

QuadGuard® CEN

CRASH CUSHION

ANCHORING ADDENDUM



QuadGuard® CEN

Anchoring Addendum

Valtir, LLC d.b.a.



15601 Dallas Parkway
Suite 525
Addison, Texas 75001



Warning: The local highway authority, distributors, owners, contractors, lessors, and lessees are responsible for the assembly, maintenance, and repair of the QuadGuard® CEN system. Failure to fulfill these **RESPONSIBILITIES** with respect to the assembly, maintenance, and repair of the QuadGuard® CEN system could result in serious injury or death.

The instructions contained in this manual supersede all previous information and manuals. All information, illustrations, and specifications in this manual are based on the latest QuadGuard® CEN system information available to Valtir International at the time of printing. We reserve the right to make changes at any time. Please contact Valtir International to confirm that you are using the most current instructions.

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Customer Service Contacts

Valtir International is committed to the highest level of customer service. Feedback regarding the QuadGuard® CEN system, its assembly procedures, supporting documentation, and performance is always welcome. Additional information can be obtained from the contact information below:

Valtir International

| | | |
|--------------|--|------------------|
| Telephone | USA | +1 214 589 8140 |
| | U.K. | +44 7361 864735 |
| | Singapore | +65 6276 3398 |
| | Sweden | +46 709 66 10 55 |
| Contact Link | Valtir.com/Contact | |



Warning: Ensure that all of the QuadGuard® CEN system Warnings, Cautions, and Important statements within the QuadGuard® CEN Guidelines are completely followed. Failure to follow this warning could result in serious injury or death in the event of a collision.

Safety Rules for Assembly

*** Important Safety Instructions ***

This manual must be kept in a location where it is readily available to persons who assemble, maintain, or repair an applicable QuadGuard® CEN foundation. Additional copies of this manual are available from Valtir International by calling +1 (214) 589-8140, or visiting Valtir.com. Please contact Valtir International if you have any questions concerning the information in this manual or about the QuadGuard® CEN.

Always use appropriate safety precautions when operating power equipment, mixing chemicals, and when moving heavy equipment or QuadGuard® CEN components. Safety articles including but not limited to work gloves, protective eyewear, safety-toe shoes, and back protection should be used.



Warning: Safety measures incorporating appropriate traffic control devices specified by the highway authority must be used to protect all personnel while at the assembly, maintenance, or repair site.

Safety Symbols

This section describes the safety symbols that appear in this QuadGuard® CEN Guidelines. Read the Guidelines for complete safety, assembly, operating, maintenance, repair, and service information.

| <u>Symbol</u> | <u>Meaning</u> |
|---------------|----------------|
|---------------|----------------|



Safety Alert Symbol: Indicates Danger, Warning, or Caution. Failure to read and follow the Danger, Warning, Safety, or Caution indicators could result in serious injury or death to the workers and/or bystanders.

Read all instructions before assembling, maintaining, or repairing a QuadGuard® CEN foundation.



Danger: Failure to comply with these warnings could result in increased risk of serious injury or death in the event of a vehicle impact with a system **that is no longer compliant with EN 1317-3.**



Warning: Do NOT modify the QuadGuard® CEN system in any way.



Important: Valtir International makes no recommendation whether use or reuse of any part of the system is appropriate or acceptable following an impact. It is the sole responsibility of the local highway authority and its engineers to make that determination. It is critical that you inspect this product after assembly is complete to make certain that the instructions provided in this manual have been strictly followed.



Caution: Ensure that your assembly meets all appropriate local specifications and standards. If you have any questions during the assembly of a QuadGuard® CEN at a particular assembly site, contact the specifying highway authority immediately.


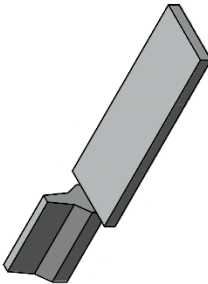
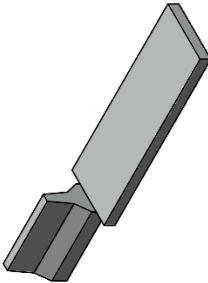
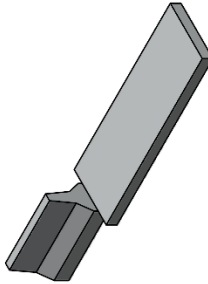




Limitations and Warnings

The QuadGuard® CEN was tested to meet the requirements and guidelines of the 110km/h, 100km/h, 80km/h and 50km/h performance classes using the CEN criteria described in EN 1317-3 (Crash Cushions).

