

Test Methods: ASTM D6638 & NCMA SRWU-1
 Geogrid Type: Miragrid 5XT
 Block Type: Positive Connection (PC) Block

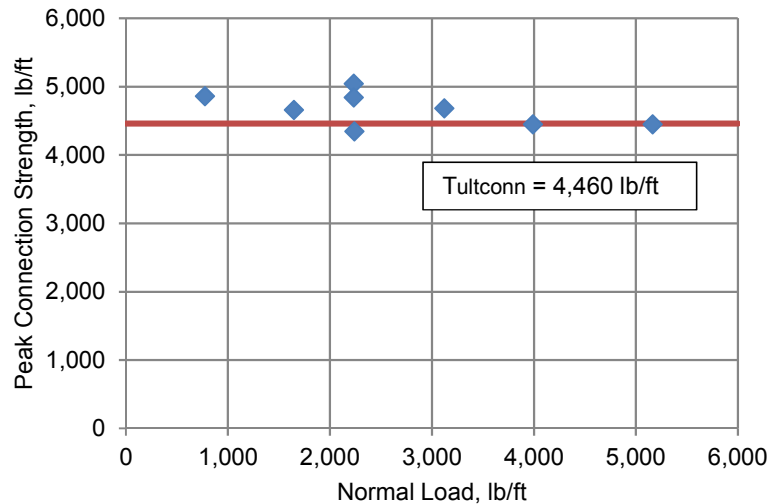
Test Facility: Bathurst, Clarabut Geotechnical Testing, Inc.
 Test Date: February 17, 2011

CONNECTION STRENGTH TEST DATA^(a)

Test No.	Normal Load, lb/ft	Peak Connection, lb/ft	Observed Failure
1	2,236	5,040	Rupture
2	775	4,860	Rupture
3	5,165	4,444	Rupture
4	2,242	4,343	Rupture
5	1,649	4,658	Rupture
6	3,123	4,680	Rupture
7	2,236	4,838	Rupture
8	3,991	4,444	Rupture

Peak Connection _(average) = 4,663 lb/ft
 Peak Connection _(95% confidence level) = 4,460 lb/ft^(b)

MIRAGRID 5XT CONNECTION STRENGTH



CONNECTION DESIGN DATA

for use with AASHTO LRFD Bridge Design Specifications, 6th Edition (2012)

Miragrid 5XT Ultimate Tensile Strength (MARV)	$T_{ult} = 4,700$ lb/ft
Ultimate Connection Strength	$T_{ultconn} = 4,460$ lb/ft
Ultimate Tensile Strength of Geosynthetic Test Sample	$T_{lot} = 5,334$ lb/ft
Connection Strength / Sample Strength	$T_{ultconn} / T_{lot} = 0.84$
Short-term Ultimate Connection Strength Reduction Factor ^(c)	$CR_u = 0.84$
Creep Reduction Factor	
75-Year Design	$RF_{CR(75)} = 1.56$
100-Year Design	$RF_{CR(100)} = 1.58$
Durability Reduction Factor ^(d)	$RF_D = 1.15$
Long-term Connection Strength Reduction Factor	
75-Year Design	$CR_{cr(75)} = 0.54$
100-Year Design	$CR_{cr(100)} = 0.53$
Nominal Long-term Geosynthetic Connection Strength	
75-Year Design	$T_{ac(75)} = 2,201$ lb/ft
100-Year Design	$T_{ac(100)} = 2,173$ lb/ft



- (a) Tested with 3/4" clean crushed stone lightly compacted in the vertical core slot in accordance with Redi-Rock's typical installation recommendations.
 (b) Because the geogrid connection is not normal load dependent and an expression of peak connection for use in design cannot be reliably determined through linear regression, the peak connection results are analyzed as continuous random variables. The average value or sample mean is reported for the test sample as well as a reduction based upon a 95% confidence interval calculated from the Student's t-test for n-1 degrees of freedom.
 (c) Recommended CR_u for design is based on a statistical best fit analysis of T_{ultconn} / T_{lot} values across all geogrid types tested.
 (d) Recommended value for 5 < pH < 8. RF_D value of 1.3 recommended for 4.5 ≤ pH ≤ 5 and 8 ≤ pH ≤ 9.

