Engineered for Life

Reinforcement Geogrids Comparison Sheet

MS™ 220 Vs. BX1100

To be effective as a reinforcement for base and sub-base applications, a geosynthetic product must not only be strong, it must be able to transfer its strength to the soil that it is reinforcing and maintain its strength for the design life of the project. The following table compares the key material, strength, and performance characteristics for Tenax MS™ 220 Geogrid to Tensar BX1100 Geogrid.

GEOSYNTHETIC PROPERTY [1]	TEST METHOD	UNIT	MS™ 220		BX1100 [2]	
			MD	TD	MD	TD
Material Characteristics						
Polymer Type	-	-	Polypropylene		Polypropylene	
Structure	-	-	Two layers of bi-oriented geogrids sewn together		Single layer of extruded geogrid	
PH Resistance	-	-	2 – 13		2 – 13	
Carbon Black Content	ASTM 4218	%	0.5		0.5	
Strength and Load Capacity						
Ultimate Tensile Strength	ASTM D6637	lb/ft	925	1,400	860	1,400
True Tensile Strength @ 2% Strain	ASTM D6637	lb/ft	301	450	280	450
" " " @ 5% Strain	ASTM D6637	lb/ft	616	920	580	920
True Initial Modulus in Use	ASTM D6637	lb/ft	17,125	27,400	17,125	27,400
True Tensile Modulus @ 2% Strain	ASTM D6637	lb/ft	15,050	22,500	14,000	22,500
" " " @ 5% Strain	ASTM D6637	lb/ft	12,320	18,400	11,600	18,400
Structural Integrity						
Flexural Rigidity	ASTM D 1388	mg-cm	250,000	250,000	250,000	NA
Junction Strength	GRI-GG2	lb/ft	860	1315	800	1,302
Performance Characteristics						
Maximum Pullout Resistance [3] (Coefficient of Interaction)						
@ 205 psf		lb/ft	-	650 (1.05)	-	460 (0.73)
@ 410 psf		lb/ft	-	1,295 (1.03)	-	940 (0.75)
Maximum Rut Depth [4] (TEAL = 40,000 cycle)	-	in.	0.827		0.980	
Durability						
Resistance to Installation Damage	ASTM D 5818	% [5]	>90/>90/90 [6]		90/83/70	

[1] Chart is for comparison purpose only. Consult your local Tenax representative for current design assistance.
[2] Per manufacturer's literature or GFR's "Specifier's Guide", latest data available and/or Tensar's website (http://www.tensarcorp.com/literature/content_spec_bx.htm).
[3] Tenax report GRID-TE-5 : "Pullout Tests of Geogrids".
[4] Tenax report GRID-TE-3 : "Full Scale In-Ground Tests for Geosynthetic-Reinforced Flexible Paved Roads".
[5] Resistance to loss of load capacity or structural integrity — %SC (clayey sand)/%SW (well graded sand)/%GP (poorly graded gravel)
[6] Tenax report GRID-TE-4 : "Construction Damage Tests of Geogrids"

The geosynthetic industry has not identified any values of the index property Torsional Stiffness (Secant Aperture Stability Modulus), nor has the test method been developed as an industry standard (ASTM or GRI). Therefore, accredited geosynthetic independent labs cannot evaluate a product per this method

Engineered for Life

Reinforcement Geogrids Comparison Sheet

MS™ 330 Vs. BX1200

To be effective as a reinforcement for base and sub-base applications, a geosynthetic product must not only be strong, it must be able to transfer its strength to the soil that it is reinforcing and maintain its strength for the design life of the project. The following table compares the key material, strength, and performance characteristics for Tenax MS™ 330 Geogrid to Tensar BX1200 Geogrid.