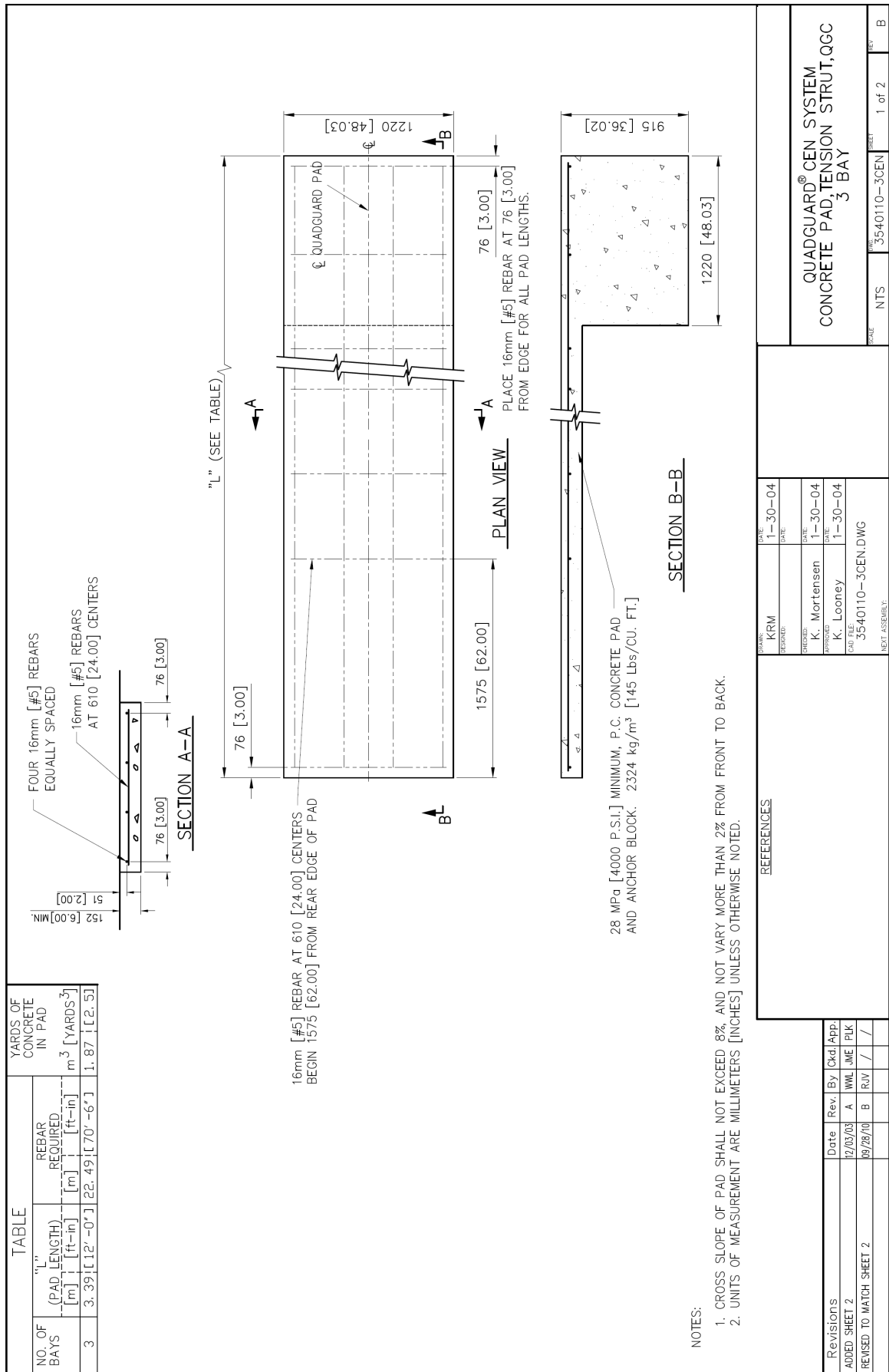
European Standard EN 1317-3 tests are not intended to represent the performance of products when impacted by every vehicle type or every impact condition existing on the roadway.

Valtir International expressly disclaims any warranty or liability for injury or damage to persons or property resulting from any impact, collision or harmful contact with products, other vehicles, or nearby hazards or objects by any vehicle, object or person, whether or not the products were assembled in consultation with Valtir International or by third parties.

The QuadGuard® CEN is intended to be assembled, delineated, and maintained in accordance with local guidelines. Valtir International offers a reflective delineator panel for its QuadGuard® CEN line of products.