The information contained in this report has been carefully compiled by Redi-Rock International, LLC as a recommendation of peak connection capacity. It is accurate to the best of our knowledge as of the date of its issue. However, final determination of the suitability of any design information and the appropriateness of this data for a given design purpose is the sole responsibility of the user. No warranty of performance is expressed or implied by the publishing of the foregoing laboratory test results. Issue date: May 12, 2014.

Test Methods: ASTM D6638 & NCMA SRWU-1
 Geogrid Type: Miragrid 8XT
 Block Type: Positive Connection (PC) Block

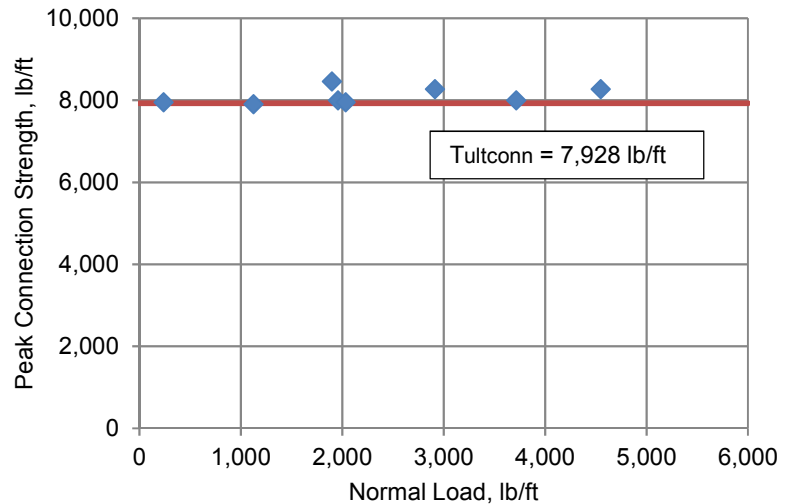
Test Facility: Bathurst, Clarabut Geotechnical Testing, Inc.
 Test Date: December 16, 2011

CONNECTION STRENGTH TEST DATA ^(a)

Test No.	Normal Load, lb/ft	Peak Connection, lb/ft	Observed Failure
1	1,960	7,995	Rupture
2	241	7,949	Rupture
3	1,125	7,904	Rupture
4	2,036	7,949	Rupture
5	2,914	8,269	Rupture
6	3,715	7,995	Rupture
7	1,900	8,452	Rupture
8	4,551	8,269	Rupture

Peak Connection _(average) = 8,098 lb/ft
 Peak Connection _(95% confidence level) = 7,928 lb/ft ^(b)

MIRAGRID 8XT CONNECTION STRENGTH



CONNECTION DESIGN DATA

for use with AASHTO LRFD Bridge Design Specifications, 6th Edition (2012)

Miragrid 8XT Ultimate Tensile Strength (MARV)	$T_{ult} = 7,400$ lb/ft
Ultimate Connection Strength	$T_{ultconn} = 7,928$ lb/ft
Ultimate Tensile Strength of Geosynthetic Test Sample	$T_{lot} = 8,055$ lb/ft
Connection Strength / Sample Strength	$T_{ultconn} / T_{lot} = 0.98$
Short-term Ultimate Connection Strength Reduction Factor ^(c)	$CR_u = 0.84$
Creep Reduction Factor	
75-Year Design	$RF_{CR(75)} = 1.56$
100-Year Design	$RF_{CR(100)} = 1.58$
Durability Reduction Factor ^(d)	$RF_D = 1.15$
Long-term Connection Strength Reduction Factor	
75-Year Design	$CR_{cr(75)} = 0.54$
100-Year Design	$CR_{cr(100)} = 0.53$
Nominal Long-term Geosynthetic Connection Strength	
75-Year Design	$T_{ac(75)} = 3,465$ lb/ft
100-Year Design	$T_{ac(100)} = 3,421$ lb/ft



- (a) Tested with 3/4" clean crushed stone lightly compacted in the vertical core slot in accordance with Redi-Rock's typical installation recommendations.
 (b) Because the geogrid connection is not normal load dependent and an expression of peak connection for use in design cannot be reliably determined through linear regression, the peak connection results are analyzed as continuous random variables. The average value or sample mean is reported for the test sample as well as a reduction based upon a 95% confidence interval calculated from the Student's t-test for n-1 degrees of freedom.
 (c) Recommended CR_u for design is based on a statistical best fit analysis of T_{ultconn} / T_{lot} values across all geogrid types tested.
 (d) Recommended value for 5 < pH < 8. RF_D value of 1.3 recommended for 4.5 ≤ pH ≤ 5 and 8 ≤ pH ≤ 9.

