

Asian Product Data Sheet

GSE STANDARD PRODUCTS GSE HD

GSE HD is a smooth, high quality, high density polyethylene (HDPE) geomembrane produced from specially formulated, virgin polyethylene resin. This polyethylene resin is designed specifically for flexible geomembrane applications. It contains approximately 97.5% polyethylene, 2.5% carbon black and trace amounts of antioxidants and heat stabilizers; no other additives, fillers or extenders are used. GSE HD has outstanding chemical resistance, mechanical properties, environmental stress crack resistance, dimensional stability and thermal aging characteristics. GSE HD has excellent resistance to UV radiation and is suitable for exposed conditions. These product specifications meet or exceed GRI GM13.

Product Specifications

TESTED PROPERTY	TEST METHOD FREQUENCY				MINIMUM VALUE						
Product Code			HDS	HDS	HDS	HDS	HDS	HDS	HDS	HDS	
			030	050	075	100	150	200	250	300	
			A00T	A00T	A00T	A00T	A00T	A00T	A00T	A00T	
Thickness, mm (mils)	ASTM D 5199	every roll	0.27	0.45	0.68	0.9	1.35	1.8	2.25	2.7	
			(10.8)	(18)	(27)	(36)	(54)	(72)	(90)	(108)	
Density, g/cm	ASTM D 1505	every 5th roll	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Tensile Properties (each direction)	ASTM D 6693, Type IV	every 5th roll									
Strength at Break, N/mm-width (lb/in)	Dumbell, 2 ipm		8 (46)	14 (80)	21 (122)		43 (243)				
Strength at Yield, N/mm-width (lb/in)			5 (29)	8 (46)	11 (63)	15 (84)		30 (173)		45 (257	
Elongation at Break, %	G.L. 51 mm (2.0 in)		600	700	700	700	700	700	700	700	
Elongation at Yield, %	G.L. 33 mm (1.3 in)		13	13	13	13	13	13	13	13	
Tear Resistance, N (lb)	ASTM D 1004	every 5th roll	40 (9)	65 (15)	93 (21)	125 (28)	187 (42)		311 (70)		
Puncture Resistance, N (lb)	ASTM D 4833	every 5th roll	105	176	263	352	530	703	881	1,059	
			(24)	(40)	(59)	(79)	(119)	(158)	(198)	(238)	
Carbon Black Content, %	ASTM D 1603	every 5th roll	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Carbon Black Dispersion	ASTM D 5596	every 5th roll	+Note 1	+Note 1	+Note 1	+Note 1	+Note 1	+Note 1	+Note 1	+Note 1	
		00 000 1	400	400	400	400	400	400	400	400	
Notched Constant Tensile Load, hrs	ASTM D 5397, Appendix	90,000 kg	400	400	400	400	100	400	100	100	
Notched Constant Tensile Load, hrs REFERENCE PROPERTY	Appendix			400			L VAL		100	100	
REFERENCE PROPERTY Thickness, mm (mils)	Appendix TEST METHOD I ASTM D 5199	REQUENC every roll	Y 0.3 (12)	0.5 (20)	NC 0.75 (30)	DMINA 1.0 (40)	1.5 (60)	UE 2.0 (80)	2.5 (100)	3.0 (120	
REFERENCE PROPERTY Thickness, mm (mils)	Appendix TEST METHOD I	REQUENC	Y	8.4	NC	OMINA	L VAL	UE			
REFERENCE PROPERTY	Appendix TEST METHOD I ASTM D 5199 ASTM D 3895, 200° C;	REQUENC every roll	Y 0.3 (12)	0.5 (20)	NC 0.75 (30)	DMINA 1.0 (40)	1.5 (60)	UE 2.0 (80)	2.5 (100)	3.0 (120	
REFERENCE PROPERTY Thickness, mm (mils) Oxidative Induction Time, minutes	Appendix TEST METHOD I ASTM D 5199 ASTM D 3895, 200° C;	REQUENC every roll	Y 0.3 (12) >100	0.5 (20)	0.75 (30) >100	1.0 (40) >100	1.5 (60) >100	2.0 (80) >100	2.5 (100) >100	3.0 (120 >100	