GEOSYNTHETIC PROPERTY [1]	TEST METHOD	UNIT	MS™ 330		BX1200 [2]	
			MD	TD	MD	TD
Material Characteristics						
Polymer Type	-	-	Polypropylene		Polypropylene	
Structure	-	-	Three layers of bi-oriented geogrids sewn together		Single layer of extruded geogrid	
PH Resistance	-	-	2 – 13		2 – 13	
Carbon Black Content	ASTM 4218	%	0.5		0.5	
Strength and Load Capacity						
Ultimate Tensile Strength	ASTM D6637	lb/ft	1,370	2,100	1,320	2,100
True Tensile Strength @ 2% Strain	ASTM D6637	lb/ft	418	616	410	600
" " " @ 5% Strain	ASTM D6637	lb/ft	925	1,342.6	810	1,340
True Initial Modulus in Use	ASTM D6637	lb/ft	27,400	44,525	27,400	44,525
True Tensile Modulus @ 2% Strain	ASTM D6637	lb/ft	20,900	30,800	19,000	29,750
" " " @ 5% Strain	ASTM D6637	lb/ft	18,500	26,852	16,400	26,800
Structural Integrity						
Flexural Rigidity	ASTM D 1388	mg-cm	750,000	750,000	750,000	NA
Junction Strength	GRI-GG2	lb/ft	1,274	1,970	1,227	1,953
Performance Characteristics						
Maximum Pullout Resistance [3] (Coefficient of Interaction)						
@ 205 psf		lb/ft	-	720 (1.15)	-	520 (0.83)
@ 410 psf		lb/ft	-	1,280 (1.02)	-	1,020 (0.82)
@ 625 psf		lb/ft	-	1,700 (0.91)	-	1,500 (0.80)
Maximum Rut Depth [4] (TEAL = 40,000 cycle)	-	in.	0.457		0.630	
Durability						
Resistance to Installation Damage	ASTM D 5818	% [5]	>91/>90/90 [6]		91/83/71	

[1] Chart is for comparison purpose only. Consult your local Tenax representative for current design assistance.
[2] Per manufacturer's literature or GFR's "Specifier's Guide", latest data available and/or Tensar's website (http://www.tensarcorp.com/literature/content_spec_bx.htm).
[3] Tenax report GRID-TE-5 : "Pullout Tests of Geogrids".
[4] Tenax report GRID-TE-3 : "Full Scale In-Ground Tests for Geosynthetic-Reinforced Flexible Paved Roads".
[5] Resistance to loss of load capacity or structural integrity — %SC (clayey sand)/%SW (well graded sand)/%GP (poorly graded gravel)
[6] Tenax report GRID-TE-4 : "Construction Damage Tests of Geogrids"

The geosynthetic industry has not identified any values of the index property Torsional Stiffness (Secant Aperture Stability Modulus), nor has the test method been developed as an industry standard (ASTM or GRI). Therefore, accredited geosynthetic independent labs cannot evaluate a product per this method

Engineered for Life

Reinforcement Geogrids Comparison Sheet

MS™ 220 Vs. BX4100

To be effective as a reinforcement for base and sub-base applications, a geosynthetic product must not only be strong, it must be able to transfer its strength to the soil that it is reinforcing and maintain its strength for the design life of the project. The following table compares the key material, strength, and performance characteristics for Tenax MS™ 220 Geogrid to Tensar BX4100 Geogrid.

GEOSYNTHETIC PROPERTY [1]	TEST METHOD	UNIT	MS™ 220		BX4100 [2]	
			MD	TD	MD	TD
Material Characteristics						
Polymer Type	-	-	Polypropylene		Polypropylene	
Structure	-	-	Two layers of bi-oriented geogrids sewn together		Single layer of extruded geogrid	
PH Resistance	-	-	2 – 13		2 – 13	
Carbon Black Content	ASTM 4218	%	0.5		0.5	
Strength and Load Capacity						
Ultimate Tensile Strength	ASTM D6637	lb/ft	925	1,400	NA	NA
True Tensile Strength @ 2% Strain	ASTM D6637	lb/ft	301	450	240	300
" " " @ 5% Strain	ASTM D6637	lb/ft	616	920	480	635
True Initial Modulus in Use	ASTM D6637	lb/ft	17,125	27,400	15,155	19,480
True Tensile Modulus @ 2% Strain	ASTM D6637	lb/ft	15,050	22,500	12,000	15,000
" " " @ 5% Strain	ASTM D6637	lb/ft	12,320	18,400	9,600	12,700
Structural Integrity						
Flexural Rigidity	ASTM D 1388	Mg-cm	250,000	250,000	250,000	NA
Junction Strength	GRI-GG2	lb/ft	860	1315	774	788
Durability						
Resistance to Installation Damage	ASTM D 5818	% [3]	>90/>90/90 [4]		90/83/70	