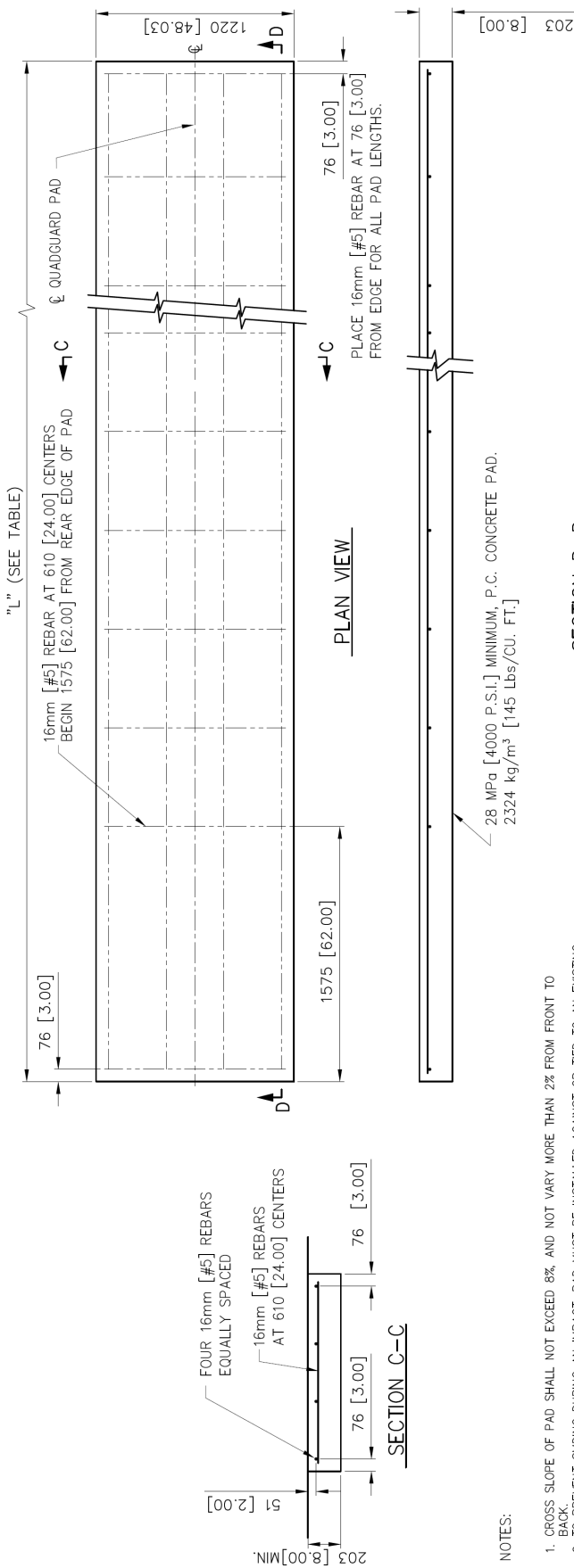
| | | | |
|---|---|---|---|
| <p>6" REINFORCED CONCRETE PAD (SEE NOTE 5)</p>  <p>180mm [7"] STUDS EMBEDMENT - 140mm [5.5"] INSPECTION - WALK-UP INSPECTION ONCE PER YEAR</p> | <p>8" REINFORCED CONCRETE PAD (NO ANCHOR BLOCK, SEE NOTE 1)</p>  <p>180mm [7"] STUDS EMBEDMENT - 140mm [5.5"] INSPECTION - WALK-UP INSPECTION ONCE PER YEAR</p> | <p>8" NON-REINFORCED CONCRETE PAD (NO ANCHOR BLOCK, SEE NOTES 1 & 3)</p>  <p>180mm [7"] STUDS EMBEDMENT - 140mm [5.5"] INSPECTION - WALK-UP INSPECTION ONCE PER YEAR</p> | <p>8" REINFORCED PORTABLE CONCRETE PAD (SEE NOTE 1)</p>  <p>180mm [7"] STUDS EMBEDMENT - 140mm [5.5"] INSPECTION - WALK-UP INSPECTION ONCE PER YEAR</p> |
| <p>8" NON-REINFORCED CONCRETE ROADWAY (1/2 FT WIDE X 5 FT LONG, MINIMUM)</p>  <p>180mm [7"] STUDS EMBEDMENT - 140mm [5.5"] INSPECTION - WALK-UP INSPECTION ONCE PER YEAR</p> | <p>3" ASPHALT CONCRETE ROADWAY OVER 3" P.C. CONCRETE ROADWAY (SEE NOTE 2)</p>  <p>480mm [18"] STUDS EMBEDMENT - 140mm [5.5"] INSPECTION - WALK-UP INSPECTION EVERY SIX MONTHS</p> | <p>6" ASPHALT CONCRETE ROADWAY OVER 6" COMPACTED SUBBASE (SEE NOTE 2)</p>  <p>480mm [18"] STUDS EMBEDMENT - 140mm [5.5"] INSPECTION - WALK-UP INSPECTION EVERY SIX MONTHS</p> | <p>8" ASPHALT CONCRETE ROADWAY (SEE NOTE 2)</p>  <p>480mm [18"] STUDS EMBEDMENT - 140mm [5.5"] INSPECTION - WALK-UP INSPECTION EVERY SIX MONTHS</p> |
| <p>LIMITATIONS AND WARNINGS</p> <ol style="list-style-type: none"> 1. PADS WITHOUT AN ANCHOR BLOCK MAY SLIDE DURING AN IMPACT OR WHEN THEY EXPERIENCE OVER DESIGN IMPACTS. TO GUARD AGAINST THIS, THE ANCHOR BLOCK SHOULD BE INSTALLED TO THE EXISTING STRUCTURE. 2. SYSTEMS INSTALLED ON ASPHALT SHOULD BE INSPECTED EVERY SIX MONTHS AND FOLLOWING EACH IMPACT TO ENSURE THE ANCHORS ARE STILL PROPERLY SET. RE-ANCHOR AS NECESSARY. 3. CONCRETE PADS WITHOUT REINFORCEMENT MAY CRACK WHEN PLACED IN ENVIRONMENTS WITH DRAMATIC TEMPERATURE CHANGES. TO PREVENT CRACKING, REINFORCE PAD AS NECESSARY. 4. OTHER OPTIONS MAY BE POSSIBLE DEPENDING ON THE SITE. PLEASE CONTACT CUSTOMER SERVICE WITH SPECIAL NEEDS. 5. ANCHOR BLOCK LOCATION IS RECOMMENDED AT BACK OF CONCRETE PAD. EXISTING CONCRETE PADS OR NEW PADS WITH BELOW GROUND OBSTRUCTIONS ARE ACCEPTABLE WITH ANCHOR BLOCKS AT THE FRONT OF THE PAD. | | | |
| <p>DESIGNER: D. Sandridge CHECKER: A. Franklin DATE: 8/21/2005 FILE: 35-40-80.dwg</p> <p>UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES (IN). DIMENSIONS IN PARENTHESES ARE IN MILLIMETERS (MM). USE 1/8" ROUNDS UP TO THE NEXT 1/16". USE 1/16" ROUNDS DOWN TO THE NEXT 1/32".</p> | | <p>QUAD GUARD FOUNDATION OPTIONS</p> | |
| | | <p>35-40-80</p> | <p>1 of 1</p> |

