

AUG 21-22 2006

Technical Data

For Sumitomo corporation India only

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1. Mooney viscosity of OCP

Sample	ESPRENE SPO				ESPRENE	OTHERS			
	SPO V0144	SPO V0115	SPO V0141	SPO V0132	201	PARATONE 8900	PA6205	VISCOTECH 6538N	VISCOTECH 7558
Manufacturer	SC	SC	SC	SC	SC	ORONITE	DSM	BRB	BRB
SORT OF POLYMER	EPM	EPM	EPM	EPM	EPM	EPM	EPM	EPM	EPM
FORM	Pellet	Pellet	Pellet	Pellet	Bale	Pellet	Bale	Bale	Pellet
IR Method Propylene Cont'(wt%)	26.9	22.7	27.8	25.8	54.3	32.3	51.9	60.6	27.1
DSC Tm(°C)	21.1	33.0	25.4	33.4	n.d.	24.8	n.d.	n.d.	40.3
Tc(°C)	14.8	20.6	14.4	17.9	n.d.	9.3	n.d.	n.d.	18.7
Density (kg/cm ³)	859	869	860	864	853	864	853	854	871
MFR 190°C, 21.2N	3.4	3.7	0.53	1.1	0.60	3.4	7.3	6.7	1.3
GPC Aw	5241	4958	8470	7000	10000	5020	4050	4290	5150
An	2729	2702	4420	3560	3410	2560	1840	2160	2450
Q	1.9	1.8	1.9	2.0	2.9	2.0	2.2	2.0	2.1
[η](dl/g)	1.31	1.31	1.92	1.66	1.86	1.24	0.94	1.04	1.26
Moony viscosity									
121°C	8.4		33	16	29				
100°C	15	12	52	28	43	15	9	13	23

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2. Test results by Sumitomo

	3-1	3-2	3-3	3-4	3-5	3-6	3-7	3-8	3-9	3-10
OCP	V0132	V0141	PA6205	VISCOTE CH6538N	VISCOTE CH7558	PARATO NE8900	E201	V0115	V0111	V0144
OCP content (wt%)	0.65	0.57	1.13	1.03	0.82	0.85	0.43	0.80	0.60	0.76
Physical properties of OCP										
Density (kg/m ³)	864	860	853	854	871	864	853	869	868	859
[η] (dl/g)	1.66	1.92	0.94	1.04	1.26	1.24	1.86	1.31	1.77	1.31
C2 unit (wt%)	74.2	72.2	48.1	39.4	72.9	67.7	45.7	77.3	76.6	73.1
Physical properties of lubricant										
Kinematic viscosity@100°C (mm ² /s)	10	10	10	10	10	10	10	10	10	10
Viscosity Loss@100°C (%)	12.6	16.7	6.9	9.3	9.4	7.9	19.9	8.0	13.8	7.8
Pour point (oC) evaluated at JALOS	-20.0	-15.0	-40.0	-45.0	-25.0	-25.0	-30.0	-25.0	-27.5	-15.0
SSI - Shear Stability Index (%)	28.0	37.1	15.3	20.8	20.8	17.5	44.3	17.7	30.7	17.3

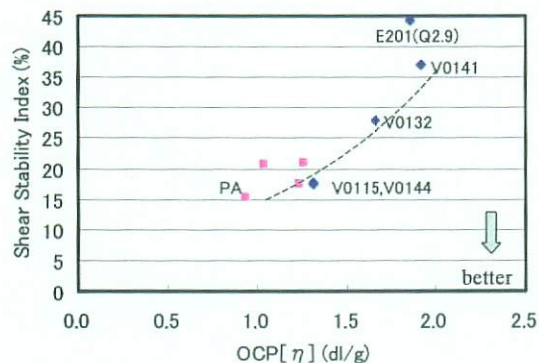
Formulation : Base oil VG32 + OCP + Infineum V351(0.3%)

Note

- ① Type of base oil (COSMO VG32)
- ② KV@100°C (10)
- ③ Non Package additive

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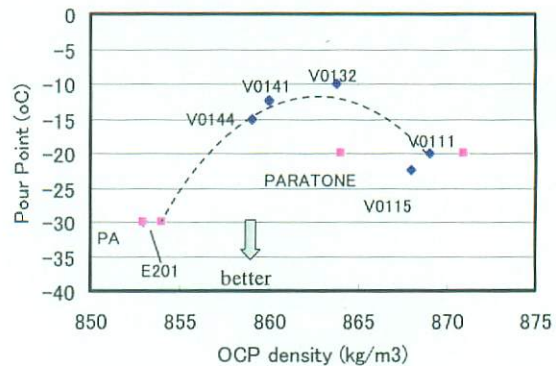
3. SSI tested by Sumitomo



Molecular weight is related with SSI.

