

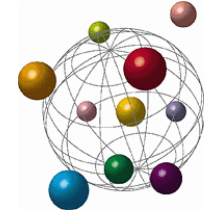
2009/09/14

Grade introduction for LED-Lighting application



Grade-List for LED-Lighting application

			GRADE	Flammability
Extrusion	Transparency	-	E-2000VUR	0.4 ~ 3mmt V-2
	Diffusion	High	DE2140VUR	0.4 ~ 3mmt V-2 Equivalent
	Transparency	-	EFT2200U	2mmt V-0
	Diffusion	Low	EFD2110U	1.2mmt V-0 Equivalent
		High	EFD2230U	1.5mmt V-0 Equivalent
Injection	Diffusion	Low to High	DS-3002R	0.4 ~ 2.4mmV-2
	Transparency	-	EFT3200U	2mmtV-0
		-	EFT3200HU	2mmtV-0
	Diffusion	Low	EFD3205U	2mmt V-0 Equivalent
		High	EFD8000	2mmt V-0



1 . Optical Property

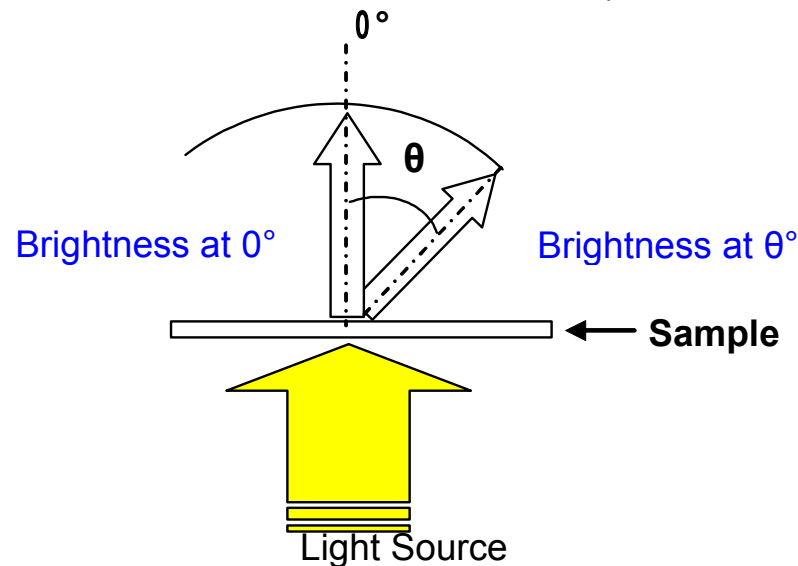
Brightness ; Evaluated by Total-light Transmittance
· measurement method · · ASTM D1003
· measurement equipment · · Haze Meter NDH2000
(NIPPON DENSHOKU INDUSTRIES Co)

Efficiency of diffusion ; Evaluated by diffusivity , and Degree of Light Distribution (D.L.D.)