Foundation Options 35-40-80



Concrete Pad for 3 Bay TS Backup 3540110-3CEN

| TABLE | | | | YARDS OF CONCRETE IN PAD |
|----------------|---------------------|----------------|-------------------|--------------------------------------|
| NO. OF BAYS | "L" (SEE TABLE) | | REBAR REQUIRED | |
| | (PAD LENGTH) [m] | [ft-in] | [ft-in] | m ³ [YARDS ³] |
| 3 | 3.66 [12'-0"] | 20.73 [68'-0"] | | 0.9 [1.2] |

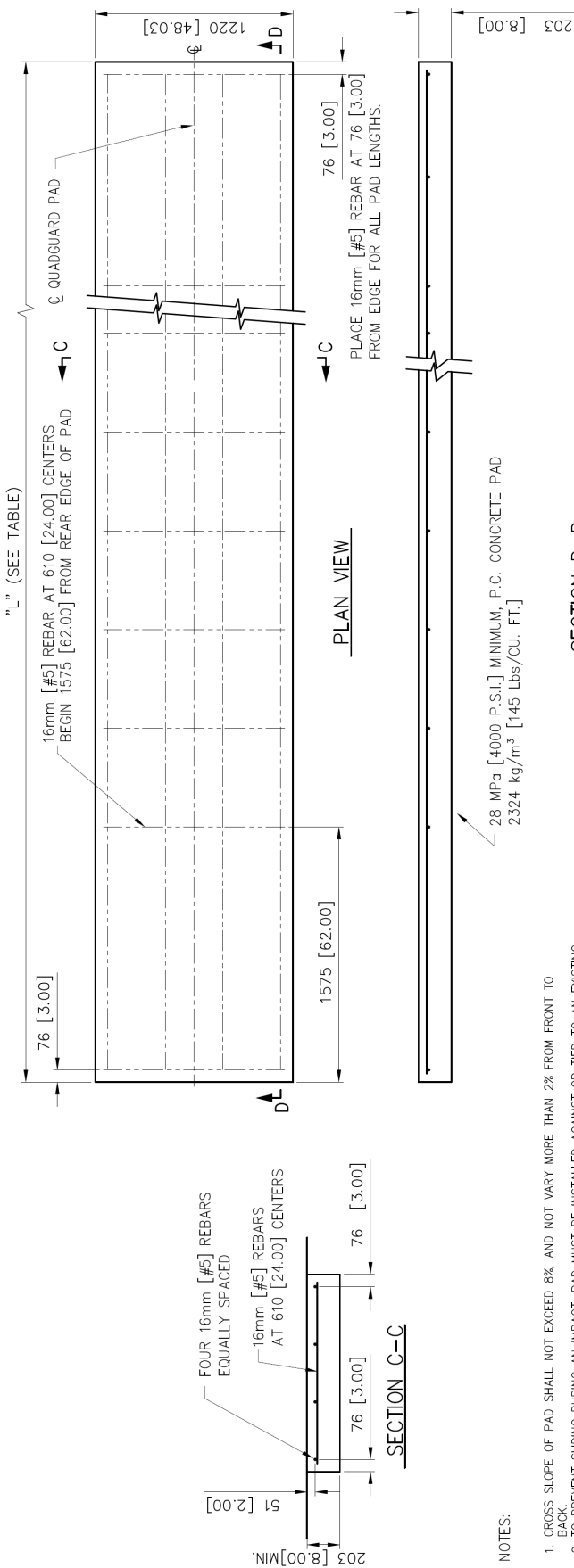


NOTES:

1. CROSS SLOPE OF PAD SHALL NOT EXCEED 8% AND NOT VARY MORE THAN 2% FROM FRONT TO BACK.
2. TO PREVENT SLIDING DURING AN IMPACT, PAD MUST BE INSTALLED AGAINST OR TIED TO AN EXISTING STRUCTURE. OTHERWISE ADDITIONAL BELOW GRADE SUPPORTS MUST BE ADDED AS DETERMINED NECESSARY BY THE PROJECT ENGINEER.
3. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.