[1] Chart is for comparison purpose only. Consult your local Tenax representative for current design assistance.
[2] Per manufacturer's literature or GFR's "Specifier's Guide", latest data available and/or Tensar's website (http://www.tensarcorp.com/literature/content_spec_bx.htm).
[3] Resistance to loss of load capacity or structural integrity — %SC (clayey sand)/%SW (well graded sand)/%GP (poorly graded gravel)
[4] Tenax report GRID-TE-4 : "Construction Damage Tests of Geogrids"

The geosynthetic industry has not identified any values of the index property Torsional Stiffness (Secant Aperture Stability Modulus), nor has the test method been developed as an industry standard (ASTM or GRI). Therefore, accredited geosynthetic independent labs cannot evaluate a product per this method

05/16/01

Engineered for Life

Reinforcement Geogrids Comparison Sheet

MS™ 330 Vs. BX4200

To be effective as a reinforcement for base and sub-base applications, a geosynthetic product must not only be strong, it must be able to transfer its strength to the soil that it is reinforcing and maintain its strength for the design life of the project. The following table compares the key material, strength, and performance characteristics for Tenax MS™ 330 Geogrid to Tensar BX4200 Geogrid.

GEOSYNTHETIC PROPERTY [1]	TEST METHOD	UNIT	MS™ 330		BX4200 [2]	
			MD	TD	MD	TD
Material Characteristics						
Polymer Type	-	-	Polypropylene		Polypropylene	
Structure	-	-	Three layers of bi-oriented geogrids sewn together		Single layer of extruded geogrid	
PH Resistance	-	-	2 – 13		2 – 13	
Carbon Black Content	ASTM 4218	%	0.5		0.5	
Strength and Load Capacity						
Ultimate Tensile Strength	ASTM D6637	lb/ft	1370	2100	NA	NA
True Tensile Strength @ 2% Strain	ASTM D6637	lb/ft	418	616	375	510
" " " @ 5% Strain	ASTM D6637	lb/ft	925	1342.6	720	1000
True Initial Modulus in Use	ASTM D6637	lb/ft	27,400	44,525	19,315	29,050
True Tensile Modulus @ 2% Strain	ASTM D6637	lb/ft	20,900	30,800	18,750	25,500
" " " @ 5% Strain	ASTM D6637	lb/ft	18,500	26,852	14,400	20,000
Structural Integrity						
Flexural Rigidity	ASTM D 1388	Mg-cm	750,000	750,000	750,000	NA
Junction Strength	GRI-GG2	lb/ft	1,274	1,970	1215	1385
Durability						
Resistance to Installation Damage	ASTM D 5818	% [3]	>90/>90/90 [4]		90/83/70	

[1] Chart is for comparison purpose only. Consult your local Tenax representative for current design assistance.
[2] Per manufacturer's literature or GFR's "Specifier's Guide", latest data available and/or Tensar's website (http://www.tensarcorp.com/literature/content_spec_bx.htm).
[3] Resistance to loss of load capacity or structural integrity — %SC (clayey sand)/%SW (well graded sand)/%GP (poorly graded gravel)
[4] Tenax report GRID-TE-4 : "Construction Damage Tests of Geogrids"