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Test Methods: ASTM D6638 & NCMA SRWU-1
 Geogrid Type: Miragrid 10XT
 Block Type: Positive Connection (PC) Block

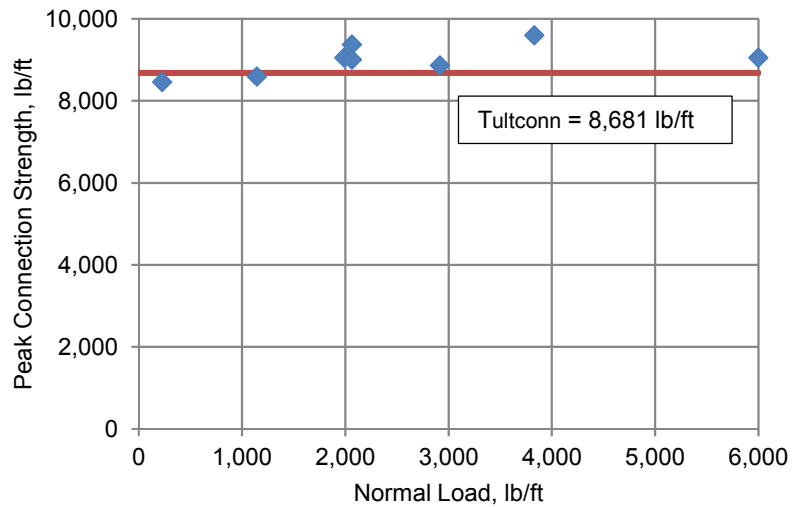
Test Facility: Bathurst, Clarabut Geotechnical Testing, Inc.
 Test Date: November 28, 2011

CONNECTION STRENGTH TEST DATA^(a)

Test No.	Normal Load, lb/ft	Peak Connection, lb/ft	Observed Failure
1	1,990	9,046	Rupture
2	228	8,452	Rupture
3	1,147	8,589	Rupture
4	2,067	9,365	Rupture
5	2,918	8,863	Rupture
6	3,830	9,594	Rupture
7	2,067	9,000	Rupture
8	6,000	9,046	Rupture

Peak Connection _(average) = 8,994 lb/ft
 Peak Connection _(95% confidence level) = 8,681 lb/ft^(b)

MIRAGRID 10XT CONNECTION STRENGTH



CONNECTION DESIGN DATA

for use with AASHTO LRFD Bridge Design Specifications, 6th Edition (2012)

Miragrid 10XT Ultimate Tensile Strength (MARV)	$T_{ult} = 9,500$ lb/ft
Ultimate Connection Strength	$T_{ultconn} = 8,681$ lb/ft
Ultimate Tensile Strength of Geosynthetic Test Sample	$T_{lot} = 10,635$ lb/ft
Connection Strength / Sample Strength	$T_{ultconn} / T_{lot} = 0.82$
Short-term Ultimate Connection Strength Reduction Factor ^(c)	$CR_u = 0.82$
Creep Reduction Factor	
75-Year Design	$RF_{CR(75)} = 1.56$
100-Year Design	$RF_{CR(100)} = 1.58$
Durability Reduction Factor ^(d)	$RF_D = 1.15$
Long-term Connection Strength Reduction Factor	
75-Year Design	$CR_{cr(75)} = 0.53$
100-Year Design	$CR_{cr(100)} = 0.52$
Nominal Long-term Geosynthetic Connection Strength	
75-Year Design	$T_{ac(75)} = 4,342$ lb/ft
100-Year Design	$T_{ac(100)} = 4,287$ lb/ft