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| DRAWN | | | | 10/27/09 | | | |
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| CHECKED | | | | 10/30/09 | | | |
| APPROVED | | | | 10/30/09 | | | |
| DATE FILE | | | | 10/30/09 | | | |
| NEXT ASSEMBLY | | | | 3540110-3CEN.dwg | | | |
| QUADGUARD® CEN SYSTEM CONCRETE PAD, TENSION STRUT, QCC 3 BAY | | | | NTS | | | |
| SCALE | | | | 3540110-3CEN | | | |
| 2 of 2 | | | | B | | | |

| TABLE | | | | YARDS OF CONCRETE IN PAD |
|----------------|---------------------------------|----------------------------------|-------------------------|--------------------------------|
| NO. OF BAYS | "L" (PAD LENGTH) [m] [ft-in] | REBAR REQUIRED [m] [ft-in] | REQUIRED [m] [ft-in] | |
| 5 | 5.49 [18'-0"] | 31.39 [103'-0"] | 1.4 [1.8] | 1.4 [1.8] |
| 6 | 6.40 [21'-0"] | 36.17 [118'-8"] | 1.6 [2.1] | 1.6 [2.1] |
| 8 | 8.23 [27'-0"] | 46.84 [153'-8"] | 2.1 [2.7] | 2.1 [2.7] |



NOTES:

- CROSS SLOPE OF PAD SHALL NOT EXCEED 8% AND NOT VARY MORE THAN 2% FROM FRONT TO BACK.
- TO PREVENT SLIDING DURING AN IMPACT, PAD MUST BE INSTALLED AGAINST OR TIED TO AN EXISTING STRUCTURE. OTHERWISE ADDITIONAL BELOW GRADE SUPPORTS MUST BE ADDED AS DETERMINED NECESSARY BY THE PROJECT ENGINEER.
- UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.

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Preassembled System on Precast Reinforced Concrete Slab



Important: If a system is preassembled on a precast concrete slab off-site, a thicker reinforced slab is required to withstand the abnormal forces present while hoisting the assembly into place (p. 11).



Alternative Reinforced Concrete Option Using Wire Mesh

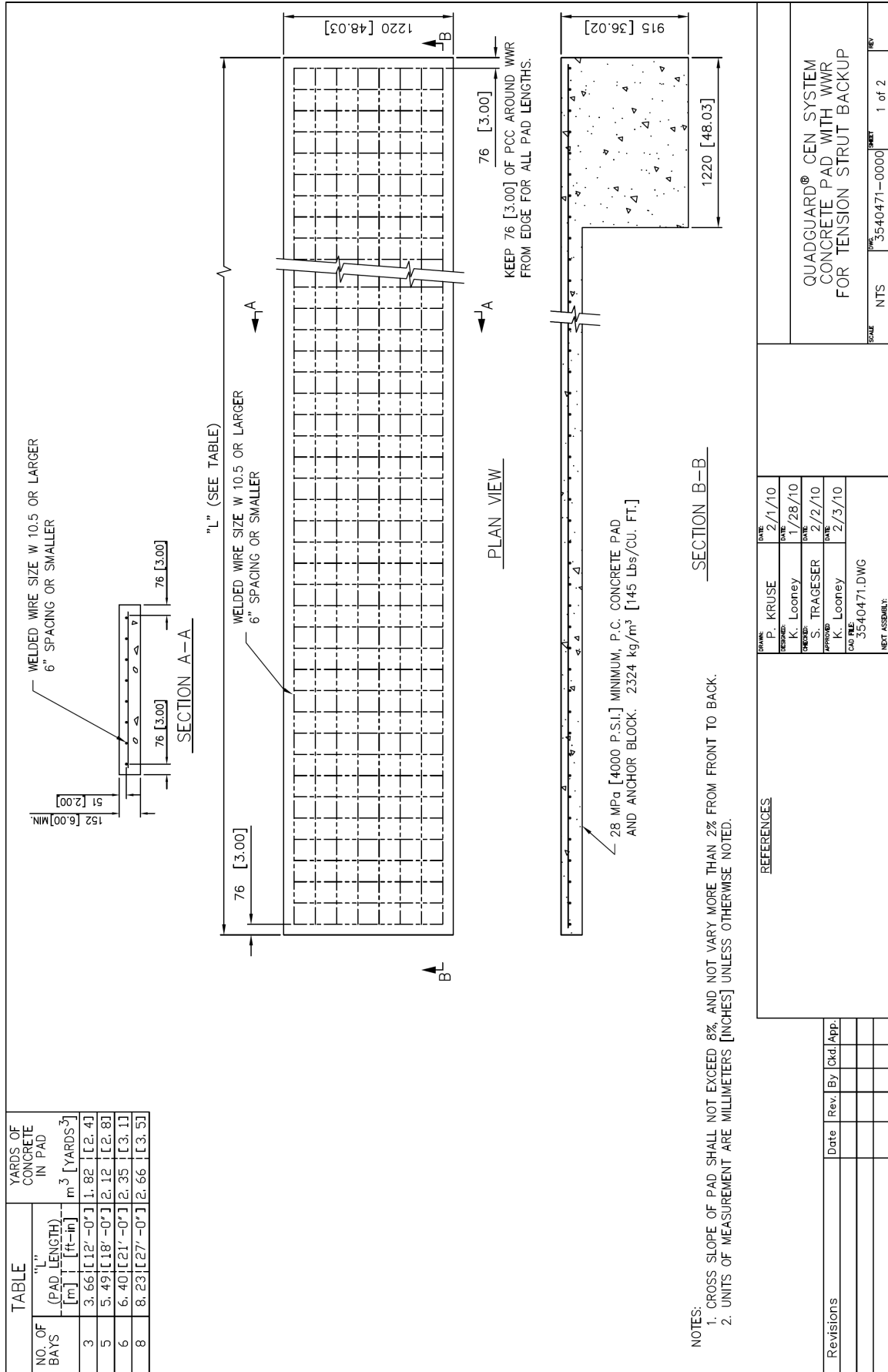
To avoid the possibility of encountering rebar while drilling anchor holes into the foundation, wire mesh is an alternative concrete reinforcement method. Wire mesh is easier to drill through compared to rebar.