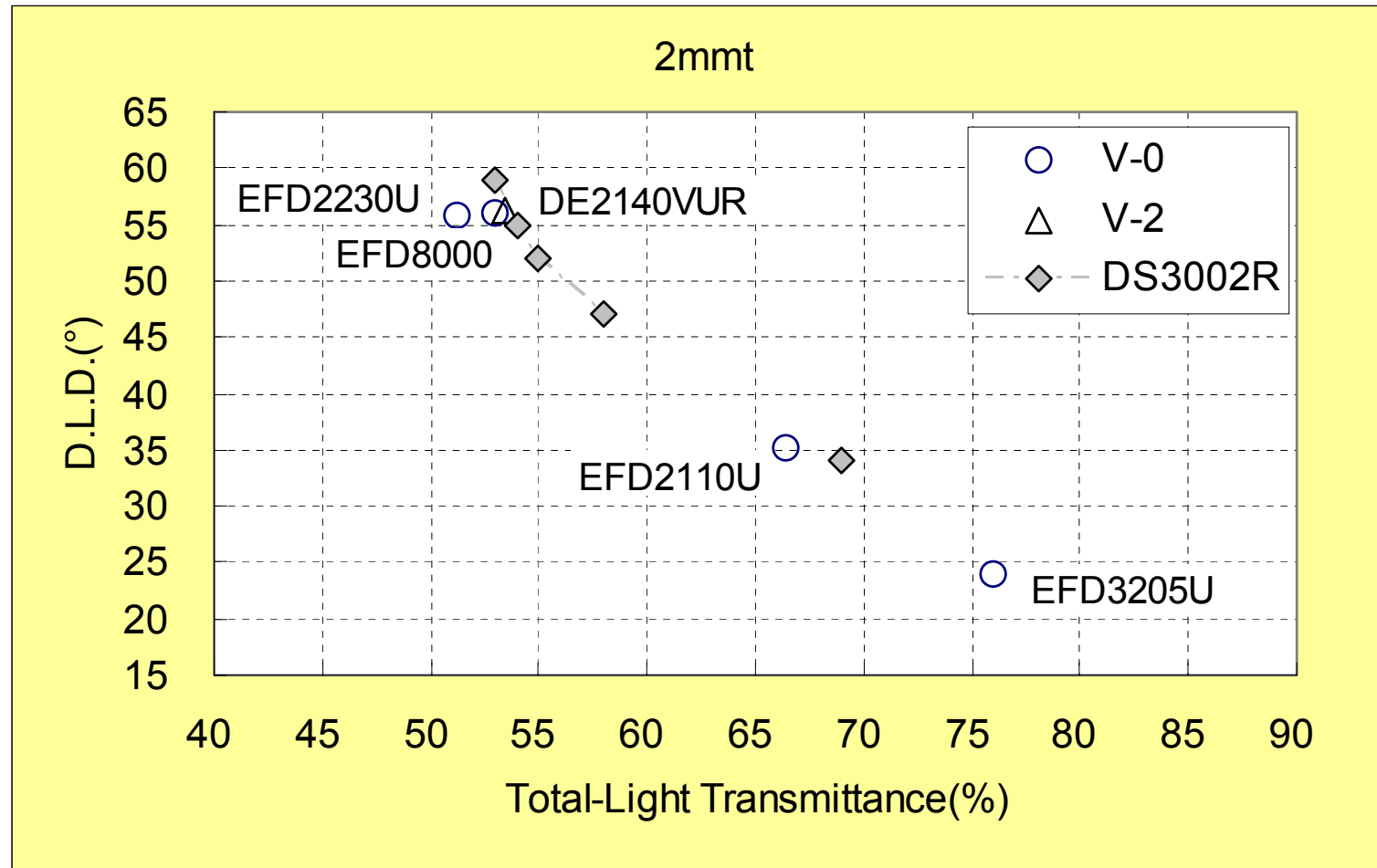
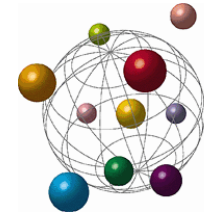
$$\text{Diffusivity(\%)} = \frac{\text{Brightness at } 20^\circ + \text{Brightness at } 70^\circ}{(\text{Brightness at } 5^\circ) \times 2} \times 100$$

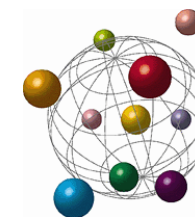
D.L.D. is the angle whose brightness is equivalent to the half value of

· measurement equipment · · goniophotometer
(Murakami Color Research Laboratory)



1 . Optical Property





2 . Properties ; Extrusion Grades (V - 2)

Properties	Test Method	Terms	Units	E-2000VUR	DE2140VUR
Physical Properties					
Density	ISO 1183	-	g/cm ³	1.20	1.20
Rheological Properties					
Melt Volume-flow Rate	ISO 1133	300 , 1.2kg	cm ³ /10min	5	5
Mechanical Properties					
Yield Stress	ISO527-1 527-2	-	Mpa	60	
Yield Strain			%	5.4	
Nominal Strain at Break			%	108	
Flexual Strength	ISO 178	-	MPa	93	
Flexual Modulus				2300	
Charpy Notched impact	ISO 179-1	3mmt	KJ/m ²	78	
	ISO179-2	4mmt		88	
Thermal Properties					
Temperature of Deflection Under Load	ISO75-1, ISO75-2	1.80MPa		131	
Coefficient of Linear Thermal Expansion	ISO 11359-2	MD	1/	6.5E-05	
		TD	1/	6.6E-05	
Flammability	UL94	0.4mmt	-	V-2	V-2(Equivalent)
		3.0mmt	-	V-2	V-2(Equivalent)
Optical Properties					
Total-Light Transmittance	ASTM D1003	1mmt	%	90	66
		2mmt	%	89	53
		3mmt	%	89	46
Haze	ASTM D1003	1mmt	%	0.4	99
		2mmt	%	0.4	99
		3mmt	%	0.4	99
Diffusivity	-	1mmt	%	-	-
		2mmt	%	-	-
		3mmt	%	-	-
D.L.D.	-	1mmt	°		48
		2mmt	°	48	56
		3mmt	°	57	60
Molding Shrinkage					
Molding Shrinkage	3mmt	M.T. ; 80	%	0.5 ~ 0.7	
Recommendation Molding Conditions					
pre-drying Condition		Temperature		120	120
		Time	Hrs	4 ~ 8	4 ~ 8
Resin Temperature		Mold Temperature		70 ~ 100	70 ~ 100
		Cylinder Temperature		270 ~ 300	270 ~ 300

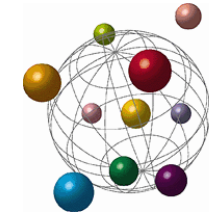
The listed properties are portrayed as general information only and not product specifications.