- (a) Tested with 3/4" clean crushed stone lightly compacted in the vertical core slot in accordance with Redi-Rock's typical installation recommendations.
 (b) Because the geogrid connection is not normal load dependent and an expression of peak connection for use in design cannot be reliably determined through linear regression, the peak connection results are analyzed as continuous random variables. The average value or sample mean is reported for the test sample as well as a reduction based upon a 95% confidence interval calculated from the Student's t-test for n-1 degrees of freedom.
 (c) Recommended CR_u for design is based on a statistical best fit analysis of T_{ultconn} / T_{lot} values across all geogrid types tested.
 (d) Recommended value for 5 < pH < 8. RF_D value of 1.3 recommended for 4.5 ≤ pH ≤ 5 and 8 ≤ pH ≤ 9.

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Test Methods: ASTM D6638 & NCMA SRWU-1
 Geogrid Type: Miragrid 20XT
 Block Type: Positive Connection (PC) Block

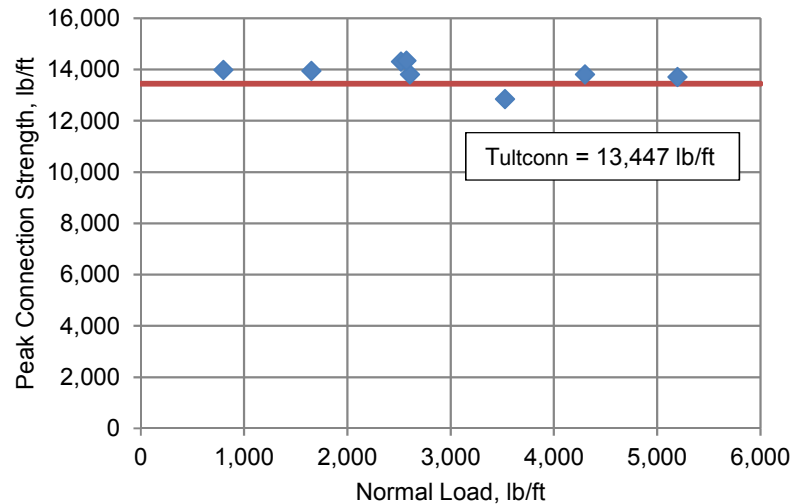
Test Facility: Bathurst, Clarabut Geotechnical Testing, Inc.
 Test Date: December 16, 2011

CONNECTION STRENGTH TEST DATA^(a)

Test No.	Normal Load, lb/ft	Peak Connection, lb/ft	Observed Failure
1	2,608	13,797	Rupture
2	802	13,980	Rupture
3	1,654	13,934	Rupture
4	2,521	14,299	Rupture
5	3,527	12,837	Rupture
6	4,302	13,797	Rupture
7	2,573	14,345	Rupture
8	5,196	13,706	Rupture

Peak Connection _(average) = 13,837 lb/ft
 Peak Connection _(95% confidence level) = 13,447 lb/ft^(b)

MIRAGRID 20XT CONNECTION STRENGTH



CONNECTION DESIGN DATA

for use with AASHTO LRFD Bridge Design Specifications, 6th Edition (2012)

Miragrid 20XT Ultimate Tensile Strength (MARV)	$T_{ult} = 13,705$ lb/ft
Ultimate Connection Strength	$T_{ultconn} = 13,447$ lb/ft
Ultimate Tensile Strength of Geosynthetic Test Sample	$T_{lot} = 16,397$ lb/ft
Connection Strength / Sample Strength	$T_{ultconn} / T_{lot} = 0.82$
Short-term Ultimate Connection Strength Reduction Factor ^(c)	$CR_u = 0.80$
Creep Reduction Factor	
75-Year Design	$RF_{CR(75)} = 1.56$
100-Year Design	$RF_{CR(100)} = 1.58$
Durability Reduction Factor ^(d)	$RF_D = 1.15$
Long-term Connection Strength Reduction Factor	
75-Year Design	$CR_{cr(75)} = 0.51$
100-Year Design	$CR_{cr(100)} = 0.51$
Nominal Long-term Geosynthetic Connection Strength	
75-Year Design	$T_{ac(75)} = 6,111$ lb/ft
100-Year Design	$T_{ac(100)} = 6,034$ lb/ft



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 (c) Recommended CR_u for design is based on a statistical best fit analysis of T_{ultconn} / T_{lot} values across all geogrid types tested.
 (d) Recommended value for 5 < pH < 8. RF_D value of 1.3 recommended for 4.5 ≤ pH ≤ 5 and 8 ≤ pH ≤ 9.