The following is non-exclusive list of acceptable wire mesh options for reinforcement:

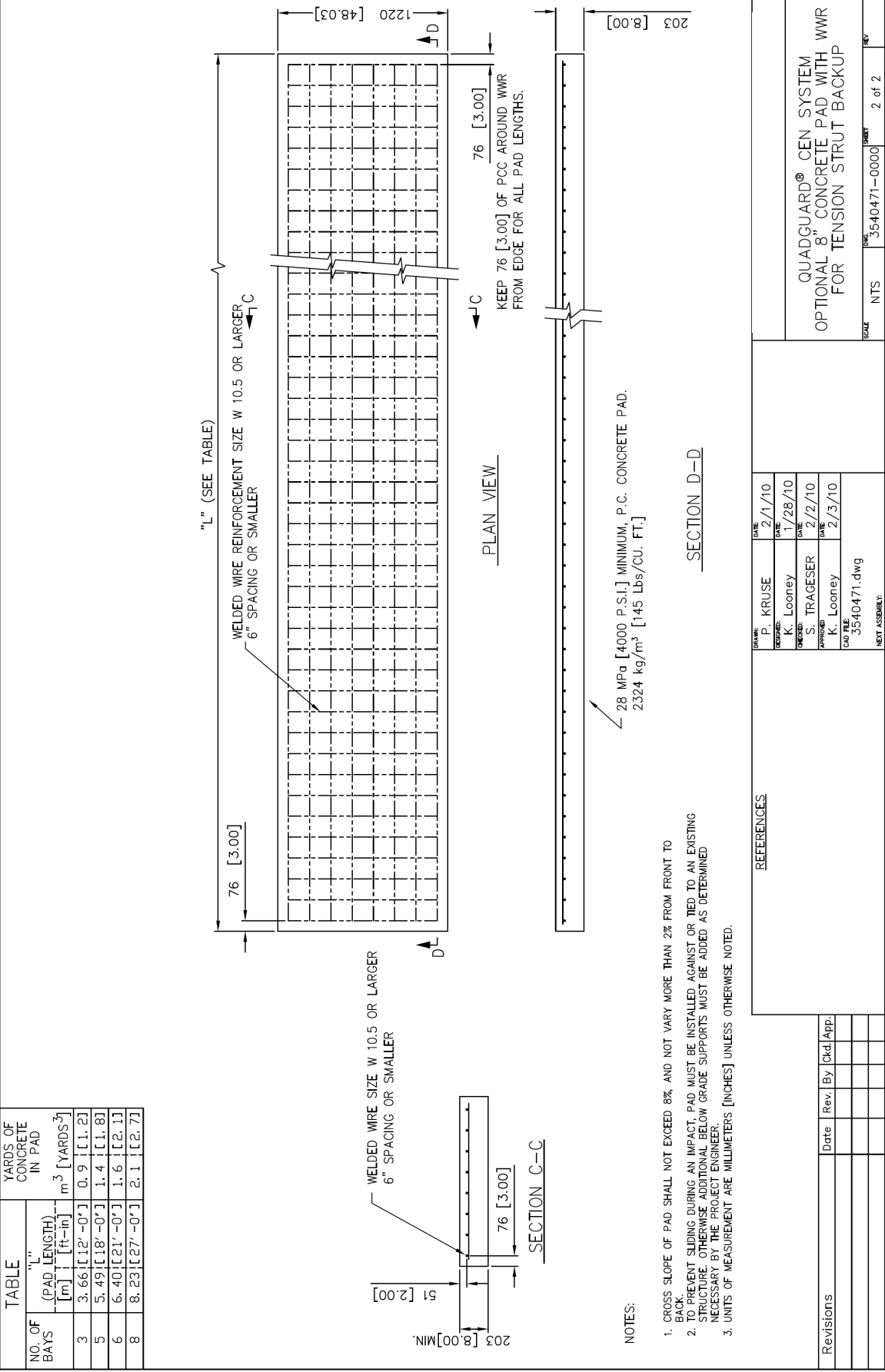
BS503

BS505





Concrete Pad with WWR 3540471-0000



Anchoring Kits

ITEM

STOCK NO.