REFERENCE PROPERTY Thickness, mm (mils) Oxidative Induction Time, minutes	Appendix TEST METHOD I ASTM D 5199 ASTM D 3895, 200° C;	REQUENC every roll	Y 0.3 (12) >100 200	0.5 (20) >100 420 (1,738)	0.75 (30) >100 280 (918)	1.0 (40) >100	1.5 (60) >100	2.0 (80) >100	2.5 (100) >100	3.0 (120 >100 70 (230)	
REFERENCE PROPERTY Thickness, mm (mils) Oxidative Induction Time, minutes Roll Length (approximate), m (ft)	Appendix TEST METHOD I ASTM D 5199 ASTM D 3895, 200° C;	REQUENC every roll	Y 0.3 (12) >100 200 (656)	0.5 (20) >100 420 (1,738)	0.75 (30) >100 280 (918)	1.0 (40) >100 210 (689)	1.5 (60) >100 140 (459)	2.0 (80) >100 105 (344)	2.5 (100) >100 85 (279)	3.0 (120 >100 70 (230)	
REFERENCE PROPERTY Thickness, mm (mils) Oxidative Induction Time, minutes Roll Length (approximate), m (ft) Roll Width, m (ft)	Appendix TEST METHOD I ASTM D 5199 ASTM D 3895, 200° C;	REQUENC every roll	Y 0.3 (12) >100 200 (656) 7.1 (23.3)	0.5 (20) >100 420 (1,738) 7.1 (23.3) 2,982	0.75 (30) >100 280 (918) 7.0 (23)	1.0 (40) >100 210 (689) 7.0 (23) 1,470	1.5 (60) >100 140 (459) 7.0 (23) 980	2.0 (80) >100 105 (344) 7.0 (23)	2.5 (100) >100 85 (279) 7.0 (23)	3.0 (120 >100 70 (230) 7.0 (23)	
REFERENCE PROPERTY Thickness, mm (mils) Oxidative Induction Time, minutes Roll Length (approximate), m (ft) Roll Width, m (ft)	Appendix TEST METHOD I ASTM D 5199 ASTM D 3895, 200° C;	REQUENC every roll	Y 0.3 (12) >100 200 (656) 7.1 (23.3) 1,420	0.5 (20) >100 420 (1,738) 7.1 (23.3) 2,982	0.75 (30) >100 280 (918) 7.0 (23) 1,960	1.0 (40) >100 210 (689) 7.0 (23) 1,470	1.5 (60) >100 140 (459) 7.0 (23) 980	2.0 (80) >100 105 (344) 7.0 (23) 735	2.5 (100) >100 85 (279) 7.0 (23) 595	3.0 (120 >100 70 (230) 7.0 (23) 490	
REFERENCE PROPERTY Thickness, mm (mils) Oxidative Induction Time, minutes Roll Length (approximate), m (ft) Roll Width, m (ft) Roll Area, m² (ft²)	Appendix TEST METHOD I ASTM D 5199 ASTM D 3895, 200° C;	REQUENC every roll	Y 0.3 (12) >100 200 (656) 7.1 (23.3) 1,420 (15,284)	0.5 (20) >100 420 (1,738) 7.1 (23.3) 2,982 (40,495)	0.75 (30) >100 280 (918) 7.0 (23) 1,960 (21,114)	1.0 (40) >100 210 (689) 7.0 (23) 1,470 (15,847)	1.5 (60) >100 140 (459) 7.0 (23) 980 (10,557)	2.0 (80) >100 105 (344) 7.0 (23) 735 (7,912)	2.5 (100) >100 85 (279) 7.0 (23) 595 (6,417)	3.0 (120 >100 70 (230) 7.0 (23) 490 (5,290)	
REFERENCE PROPERTY Thickness, mm (mils) Oxidative Induction Time, minutes Roll Length (approximate), m (ft) Roll Width, m (ft) Roll Area, m² (ft²) 40' Container, roll	Appendix TEST METHOD I ASTM D 5199 ASTM D 3895, 200° C; O ₂ , 1 atm	every roll 90,000 kg	Y 0.3 (12) >100 200 (656) 7.1 (23.3) 1,420 (15,284)	0.5 (20) >100 420 (1,738) 7.1 (23.3) 2,982 (40,495) 16	0.75 (30) >100 280 (918) 7.0 (23) 1,960 (21,114) 16	1.0 (40) >100 210 (689) 7.0 (23) 1,470 (15,847) 16	1.5 (60) >100 140 (459) 7.0 (23) 980 (10,557)	2.0 (80) >100 105 (344) 7.0 (23) 735 (7,912) 16	2.5 (100) >100 85 (279) 7.0 (23) 595 (6,417) 16	3.0 (120 >100 70 (230) 7.0 (23) 490 (5,290) 16	