The geosynthetic industry has not identified any values of the index property Torsional Stiffness (Secant Aperture Stability Modulus), nor has the test method been developed as an industry standard (ASTM or GRI). Therefore, accredited geosynthetic independent labs cannot evaluate a product per this method

Engineered for Life

Reinforcement Geogrids Comparison Sheet

MS™ 500 Vs. BX1300

To be effective as a reinforcement for base and sub-base applications, a geosynthetic product must not only be strong, it must be able to transfer its strength to the soil that it is reinforcing and maintain its strength for the design life of the project. The following table compares the key material, strength, and performance characteristics for Tenax MS™ 500 Geogrid to Tensar BX1300 Geogrid.

GEOSYNTHETIC PROPERTY [1]	TEST METHOD	UNIT	MS™ 500		BX1300 [2]	
			MD	TD	MD	TD
Material Characteristics						
Polymer Type	-	-	Polypropylene		Polypropylene	
Structure	-	-	Five layers of bi-oriented geogrids sewn together		Single layer of extruded geogrid	
PH Resistance	-	-	2 – 13		2 – 13	
Carbon Black Content	ASTM 4218	%	0.5		0.5	
Strength and Load Capacity						
Ultimate Tensile Strength	ASTM D6637	lb/ft	1500	2400	NA	NA
True Tensile Strength @ 2% Strain	ASTM D6637	lb/ft	411	685	300	480
" " " @ 5% Strain	ASTM D6637	lb/ft	925	1340	680	1030
True Initial Modulus in Use	ASTM D6637	lb/ft	19,500	31,200	19,500	31,200
True Tensile Modulus @ 2% Strain	ASTM D6637	lb/ft	20,550	34,250	18,750	25,500
" " " @ 5% Strain	ASTM D6637	lb/ft	18,500	26,850	14,400	20,000
Structural Integrity						
Flexural Rigidity	ASTM D 1388	Mg-cm	750,000	750,000	450,000	NA
Junction Strength	GRI-GG2	lb/ft	1,230	1,970	990	1,665
Durability						
Resistance to Installation Damage	ASTM D 5818	% [3]	>92/ >92/ 92 [4]		91/83/72	

[1] Chart is for comparison purpose only. Consult your local Tenax representative for current design assistance.
[2] Per manufacturer's literature or GFR's "Specifier's Guide", latest data available and/or Tensar's website (http://www.tensarcorp.com/literature/content_spec_bx.htm).
[3] Resistance to loss of load capacity or structural integrity — %SC (clayey sand)/%SW (well graded sand)/%GP (poorly graded gravel)
[4] Tenax report: "Construction Damage Test on MS500"

The geosynthetic industry has not identified any values of the index property Torsional Stiffness (Secant Aperture Stability Modulus), nor has the test method been developed as an industry standard (ASTM or GRI). Therefore, accredited geosynthetic independent labs cannot evaluate a product per this method

Engineered for Life

Reinforcement Geogrids Comparison Sheet

MS™ 220 Vs. Enkagrid MAX 20

To be effective as a reinforcement for base and sub-base applications, a geosynthetic product must not only be strong, it must be able to transfer its strength to the soil that it is reinforcing and maintain its strength for the design life of the project. The following table compares the key material, strength, and performance characteristics for Tenax MS™ 220 Geogrid to Enkagrid Max 20 Geogrid.

