

TenCate™ and AASHTO M288-17

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The use of geotextiles in transportation applications has dramatically increased over the past several decades. As a result, a variety of specifications and subsequent products were developed to meet the ever-increasing needs of Federal, State, and Local governmental organizations. This has resulted in greater acceptance of geotextiles, but has also created vast confusion concerning the important and relevant properties associated with specifying geotextiles in general transportation applications.

As a result, a joint committee was formed from the American Association of State Highway and Transportation Officials (AASHTO) and the Industrial Fabrics Association International (IFAI) to revise and improve the current standards and develop a platform that could be used to standardize geotextiles for general transportation applications. The original result of this effort was the “Standard Specifications for Geotextiles,” AASHTO M288-17. The current revision for this standard is AASHTO M288-17.

Selection Criteria

AASHTO M288-17 addresses the following applications: Subsurface Drainage, Stabilization, Separation, Permanent Erosion Control, Sediment Control, and Paving Fabrics. The user of the specification must be cautioned that AASHTO M288-17 is not a design guideline. Instead, the selection criteria are based on an engineer’s knowledge of the site-specific installation stresses and soil hydraulic properties for the project application. If installation stresses are not known, AASHTO M288-17 has recommended “Survivability Default Classes” to assist an engineer in selection of the appropriate product properties.

AASHTO M288-17 categorizes the survivability of the geotextile into one of three different classes based on the harshness of the installation conditions: Class 1 being the most severe and Class 3 being the least severe. The potential survivability of the geotextile within each class is determined by a standard set of properties generated from ASTM test methods. These properties are Grab Tensile Strength, Trapezoidal Tear Strength, CBR Puncture Strength, and Ultraviolet Stability. Paving Fabrics incorporate the addition of Mass per Unit Area, Asphalt Retention, and Melting Point as survivability criteria.

In addition, for selected applications, a group of hydraulic properties is included based on the site soil conditions (i.e., % fines). These properties are Permittivity and Apparent Opening Size.

Conclusion

The result of this type of specification is several selection criteria that are based on site-specific conditions. This should result in more care when specifying appropriate geotextiles for common transportation applications. In addition, a standard specification should allow geotextile manufacturer’s to produce products more efficiently and in a timelier manner.

The following table summarizes the different AASHTO M288-17 categories and the appropriate TenCate™ product. For further information on TenCate™ Geosynthetics and AASHTO M288-17 contact your local TenCate™ Representative or call (800) 685-9990. To order a copy of the complete AASHTO M288-17 specification, contact AASHTO at (202) 624-5800.

AASHTO M288-17 Selection Guide

Application	CLASS 1		CLASS 2		CLASS 3	
	Woven (elongation < 50%)	Nonwoven (elongation > 50%)	Woven (elongation < 50%)	Nonwoven (elongation > 50%)	Woven (elongation < 50%)	Nonwoven (elongation > 50%)
Subsurface Drainage						
% Fines						
< 15%	FW404 NTPEP Listed	180N NTPEP Listed	FW404 NTPEP Listed	160N NTPEP Listed	FW404 NTPEP Listed	140N NTPEP Listed
15% to 50%	N/A		FW700 NTPEP Listed		FW700 ¹ NTPEP Listed	
> 50%	N/A					
¹ Default geotextile selection. The engineer may specify a Class 3 geotextile from Table 1 (see note b in specification).						
Separation	600X NTPEP Listed	180N NTPEP Listed	600X NTPEP Listed	160N NTPEP Listed	500X NTPEP Listed	140N NTPEP Listed
Stabilization	600X NTPEP Listed	180N NTPEP Listed	600X ² NTPEP Listed	160N NTPEP Listed	500X ² NTPEP Listed	140N NTPEP Listed
² Default geotextile selection. The engineer may specify a Class 2 or 3 geotextile from Table 1 (see note 1 and 2 in specification)						
Permanent Erosion Control						
% Fines						
< 15%	FW404 NTPEP Listed	180N NTPEP Listed	FW404 NTPEP Listed	160N NTPEP Listed	FW404 NTPEP Listed	140N NTPEP Listed
15% to 50%	N/A		FW700 NTPEP Listed		FW700 NTPEP Listed	
> 50%	N/A					

