	234	193	162
Downstream	267	210	173	146	123	98	80	64
E(%)	51.6	53.0	53.6	54.9	56.1	58.3	58.5	60.3
Size (μm(c))	> 28	> 29	> 30	> 32	> 35	> 40	> 45	> 50
Upstream	128	104	79	41	19	6	2	1
Downstream	50	36	26	9	2	0	0	0
E(%)	61.0	65.2	66.6	78.0	91.9	100.0	100.0	100.0

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Address: _____

Time: 10 min		Pressure Drop: 517 hPa						
Size (μm(c))	> 4	> 5	> 6	> 7	> 8	> 9	> 10	> 11
Upstream	266,459	162,684	101,575	66,767	44,295	29,832	20,645	14,187
Downstream	265,679	163,012	100,784	64,549	41,656	27,384	18,236	12,023
E(%)	0.3	-0.2	0.8	3.3	6.0	8.2	11.7	15.3
Size (μm(c))	> 12	> 13	> 14	> 15	> 16	> 17	> 18	> 19
Upstream	9,857	6,895	4,875	3,472	2,520	1,842	1,413	1,086
Downstream	8,049	5,404	3,669	2,479	1,705	1,204	879	652
E(%)	18.3	21.6	24.7	28.6	32.3	34.6	37.8	40.0
Size (μm(c))	> 20	> 21	> 22	> 23	> 24	> 25	> 26	> 27
Upstream	840	678	563	478	406	341	280	228
Downstream	486	376	303	250	207	171	137	112
E(%)	42.2	44.5	46.2	47.7	49.0	49.8	51.0	51.2
Size (μm(c))	> 28	> 29	> 30	> 32	> 35	> 40	> 45	> 50
Upstream	179	141	107	57	21	6	3	1
Downstream	86	64	47	20	4	0	0	0
E(%)	51.9	54.4	56.3	65.3	82.4	100.0	100.0	100.0

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Time: 15 min Pressure Drop: 893 hPa								
Size (μm(c))	> 4	> 5	> 6	> 7	> 8	> 9	> 10	> 11
Upstream	395,481	244,507	153,732	101,321	67,386	45,340	31,320	21,405
Downstream	386,717	240,559	150,117	96,702	62,740	41,256	27,552	18,073
E(%)	2.2	1.6	2.4	4.6	6.9	9.0	12.0	15.6
Size (μm(c))	> 12	> 13	> 14	> 15	> 16	> 17	> 18	> 19
Upstream	14,826	10,291	7,239	5,129	3,693	2,692	2,052	1,574
Downstream	12,052	8,081	5,478	3,697	2,542	1,779	1,301	964
E(%)	18.7	21.5	24.3	27.9	31.2	33.9	36.6	38.7
Size (μm(c))	> 20	> 21	> 22	> 23	> 24	> 25	> 26	> 27
Upstream	1,213	968	796	674	572	473	384	317
Downstream	722	559	451	366	306	244	197	154
E(%)	40.5	42.3	43.3	45.7	46.6	48.4	48.7	51.4
Size (μm(c))	> 28	> 29	> 30	> 32	> 35	> 40	> 45	> 50
Upstream	249	195	146	72	24	6	2	1
Downstream	119	86	59	24	5	0	0	0
E(%)	52.1	55.9	59.7	66.6	78.8	100.0	100.0	100.0

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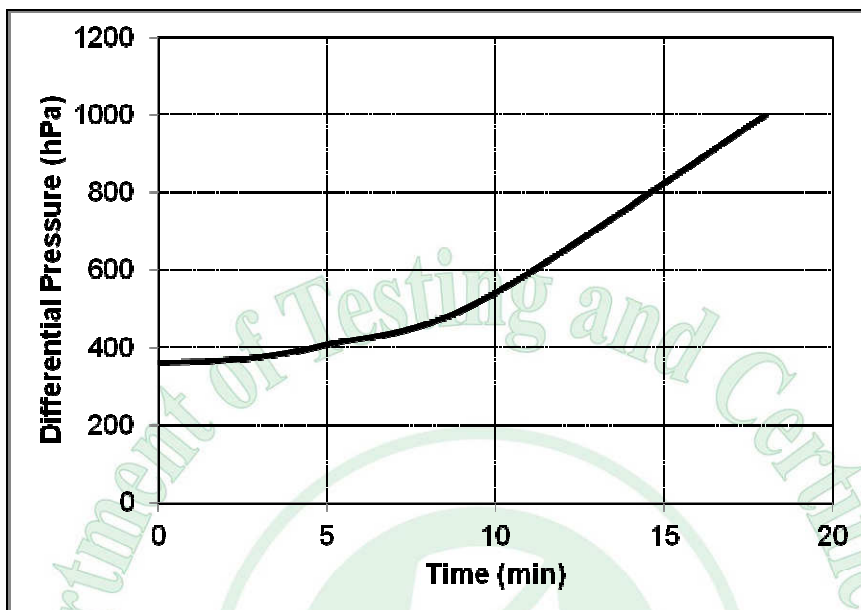


Fig 1. Time vs Differential Pressure

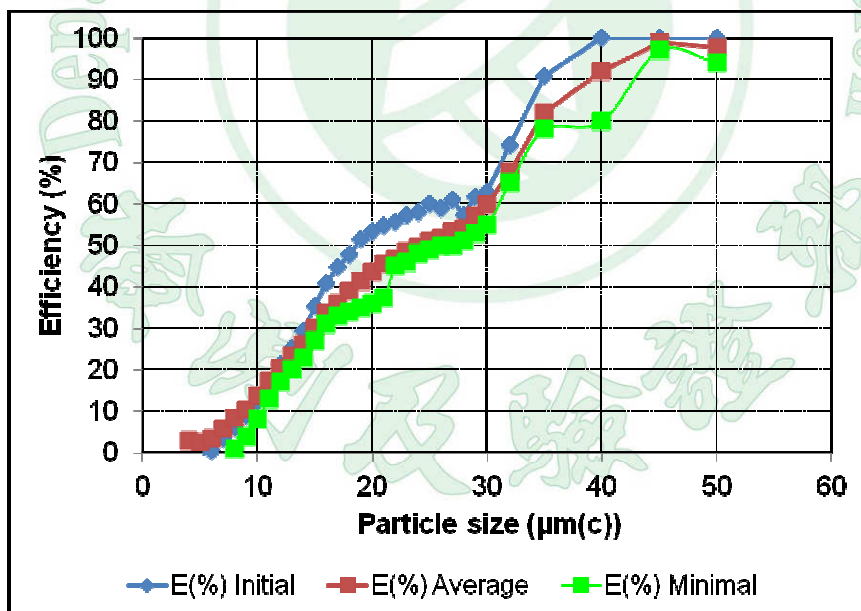


Fig. 2 Efficiency of different Particle size

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