DESCRIPTION

QTY.

1

619316

ANCHOR KIT, HILT, 3/4x7 (4)

*

2

610427

INSTALL INSTRUCTIONS, ANCHOR KIT

1

PARTS LIST

* SEE TABLE

ANCHOR NOT REQUIRED AT THIS LOCATION (BOTH SIDES)

ANCHOR

BACKUP ASSEMBLY

QUADGUARD CEN SYSTEM

CONCRETE PAD (SEE NOTES 1 & 2)

Ø3/4" X 7" ANCHOR
FINAL TORQUE TO BE
136 Nm [100 lb-ft]

MIN. 483 [19.00] TYP.

SOIL

REFER TO QUADGUARD CEN ANCHORING SYSTEM
INSTALLATION & SAFETY INSTRUCTIONS
FOR FURTHER INFORMATION

TABLE

| BAYS | PERFORMANCE LEVEL | ANCHORS REQ'D | ITEM 1 QTY | ASSEMBLY NO. |
|------|-------------------|---------------|------------|--------------|
| 3 | 50 kN/m [31 MPH] | 30 | 6 | 603703 |
| 5 | 70 kN/m [45 MPH] | 44 | 11 | 603705 |
| 6 | 100 kN/m [62 MPH] | 52 | 13 | 603707 |
| 8 | 110 kN/m [68 MPH] | 66 | 17 | 603709 |

NOTES:

1. 152mm [6.00in] MIN. REINFORCED 28MPa [4000PSI] P.C. CONCRETE PAD, OR 178mm [7.00in] MIN. REINFORCED 28MPa [4000PSI] CONCRETE DECK STRUCTURE, OR 203mm [8.00in] MIN. NON-REINFORCED 28MPa [4000PSI] P.C. CONCRETE ROADWAY ENCOUNTERED AT LEAST 3.66m [12.0ft-0in] WIDE BY 15.24m [50ft-0in] LONG. IF REBAR IS ENCOUNTERED ON A DECK STRUCTURE, CONSULT THE PROJECT ENGINEER FOR REBAR LOCATION.

2. THE QUADGUARD CEN SYSTEM CAN ALSO BE PREASSEMBLED ONTO A PRECAST CONCRETE SLAB.

3. 254mm [10.00in] MIN. REINFORCED 28MPa [4000PSI] PRECAST CONCRETE SLAB. MANUFACTURER RECOMMENDS USING THE MONORAIL AND BACKUP AS A TEMPLATE FOR DRILLING HOLES.