2 . Properties ; Injection Grades (V - 2)

Properties	Test Method	Terms	Units	DS3002R 7011A	DS3002R 7021A	DS3002R 7031A	DS3002R 7041A	DS3002R 7051A
Physical Properties								
Density	ISO 1183	-	g/cm ³	1.20	1.20	1.20	1.20	1.20
Rheological Properties								
Melt Volume-flow Rate	ISO 1133	300 , 1.2kg	cm ³ /10min	13	13	13	13	13
Mechanical Properties								
Yield Stress	ISO527-1 527-2	-	Mpa	64	65	65	65	65
Yield Strain			%	6	6	6	6	6
Nominal Strain at Break			%	70 ~ 120	70 ~ 120	70 ~ 120	70 ~ 120	70 ~ 120
Flexual Strength	ISO 178	-	MPa	92	92	92	92	92
Flexual Modulus				2300	2300	2300	2300	2300
Charpy Notched impact	ISO 179-1	3mmt	KJ/m ²	-	-	-	-	-
	ISO179-2	4mmt		8	7	6	6	5
Thermal Properties								
Temperature of Deflection Under Load	ISO75-1, ISO75-2	1.80MPa		124	123	122	122	121
Coefficient of Linear Thermal Expansion	ISO 11359-2	MD	1/	6.5E-05	6.5E-05	6.5E-05	6.5E-05	6.5E-05
		TD	1/	6.6E-05	6.6E-05	6.6E-05	6.6E-05	6.6E-05
Flammability	UL94	0.4mmt	-	V-2	V-2	V-2	V-2	V-2
		3.0mmt	-	V-2	V-2	V-2	V-2	V-2
Optical Properties								
Total-Light Transmittance	ASTM D1003	1mmt	%	84	75	71	67	64
		2mmt	%	69	58	55	54	53
		3mmt	%	57	48	46	46	45
Haze	ASTM D1003	1mmt	%	99	99	99	99	99
		2mmt	%	99	99	99	99	99
		3mmt	%	99	99	99	99	99
Diffusivity	-	1mmt	%	28	44	49	53	57
		2mmt	%	44	55	59	61	63
		3mmt	%	50	59	62	64	66
D.L.D.	-	1mmt	°	20	34	40	45	50
		2mmt	°	34	47	52	55	59
		3mmt	°	40	52	56	60	62
Molding Shrinkage								
Molding Shrinkage	3mmt	M.T. ;80	%	0.5 ~ 0.7	0.5 ~ 0.7	0.5 ~ 0.7	0.5 ~ 0.7	0.5 ~ 0.7
Recommendation Molding Conditions								
pre-drying Condition		Temperature		120	120	120	120	120
		Time	Hrs	4 ~ 8	4 ~ 8	4 ~ 8	4 ~ 8	4 ~ 8
Resin Temperature		Mold Temperature		70 ~ 100	70 ~ 100	70 ~ 100	70 ~ 100	70 ~ 100
		Cylinder Temperature		270 ~ 300	270 ~ 300	270 ~ 300	270 ~ 300	270 ~ 300

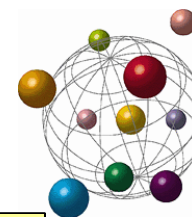
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2 . Properties ; Extrusion Grades (V - 0)