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Test Methods: ASTM D6638 & NCMA SRWU-1
 Geogrid Type: Miragrid 24XT
 Block Type: Positive Connection (PC) Block

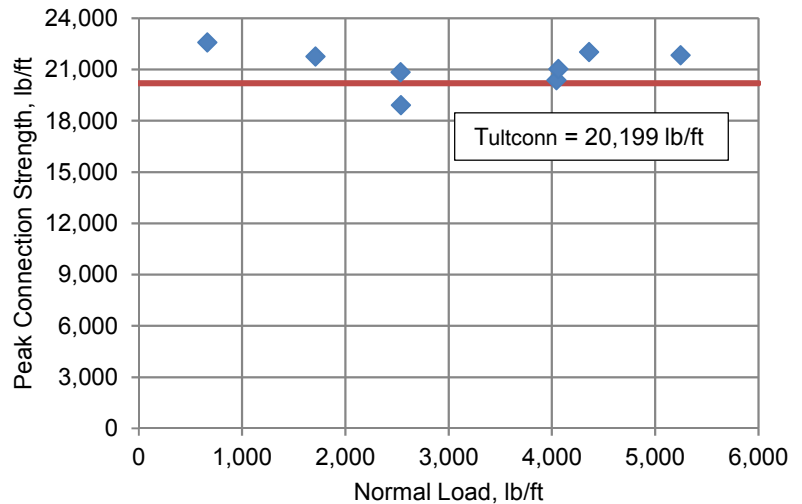
Test Facility: Bathurst, Clarabut Geotechnical Testing, Inc.
 Test Date: February 29, 2012

CONNECTION STRENGTH TEST DATA^(a)

Test No.	Normal Load, lb/ft	Peak Connection, lb/ft	Observed Failure
1	4,046	20,375	Grid Rupture
2	4,362	22,020	Grid Rupture
3	665	22,568	Grid Rupture
4	2,538	20,832	Grid Rupture
5	1,713	21,746	Grid Rupture
6	5,248	21,837	Block & Grid
7	2,539	18,913	Grid Rupture
8	4,063	21,015	Block Rupture

Peak Connection _(average) = 21,163 lb/ft
 Peak Connection _(95% confidence level) = 20,199 lb/ft^(b)

MIRAGRID 24XT CONNECTION STRENGTH



CONNECTION DESIGN DATA

for use with AASHTO LRFD Bridge Design Specifications, 6th Edition (2012)

Miragrid 24XT Ultimate Tensile Strength (MARV)	$T_{ult} = 27,415$ lb/ft
Ultimate Connection Strength	$T_{ultconn} = 20,199$ lb/ft
Ultimate Tensile Strength of Geosynthetic Test Sample	$T_{lot} = 29,130$ lb/ft
Connection Strength / Sample Strength	$T_{ultconn} / T_{lot} = 0.69$
Short-term Ultimate Connection Strength Reduction Factor ^(c)	$CR_u = 0.69$
Creep Reduction Factor	
75-Year Design	$RF_{CR(75)} = 1.56$
100-Year Design	$RF_{CR(100)} = 1.58$
Durability Reduction Factor ^(d)	$RF_D = 1.15$
Long-term Connection Strength Reduction Factor	
75-Year Design	$CR_{cr(75)} = 0.44$
100-Year Design	$CR_{cr(100)} = 0.44$
Nominal Long-term Geosynthetic Connection Strength	
75-Year Design	$T_{ac(75)} = 10,544$ lb/ft
100-Year Design	$T_{ac(100)} = 10,411$ lb/ft



- (a) Tested with 3/4" clean crushed stone lightly compacted in the vertical core slot in accordance with Redi-Rock's typical installation recommendations.
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