REFERENCE PROPERTY Thickness, mm (mils) Oxidative Induction Time, minutes Roll Length (approximate), m (ft) Roll Width, m (ft) Roll Area, m² (ft²) 40' Container, roll Tensile Properties (each direction)	Appendix TEST METHOD I ASTM D 5199 ASTM D 3895, 200° C; O ₂ , 1 atm	every roll 90,000 kg	Y 0.3 (12) >100 200 (656) 7.1 (23.3) 1,420 (15,284) 35	0.5 (20) >100 420 (1,738) 7.1 (23.3) 2,982 (40,495) 16	0.75 (30) >100 280 (918) 7.0 (23) 1,960 (21,114) 16 26 (149)	210 (689) 7.0 (23) 1,470 (15,847) 16	1.5 (60) >100 140 (459) 7.0 (23) 980 (10,557) 16	2.0 (80) >100 105 (344) 7.0 (23) 735 (7,912) 16 70 (400)	2.5 (100) >100 85 (279) 7.0 (23) 595 (6,417) 16 88 (503)	3.0 (120 >100 70 (230) 7.0 (23) 490 (5,290) 16	
REFERENCE PROPERTY Thickness, mm (mils) Oxidative Induction Time, minutes Roll Length (approximate), m (ft) Roll Width, m (ft) Roll Area, m² (ft²) 40' Container, roll Tensile Properties (each direction) Strength at Break, N/mm-width (lb/in)	Appendix TEST METHOD I ASTM D 5199 ASTM D 3895, 200° C; O ₂ , 1 atm	every roll 90,000 kg	Y 0.3 (12) >100 200 (656) 7.1 (23.3) 1,420 (15,284) 35 11 (63)	0.5 (20) >100 420 (1,738) 7.1 (23.3) 2,982 (40,495) 16 18 (103)	0.75 (30) >100 280 (918) 7.0 (23) 1,960 (21,114) 16 26 (149)	210 (689) 7.0 (23) 1,470 (15,847) 16	1.5 (60) >100 140 (459) 7.0 (23) 980 (10,557) 16 53 (303)	2.0 (80) >100 105 (344) 7.0 (23) 735 (7,912) 16 70 (400)	2.5 (100) >100 85 (279) 7.0 (23) 595 (6,417) 16 88 (503)	3.0 (120 >100 70 (230) 7.0 (23) 490 (5,290) 16	
REFERENCE PROPERTY Thickness, mm (mils) Oxidative Induction Time, minutes Roll Length (approximate), m (ft) Roll Width, m (ft) Roll Area, m² (ft²) 40' Container, roll Tensile Properties (each direction) Strength at Break, N/mm-width (lb/in) Elongation at Break, %	Appendix TEST METHOD I ASTM D 5199 ASTM D 3895, 200° C; O ₂ , 1 atm ASTM D 6693, Type IV Dumbell, 2 ipm	every roll 90,000 kg	Y 0.3 (12) >100 200 (656) 7.1 (23.3) 1,420 (15,284) 35 11 (63) 7 (40)	0.5 (20) >100 420 (1,738) 7.1 (23.3) 2,982 (40,495) 16 18 (103) 10 (57)	0.75 (30) >100 280 (918) 7.0 (23) 1,960 (21,114) 16 26 (149) 14 (80)	210 (689) 7.0 (23) 1,470 (15,847) 16 35 (200) 19 (109)	1.5 (60) >100 140 (459) 7.0 (23) 980 (10,557) 16 53 (303) 29 (166)	2.0 (80) >100 105 (344) 7.0 (23) 735 (7,912) 16 70 (400) 38 (217)	2.5 (100) >100 85 (279) 7.0 (23) 595 (6,417) 16 88 (503) 48 (274)	3.0 (120 >100 70 (230) 7.0 (23) 490 (5,290) 16 105 (600 57 (326)	
REFERENCE PROPERTY Thickness, mm (mils) Oxidative Induction Time, minutes Roll Length (approximate), m (ft) Roll Width, m (ft) Roll Area, m² (ft²) 40' Container, roll Tensile Properties (each direction) Strength at Break, N/mm-width (lb/in) Strength at Yield, N/mm-width (lb/in) Elongation at Break, % Elongation at Yield, % Tear Resistance, N (lb)	Appendix TEST METHOD I ASTM D 5199 ASTM D 3895, 200° C; O2, 1 atm ASTM D 6693, Type IV Dumbell, 2 ipm G.L. 51 mm (2.0 in)	every roll 90,000 kg	Y 0.3 (12) >100 200 (656) 7.1 (23.3) 1,420 (15,284) 35 11 (63) 7 (40) 750	0.5 (20) >100 420 (1,738) 7.1 (23.3) 2,982 (40,495) 16 18 (103) 10 (57) 800	0.75 (30) >100 280 (918) 7.0 (23) 1,960 (21,114) 16 26 (149) 14 (80) 800 17	210 (689) 7.0 (23) 1,470 (15,847) 16 35 (200) 19 (109) 800 17	1.5 (60) >100 140 (459) 7.0 (23) 980 (10,557) 16 53 (303) 29 (166) 800 17	2.0 (80) >100 105 (344) 7.0 (23) 735 (7,912) 16 70 (400) 38 (217) 800 17	2.5 (100) >100 85 (279) 7.0 (23) 595 (6,417) 16 88 (503) 48 (274) 800 17	3.0 (120) 70 (230) 7.0 (23) 490 (5,290) 16 105 (600) 57 (326) 800 17	