Properties	Test Method	Terms	Units	EFT2200U	EFD2110U	EFD2230U
Physical Properties						
Density	ISO 1183	-	g/cm ³	1.20	1.20	1.20
Rheological Properties						
Melt Volume-flow Rate	ISO 1133	300 , 1.2kg	cm ³ /10min	5	4	4
Mechanical Properties						
Yield Stress	ISO527-1 527-2	-	Mpa	63	65	66
Yield Strain			%	5.9	7	6
Nominal Strain at Break			%	95	70 ~ 120	70 ~ 120
Flexual Strength	ISO 178	-	MPa	97	92	97
Flexual Modulus				2350	2200	2300
Charpy Notched impact	ISO 179-1	3mmt	KJ/m ²	-	17	13
	ISO179-2	4mmt	KJ/m ²	70	-	-
Thermal Properties						
Temperature of Deflection Under Load	ISO75-1, ISO75-2	1.80MPa		125	122	123
Coefficient of Linear Thermal Expansion	ISO 11359-2	MD	1/	6.5E-05	6.5E-05	6.5E-05
		TD	1/	6.5E-05	6.6E-05	6.6E-05
Flammability	UL94	1.2mm	-	-	V-0(Equivalent)	V-0(Equivalent)
		1.5mm	-	V-1	V-0(Equivalent)	V-0(Equivalent)
		2.0mm	-	V-0	V-0(Equivalent)	V-0(Equivalent)
Optical Properties						
Total-Light Transmittance	ASTM D1003	1mmt	%	-	81	67
		2mmt	%	-	66	51
		3mmt	%	88	53	43
Haze	ASTM D1003	1mmt	%	-	98	99
		2mmt	%	-	99	99
		3mmt	%	0.5	99	99
Diffusivity	-	1mmt	%	-	28	51
		2mmt	%	-	45	61
		3mmt	%	-	50	64
D.L.D.	-	1mmt	°	-	21	43
		2mmt	°	-	35	56
		3mmt	°	-	42	59
Molding Shrinkage						
Molding Shrinkage	3mmt	M.T. ; 80	%	0.5 ~ 0.7	0.5 ~ 0.7	0.5 ~ 0.7
Recommendation Molding Conditions						
pre-drying Condition		Temperature		120	120	120
		Time	Hrs	4 ~ 8	4 ~ 8	4 ~ 8
Resin Temperature		Mold Temperature		70 ~ 100	70 ~ 100	70 ~ 100
		Cylinder Temperatur		270 ~ 300	270 ~ 300	270 ~ 300

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2 . Properties ; Injection Grades (V - 0)

Properties	Test Method	Terms	Units	EFT3200U	EFT3200HU	EFD3205U	EFD8000
Physical Properties							
Density	ISO 1183	-	g/cm ³	1.20	1.20	1.20	1.20
Rheological Properties							
Melt Volume-flow Rate	ISO 1133	300 , 1.2kg	cm ³ /10min	8	11	15	12
Mechanical Properties							
Yield Stress	ISO527-1	-	Mpa	62	62	64	64
Yield Strain			%	7	7	6	6
Nominal Strain at Break	527-2		%	100	100	70 ~ 120	70 ~ 120
Flexual Strength	ISO 178	-	MPa	93	93	90	90
Flexual Modulus				2400	2300	2,200	2,200
Charpy Notched impact	ISO 179-1	3mmt	KJ/m ²			11	6
	ISO179-2	4mmt	KJ/m ²	16	14	-	6
Thermal Properties							
Temperature of Deflection Under Load	ISO75-1、ISO75-2	1.80MPa		124	122	124	122
Coefficient of Linear Thermal Expansior	ISO 11359-2	MD	1/	6.5E-05	6.5E-05	6.5E-05	6.5E-05
		TD	1/	6.6E-05	6.6E-05	6.6E-05	6.6E-05
Flammability	UL94	1.2mm	-	-	-	-	V-1
		1.5mm	-	-	-	-	V-1
		2.0mm	-	V-0	V-0	V-0相当	V-0
Optical Properties							
Total-Light Transmittance	ASTM D1003	1mmt	%	-	-	86	67
		2mmt	%	88	88	76	53
		3mmt	%	88	88	65	45
Haze	ASTM D1003	1mmt	%	-	-	96	99
		2mmt	%	0.4	0.4	98	99
		3mmt	%	0.4	0.4	99	99
Diffusivity	-	1mmt	%	-	-	15	51
		2mmt	%	-	-	33	61
		3mmt	%	-	-	42	64
D.L.D.	-	1mmt	°	-	-	10	40
		2mmt	°	-	-	24	56
		3mmt	°	-	-	32	61
Molding Shrinkage							
Molding Shrinkage	3mmt	M.T. ; 80	%	0.5 ~ 0.7%	0.5 ~ 0.7%	0.5 ~ 0.7%	0.5 ~ 0.7%
Recommendation Molding Conditions							
pre-drying Condition		Temperature		120	120	120	120
		Time	Hrs	4 ~ 8	4 ~ 8	4 ~ 8	4 ~ 8
Resin Temperature		Mold Temperature		70 ~ 100	70 ~ 100	70 ~ 100	70 ~ 100
		Cylinder Temperatur		280 ~ 310	280 ~ 310	280 ~ 300	280 ~ 300

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