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4. PP relation tested by Sumitomo



High propylene grade shows good PP.

(Low gravity or amorphous EPR)

Low propylene grade is not easy to dissolve.



6. PP and SSI improvement

i) Purposes

- 1) To improve PP of SPO ... Blend with SPO(V0144 or V0115) and amorphous EPM (E201 or PA6205)
- 2) To keep good SSI Blend with SPO and low MW EPM (PA6205)
Blend with SPO and high MW EPM (a small amount of E201)

ii) Formulation

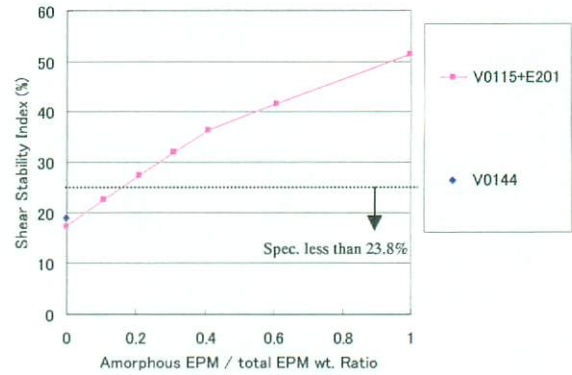
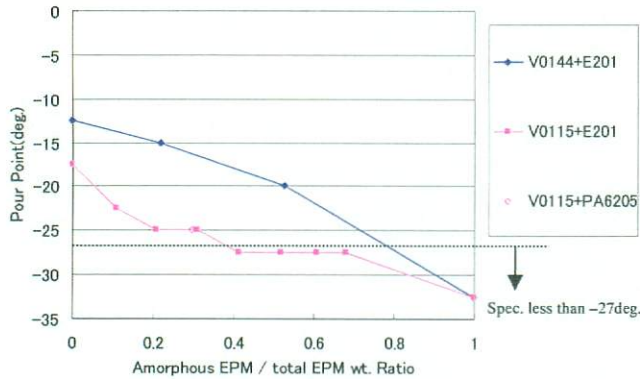
Base oil VG32 + OCP + Infineum V351(0.3%)

iii) Results and recommendations

- 1) To improve PP ...
 - a) V0115 is more preferable to decrease the amount of additional amorphous EPM than V0144.
 - b) PP specification -27°C is satisfied to use V0115 / amorphous EPM. (65/35)
 - c) PP improvement effect of E201 is as same as that of PA6205.
- 2) To keep good SSI ..
 - d) The combination of Low MW SPO(V0115 or V0144) and low MW EPM (like PA6205) is most preferable. (please see 6-11)
 - e) There is an upper limit of amount of high MW EPM (like E201) to satisfy SSI specification.



	6-1	6-2	6-3	6-4	6-5	6-6	6-7	6-8	6-9	6-10	6-11	6-12
Formulation												
Base oil VG32	98.94	99.06	99.17	98.90	98.96	99.03	99.09	99.12	99.19	99.27	98.79	98.57
V0144	0.76	0.50	0.25									
V0115				0.80	0.66	0.53	0.42	0.34	0.20		0.64	
E201		0.14	0.28		0.08	0.14	0.19	0.24	0.31	0.43		
PA6205											0.27	1.13
PPD Infineum V351	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Amorphous EPM / total EPM wt. Ratio (%)	0	22	53	0.00	11	21	31	41	61	100	30	30
Physical properties of lubricant												
Kinematic viscosity@40°C (mm ² /s)	66.07			67.63	65.52	63.14	60.57	59.92	57.68	56.19		
Kinematic viscosity@100°C (mm ² /s)	9.96	(10)	(10)	10.20	9.95	9.66	9.33	9.26	8.98	8.83	(10)	(10)
Viscosity Index	135			136	136	135	134	134	134	134		
Viscosity Loss@40°C (%)	9.6			8.7	10.7	12.4	13.9	15.7	17.3	20.5		
Viscosity Loss@100°C (%)	8.5			7.9	10.0	11.7	13.1	14.7	16.1	19.4		9.3
SSI - Shear Stability Index (%)	19.0			17.1	22.4	27.2	31.9	36.2	41.6	51.5	(15.3-17.1)	15.3
Pour point(°C)	-12.5	-15.0	-20.0	-17.5	-22.5	-25.0	-25.0	-27.5	-27.5	-32.5	-25.0	<-30



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7.The difference between each base oil

	1	2	3	4	5	6
SN150	100			99.7		
SN500		100			99.7	
VG32			100			99.7
Infineum V351				0.3	0.3	0.3
Pour Point(°C)	-7.5	-7.5	-7.5	-30	-20	-35

The sort of base oil and PPD are very important factors in order to reach good PP.

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