REFERENCE PROPERTY Thickness, mm (mils) Oxidative Induction Time, minutes Roll Length (approximate), m (ft) Roll Width, m (ft) Roll Area, m² (ft²) 40' Container, roll Tensile Properties (each direction) Strength at Break, N/mm-width (lb/in) Strength at Yield, N/mm-width (lb/in) Elongation at Break, % Elongation at Yield, %	Appendix TEST METHOD I ASTM D 5199 ASTM D 3895, 200° C; O ₂ , 1 atm ASTM D 6693, Type IV Dumbell, 2 ipm G.L. 51 mm (2.0 in) G.L. 33 mm (1.3 in)	every roll 90,000 kg	Y 0.3 (12) >100 200 (656) 7.1 (23.3) 1,420 (15,284) 35 11 (63) 7 (40) 750 17	0.5 (20) >100 420 (1,738) 7.1 (23.3) 2,982 (40,495) 16 18 (103) 10 (57) 800 17	0.75 (30) >100 280 (918) 7.0 (23) 1,960 (21,114) 16 26 (149) 14 (80) 800 17	210 (689) 7.0 (23) 1,470 (15,847) 16 35 (200) 19 (109) 800 17	1.5 (60) >100 140 (459) 7.0 (23) 980 (10,557) 16 53 (303) 29 (166) 800 17	2.0 (80) >100 105 (344) 7.0 (23) 735 (7,912) 16 70 (400) 38 (217) 800 17	2.5 (100) >100 85 (279) 7.0 (23) 595 (6,417) 16 88 (503) 48 (274) 800 17	3.0 (120) 70 (230) 7.0 (23) 490 (5,290) 16 105 (600) 57 (326) 800 17	
REFERENCE PROPERTY Thickness, mm (mils) Oxidative Induction Time, minutes Roll Length (approximate), m (ft) Roll Width, m (ft) Roll Area, m² (ft²) 40' Container, roll Tensile Properties (each direction) Strength at Break, N/mm-width (lb/in) Strength at Yield, N/mm-width (lb/in) Elongation at Break, % Elongation at Yield, % Tear Resistance, N (lb)	Appendix TEST METHOD I ASTM D 5199 ASTM D 3895, 200° C; O2, 1 atm ASTM D 6693, Type IV Dumbell, 2 ipm G.L. 51 mm (2.0 in) G.L. 33 mm (1.3 in) ASTM D 1004	every 5th roll	Y 0.3 (12) >100 200 (656) 7.1 (23.3) 1,420 (15,284) 35 11 (63) 7 (40) 750 17 45 (10)	0.5 (20) >100 420 (1,738) 7.1 (23.3) 2,982 (40,495) 16 18 (103) 10 (57) 800 17	0.75 (30) >100 280 (918) 7.0 (23) 1,960 (21,114) 16 26 (149) 14 (80) 800 17	210 (689) 7.0 (23) 1,470 (15,847) 16 35 (200) 19 (109) 800 17 150 (34)	1.5 (60) >100 140 (459) 7.0 (23) 980 (10,557) 16 53 (303) 29 (166) 800 17 225 (51)	2.0 (80) >100 105 (344) 7.0 (23) 735 (7,912) 16 70 (400) 38 (217) 800 17 300 (68)	2.5 (100) >100 85 (279) 7.0 (23) 595 (6,417) 16 88 (503) 48 (274) 800 17 375 (84)	3.0 (120 >100 70 (230) 7.0 (23) 490 (5,290) 16 105 (600) 57 (326) 800 17 450 (101)	

NOTES:

- Note 1: Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
 GSE HD provided in thicknesses of 0.5 mm to 3.0 mm has an approximate weight of 1,430 kg (3,152 lb). GSE HD 0.3 mm material is provided in rolls weighing approximately 413 kg (910 lb) each.
 All GSE geomembranes have dimensional stability of ±2% when tested with ASTM D 1204 and ITB of <77° C when tested with ASTM D 746.

DS005 TH R03/10/03

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POLYETHYLENE GEOMEMBRANE SPECIALIST

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ISO 9001: 2000 & ISO 14001: 2004 Certified









WATER RESERVOIR



CANAL LINING



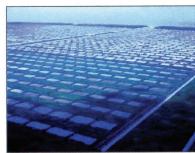
WASTE WATER POND



FLOATING COVER



LANDFILL WASTE PIT



AQUACULTURAL POND



ASH POND



LINER DEPLOYMENT

Our Commitments - Highest Quality Products and Services