GEOSYNTHETIC PROPERTY [1]	TEST METHOD	UNIT	MS™ 220		Enkagrid Max 20[2]	
			MD	TD	MD	TD
Material Characteristics						
Polymer Type	-	-	Polypropylene		Polypropylene	
Structure	-	-	Two layers of bi-oriented geogrids sewn together		Single layer of laser welded geogrid	
PH Resistance	-	-	2 – 13		-	
Carbon Black Content	ASTM 4218	%	0.5		-	
Strength and Load Capacity						
Ultimate Tensile Strength	ASTM D6637	lb/ft	925	1,400	1370	2192
True Tensile Strength @ 2% Strain	ASTM D6637	lb/ft	301	450	411	685
" " " @ 5% Strain	ASTM D6637	lb/ft	616	920	822	1370
True Initial Modulus in Use	ASTM D6637	lb/ft	17,125	27,400	NA	NA
True Tensile Modulus @ 2% Strain	ASTM D6637	lb/ft	15,050	22,500	20550	34250
" " " @ 5% Strain	ASTM D6637	lb/ft	12,320	18,400	16440	27400
Structural Integrity						
Flexural Rigidity	ASTM D 1388	mg-cm	250,000	250,000	450000	450000
Junction Strength	GRI-GG2	lb/ft	860	1315	840	630
Performance Characteristics						
Maximum Pullout Resistance [3] (Coefficient of Interaction)						
@ 205 psf		lb/ft	-	650 (1.05)	-	-
@ 410 psf		lb/ft	-	1,295 (1.03)	-	-
Maximum Rut Depth [4] (TEAL = 40,000 cycle)	-	in.	0.827		-	
Durability						
Resistance to Installation Damage	ASTM D 5818	% [5]	>90/>90/90 [6]		-	

[1] Chart is for comparison purpose only. Consult your local Tenax representative for current design assistance.
[2] Per manufacturer's literature or GFR's "Specifier's Guide", latest data available and/or manufacturer website.
[3] Tenax report GRID-TE-5 : "Pullout Tests of Geogrids".
[4] Tenax report GRID-TE-3 : "Full Scale In-Ground Tests for Geosynthetic-Reinforced Flexible Paved Roads".
[5] Resistance to loss of load capacity or structural integrity — %SC (clayey sand)/%SW (well graded sand)/%GP (poorly graded gravel)
[6] Tenax report GRID-TE-4 : "Construction Damage Tests of Geogrids"

Engineered for Life

Reinforcement Geogrids Comparison Sheet

MS™ 220 Vs. Mirafi BasXgrid 11

To be effective as a reinforcement for base and sub-base applications, a geosynthetic product must not only be strong, it must be able to transfer its strength to the soil that it is reinforcing and maintain its strength for the design life of the project. The following table compares the key material, strength, and performance characteristics for Tenax MS™ 220 Geogrid to Mirafi BasXgrid 11 Geogrid.

GEOSYNTHETIC PROPERTY [1]	TEST METHOD	UNIT	MS™ 220		Mifafi BasXgrid 11[2]	
			MD	TD	MD	TD
Material Characteristics						
Polymer Type	-	-	Polypropylene		Polyester	
Structure	-	-	Two layers of bi-oriented geogrids sewn together		Single layer of woven geogrid	
PH Resistance	-	-	2 – 13		-	
Carbon Black Content	ASTM 4218	%	0.5		-	
Strength and Load Capacity						
Ultimate Tensile Strength	ASTM D6637	lb/ft	925	1,400	2,000	2,000
True Tensile Strength @ 2% Strain	ASTM D6637	lb/ft	301	450	500	500
" " " @ 5% Strain	ASTM D6637	lb/ft	616	920	920	920
True Initial Modulus in Use	ASTM D6637	lb/ft	17,125	27,400	30,000 @1% strain	30,000 @1% strain
True Tensile Modulus @ 2% Strain	ASTM D6637	lb/ft	15,050	22,500	NA	NA
" " " @ 5% Strain	ASTM D6637	lb/ft	12,320	18,400	NA	NA
Structural Integrity						
Flexural Rigidity	ASTM D 1388	mg-cm	250,000	250,000	NA	NA
Junction Strength	GRI-GG2	lb/ft	860	1315	840	630
Performance Characteristics						
Maximum Pullout Resistance [3] (Coefficient of Interaction)						
@ 205 psf		lb/ft	-	650 (1.05)	-	-
@ 410 psf		lb/ft	-	1,295 (1.03)	-	-
Maximum Rut Depth [4] (TEAL = 40,000 cycle)	-	in.	0.827		-	
Durability						
Resistance to Installation Damage	ASTM D 5818	% [5]	>90/>90/90 [6]		-	