Enhancement Geotextile	CLASS 1A
	Woven
	(elongation < 50%)
Based on properties in Table 6	HP570 NTPEP Listed

Paving Fabrics	Type I	Type II
	MPM30	MPV500 NTPEP Listed

Table 10—Geosynthetic Reinforcement Property Requirements

	Geosynthetic Type	Test Methods	Units	Requirements	Miragrid 2XT and 3XT is below weight noted in footnote d, we have supporting data in accordance with R69 to support use of these products.
Minimum Strength to Resist Installation Damage ^a	Geogrid	ASTM D6637/D6637M	kN/m	10 ^d	
	Geotextile			Class 1 from Table 1 ^d	
Ultimate Tensile Strength based on Structure Specific Design	Geogrid	ASTM D6637/D6637M	kN/m	Site and Structure Specific Value of $T_{min} \times FS \times RF^b$	
	Geotextile	ASTM D4595	kN/m	Site and Structure Specific Value of $T_{min} \times FS \times RF^b$	
RF_{ID}	All	R 69		Value from R 69 for Site Specific Backfill Gradation and Specific Product, but Not Less Than 1.1	
RF_{CR}	All	R69		Value from R 69 for Specific Product	
RF_D	All	R 69		1.3 ^c	
Secant Stiffness at 1,000 hrs and 2% Strain ^e	All	R 69	kN/m	Site and Structure Specific Value	

^a The minimum strengths required here are to limit damage to the geosynthetic during installation to a tolerable and predictable level. All values are minimum values unless otherwise specified.

^b T_{min} is determined from internal stability analysis of the wall or reinforced slope under consideration in accordance with the AASHTO LRFD Bridge Design Specifications, Article 11.10.6.4.3b. FS is the safety factor, or for Load and Resistance Factor Design (LRFD), the combination of load factor divided by the resistance factor. $RF = RF_{ID} \times RF_{CR} \times RF_D$.

^c The default value of 1.3 shall be used only if the geosynthetic meets the minimum requirements in Table 10 and the backfill soil chemical properties meet the requirements in Table 11. If the effective design temperature is greater than 20°C but less than 30°C, a default value for RF_D of 1.5 should be used. If RF_{ID} is greater than 1.7, consideration should be given to either using a finer backfill material with a smaller top size to reduce installation damage, or conducting long-term chemical durability tests on damaged material to justify the use of a default reduction factor of RF_D .

^d Minimum strength requirements are based on the results of numerous exhumations of geosynthetics, in which it was determined that installation damage was minimal for products with a minimum weight of 270 g/m² (8 oz/yd²) (Koerner and Koerner, 1990; Allen, 1991). This roughly corresponds to a Class 1 geotextile as specified in Table 1. A lighter weight geotextile class may be used if site specific installation damage testing is conducted in accordance with R 69, and RF_{ID} is determined to be 1.7 or less.

^e Property requirement is optional as specified by the purchasing agency.

Geotextile and Geogrid Property Requirements for Reinforced Soil Applications. Table 10 has been added for MSE structures. Section 11.1 does indicate – “This specification is applicable to placing a geotextile or geogrid between layers of compacted fill for reinforced soil structures such as retaining walls or reinforced slopes.” If a roadway specs or other applications referenced with properties in Table 10, we should explain the proper applications for Table 10 is MSE walls and slopes. If specifications for retaining walls reference Table 10 and indicate a Class 1 geotextile which is Mirafi 600X and Mirafi 180N, these products should not be used as reinforcement for MSE structures. Section 11 should only be used for Miragrid XT geogrid products. It is not for Class 1 or even Class 1A materials. We recommend using NTPEP REGEO data and Miragrid XT geogrids for MSE structures as outlined in Section 11.

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