SEE PARTS LIST

W. Leddington
P. Kruse
10/27/2019
10/30/2019
TOLERANCES PER
THP-SF-001, UNLESS
OTHERWISE SPECIFIED.
DO NOT SCALE DRAWING

EST UNFINISHED WT: 33.1 lbs

ANCHORING KIT, QGC

INSTRUCTIONS PIN 610427

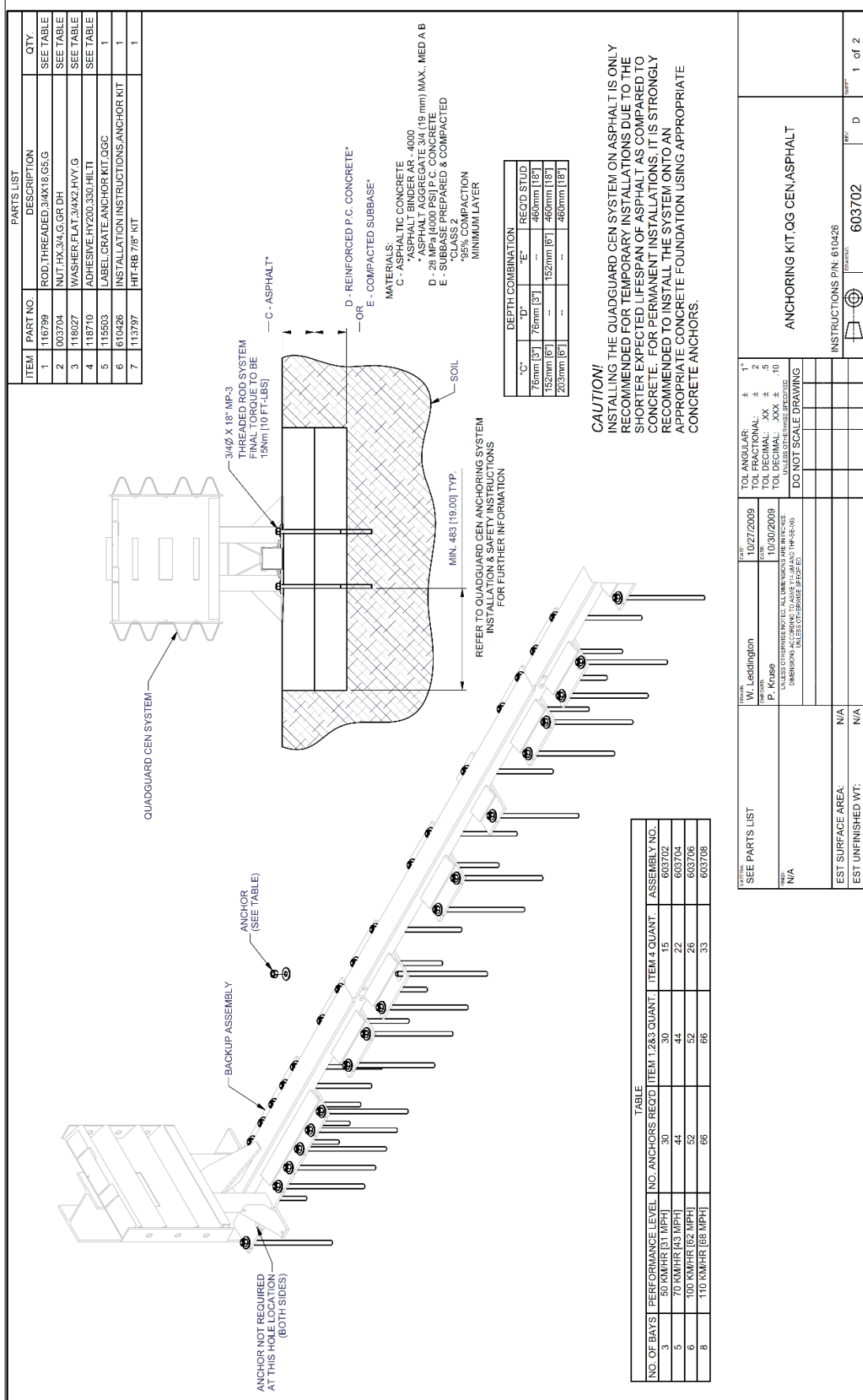
603703

1 of 1

Valtir.com

15

Revision D November 2022



Asphalt Anchoring Kit 603702

Alternative Anchor Options

There are numerous manufacturers of anchors that provide a product that will successfully anchor the QuadGuard® CEN to the foundation. Valtir has performed anchor performance tests on several of these alternative anchors. The following list illustrates which anchors have satisfactorily passed our minimum requirements (i.e. minimum pull out strength of 82.3 kN [18,500 lbs.] and minimum shear strength of 109 kN [24,500 lbs.]).



Caution: All anchors must be assembled strictly per manufacturer requirements. It is recommended that the anchor manufacturer is consulted to discuss your specific assembly site conditions prior to finalizing your anchor selection.

Concrete



<http://www.hilti.com>

Models [Epoxy-based anchoring systems]:

HVU M20 x 170

HY 200

RE 500

Asphalt



<http://www.kelken.com>

Model [Epoxy-based anchoring system]:

N/A Kelken “Lefty” anchor coated with Kelislip bond release agent and anchored with Keligrout epoxy

- Kelken “Lefty” anchors (3/4 inch diameter x 18 inch long)
 - 3/4 - 10 threads at top 2 inches of anchor, 3/4 inch “Lefty” removable thread for remaining anchor length (~16 inches)
 - Material per ASTM A449 Type 1 or ASTM A193 Grade B7 or SAE J429 Grade 5
 - Galvanized for corrosion resistance
 - Includes 3/4 inch galvanized washers and 3/4 - 10 galvanized nuts
- 1KS12Q (Kelislip bond release agent)
- 1KG101T (Keligrout epoxy)



<http://www.simpsonanchors.com>

Model [Mechanical anchoring systems]:

THD75812HMG (3/4 inch diameter x 8.5 inches long; mechanically galvanized)

THD75100HMG (3/4 inch diameter x 10 inches long; mechanically galvanized)



<http://toge-road.de>

Model [Epoxy-based anchoring system]:

TSM B 22 X 155 IM 16 ASPHALT



Warning: For **permanent** applications on **asphalt**, including Hilti (HY200), Valtir recommends that the system be inspected according to the guidelines set forth in the Maintenance and Repair section of the **Assembly Manual** (PN 115309) to ensure the following specifications:

1. Increase the frequency of Walk-Up Inspections to once every six months (instead of once every 12 months for **concrete** applications).
2. After each impact, check to see that all anchor bolts are not damaged and have remained firmly anchored in the roadway surface. Damaged anchor bolts are those found to be loose, broken, or showing signs of pull out and must be replaced. Systems mounted on asphalt must be replaced and mounted on fresh, undisturbed asphalt if more than 10% of anchors are found to be loose, broken, or show signs of pull out. If 10% or fewer anchors are damaged, replace the damaged anchors in the existing asphalt.

If you have any questions, please contact our Customer Service Department (p. 3).

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