[1] Chart is for comparison purpose only. Consult your local Tenax representative for current design assistance.
[2] Per manufacturer's literature or GFR's "Specifier's Guide", latest data available and/or manufacturer website.
[3] Tenax report GRID-TE-5 : "Pullout Tests of Geogrids".
[4] Tenax report GRID-TE-3 : "Full Scale In-Ground Tests for Geosynthetic-Reinforced Flexible Paved Roads".
[5] Resistance to loss of load capacity or structural integrity — %SC (clayey sand)/%SW (well graded sand)/%GP (poorly graded gravel)
[6] Tenax report GRID-TE-4 : "Construction Damage Tests of Geogrids"

Engineered for Life

Reinforcement Geogrids Comparison Sheet

MS™ 330 Vs. Mirafi BasXgrid 12

To be effective as a reinforcement for base and sub-base applications, a geosynthetic product must not only be strong, it must be able to transfer its strength to the soil that it is reinforcing and maintain its strength for the design life of the project. The following table compares the key material, strength, and performance characteristics for Tenax MS™ 330 Geogrid to Mirafi BasXgrid 12 Geogrid.

GEOSYNTHETIC PROPERTY [1]	TEST METHOD	UNIT	MS™ 330		Mifafi BasXgrid 12[2]	
			MD	TD	MD	TD
Material Characteristics						
Polymer Type	-	-	Polypropylene		Polyester	
Structure	-	-	Two layers of bi-oriented geogrids sewn together		Single layer of woven geogrid	
PH Resistance	-	-	2 – 13		-	
Carbon Black Content	ASTM 4218	%	0.5		-	
Strength and Load Capacity						
Ultimate Tensile Strength	ASTM D6637	lb/ft	1,370	2,100	2,000	4,000
True Tensile Strength @ 2% Strain	ASTM D6637	lb/ft	418	616	500	750
" " " @ 5% Strain	ASTM D6637	lb/ft	925	1,342.6	920	1350
True Initial Modulus in Use	ASTM D6637	lb/ft	27,400	44,525	30,000 @1% strain	30,000 @1% strain
True Tensile Modulus @ 2% Strain	ASTM D6637	lb/ft	20,900	30,800	NA	NA
" " " @ 5% Strain	ASTM D6637	lb/ft	18,500	26,852	NA	NA
Structural Integrity						
Flexural Rigidity	ASTM D 1388	mg-cm	750,000	750,000	NA	NA
Junction Strength	GRI-GG2	lb/ft	1,274	1,970	NA	NA
Performance Characteristics						
Maximum Pullout Resistance [3] (Coefficient of Interaction)						
@ 205 psf		lb/ft	-	720 (1.15)	-	-
@ 410 psf		lb/ft	-	1,280 (1.02)		
@ 625 psf		lb/ft	-	1,700 (0.91)	-	-
Maximum Rut Depth [4] (TEAL = 40,000 cycle)	-	in.	0.457		-	
Durability						
Resistance to Installation Damage	ASTM D 5818	% [5]	>91/>90/90 [6]		-	

[1] Chart is for comparison purpose only. Consult your local Tenax representative for current design assistance.
[2] Per manufacturer's literature or GFR's "Specifier's Guide", latest data available and/or manufacturer website.
[3] Tenax report GRID-TE-5 : "Pullout Tests of Geogrids".
[4] Tenax report GRID-TE-3 : "Full Scale In-Ground Tests for Geosynthetic-Reinforced Flexible Paved Roads".
[5] Resistance to loss of load capacity or structural integrity — %SC (clayey sand)/%SW (well graded sand)/%GP (poorly graded gravel)
[6] Tenax report GRID-TE-4 : "Construction Damage Tests of Geogrids"