**SECTION 04051 – MASONRY HELICAL TIES**

**PART 1 — GENERAL**

* 1. **SECTION INCLUDES**
1. This Section pertains to all other Sections of these Specifications that require post-installed helical ties, unless specified otherwise. Requirements pertaining to post-installed helical tie work including, but not limited to, furnishing and installing helical ties and providing all equipment, labor, services, and access to complete the work:
	1. Helical wall ties to connect multiple wythes of masonry or other wall construction together
	2. Helical stitching ties installed in mortar bed joints for crack stabilization
	3. **RELATED DOCUMENTS**
2. Division 1: General Requirements
3. Division 4: Masonry

	1. **REFERENCES**

Use the most recent edition of the following referenced Standards based on current, jurisdictional Code adoptions.

1. ANSI B212.15 — Cutting Tools — Carbide-tipped Masonry Drills and Blanks for Carbide-tipped Masonry Drills
2. ASTM E3121 — Standard Test Methods for Field Testing of Anchors in Concrete or Masonry
3. CSA A370 — Connectors for Masonry
4. SAE J405 — Chemical Compositions of SAE Wrought Stainless Steels
5. TMS 402/602 — Building Code Requirements and Specification for Masonry Structures
6. 29 CFR, Standard 1926 – Safety and Health Regulations for Construction

	1. **SUBMITTALS AND SUBSTITUTIONS**

Submittals and substitutions shall be in accordance with the General Conditions of the Contract Documents, Division 1: General Requirements, and the following procedures.

1. Submittals: Submit product data for proprietary products and materials listed under Part 2 — Products of this Section that includes:
	1. General Product Information
	2. Technical Performance Data
	3. Material Safety Data Sheets (MSDS)
	4. Manufacturer’s Published Installation Instructions (MPII)
	5. Results of preconstruction, site-specific, field testing program when required by the Contract Documents or Project exiting conditions.
2. Substitutions
	1. The Contractor shall submit technical performance data and calculations that are prepared & sealed by a registered Design Professional demonstrating that the product substitution is capable of achieving performance values equal to, or better than, the specified product using appropriate design procedure and/or standard(s) as required by the Contract Documents and applicable Building Code.
	2. Calculations shall specify the diameter and embedment depth required of the substituted product as well as the diameter of drill bits and drilling procedures required to drill holes for the installation.
	3. The Contractor shall submit results of a preconstruction, site-specific, field testing program for product proposed as substitutes when such field testing is required by the Contract Documents or Project existing conditions.
	4. Substitution requests must be accompanied by all Submittal information required of the specified product for which the substitution is proposed.
	5. Any increase in costs for such substitution shall be the sole responsibility of the Contractor.

 **1.05 QUALITY ASSURANCE**

1. Installer Qualifications: Installers shall be trained by a qualified, helical tie product manufacturer’s representative to assure proper installation.
2. The Installer shall be experienced with the installation of product similar or equal to the type specified, and into the base material required for the Project, or shall otherwise be acceptable to the Owner.

 **1.06 DELIVERY, STORAGE, AND HANDLING**

1. Deliver products to job site undamaged and in product manufacturer’s or distributor’s original packaging, complete with installation instructions.
2. Protect and handle materials in accordance with product manufacturer’s recommendations to prevent product damage, degradation, or deterioration.

 **1.07 PROJECT CONDITIONS**

1. Contractor shall notify the registered Design Professional of inadequate, deteriorated, poor quality, and/or inappropriate base material conditions prior to commencing the work.
2. The product steel type must provide suitable corrosion resistance for the anticipated service environment following proper installation.
3. Preconstruction, Site-Specific, Field Testing Program
	1. Preconstruction, site-specific, field testing of product may be specified or required when base materials are of unknown quality or poor existing condition to determine specific installation parameters, i.e., drill bit diameter, hole drilling procedures, etc., to optimize product performance.
	2. Results of the preconstruction, site-specific, field testing program shall be documented in a written field test report. The field test report shall include, but not be limited to, the following information: maximum tension performance, tension performance/axial deflection relationship, embedment depth, drill bit size, and rotohammer settings for each test and base material tested.
	3. Preconstruction, site-specific, field testing shall conform to ASTM E3121 to the greatest extent possible and shall be conducted by qualified field technicians using calibrated test equipment.

**PART 2 — PRODUCTS**

* 1. **Helical Ties**
1. Post-installed helical ties for use in masonry/concrete base materials shall be feature radial fins formed on the steel wire via cold rolling process suitable to support and resist structural demand loading by means of tension, compression or a combination of both.
2. Material: Type 304 or 316 Stainless Steel as specified for the Project conditions.
3. Helical ties shall be installed using the manufacturer’s accessories.
4. Unless noted otherwise, Helical Ties shall be Heli-Tie™ products by the Simpson Strong-Tie Company. Use Heli-Tie Wall Tie for wall tie applications and Heli-Tie Stitching Tie for crack stitching applications.
	1. **Nonshrink Repair Mortar**
5. Mortar for use as a system in the stitching tie application shall be cementitious, single-component, fiber-reinforced, polymer-modified, silica fume-enhanced, structural repair mortar with integral corrosion inhibitor.
6. Minimum properties for nonshrink grout or mortar are in the table below. Failure to meet these minimum properties may result in decreased performance.

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| Compressive Strength – 7 days | 4,500 psi (31.1 MPa) | ASTM C109 |
| Compressive Strength – 28 days | 6,400 psi (44.2 MPa) |
| Tensile Strength – 28 days | 310 psi (2.14 MPa) | ASTM C1583 |
| Flexural Strength – 28 days | 680 psi (4.69 MPa) | ASTM C348 |

* 1. **Misc. Repair Materials**
1. Material used for vertical crack repair in stitching tie application shall be as specified or approved by the registered Design Professional.
2. Material used to conceal horizontal mortar joint in stitching tie application shall be as specified or approved by the registered Design Professional.
	1. **Equipment and tools for installing wall ties**
3. Drill bit. Drill bit shall be carbide-tipped and conforming to ANSI B212.15. Diameter shall be as specified in the Contract Documents.
4. Installation Tool. Use installation tool as specified by the helical tie manufacturer. Unless noted otherwise, use Simpson Strong-Tie® Heli-Tie Installation Tool (model HELITOOL37A).
	1. **Equipment and tools for installing stitching ties**
5. Rotary grinding wheel or other suitable tools for safely removing mortar in bed joints to the depth specified in the Contract Documents.

**PART 3 — EXECUTION**

**3.01 EXAMINATION**

1. Examine supporting base materials and environmental conditions. Do not begin installation until base materials have been properly prepared.
2. Unless otherwise specified, do not drill holes or commence helical wall tie installations in concrete or masonry until the concrete, mortar, or grout base materials have achieved their full design strength.

**3.02 INSTALLATION**

Installations shall conform to the Manufacturer’s Published Installation Instructions (MPII) or to alternative procedures specified in the Contract Documents. Installation procedures specified in the Contract Documents shall supersede procedures in the MPII.

1. For Wall Tie applications
	1. Drill all holes for helical ties using carbide-tipped drill bits of the diameter specified in the Contract Documents or otherwise recommended in the MPII. Drill holes with rotohammer setting set as specified in the Contract Documents or otherwise recommended in the MPII. It is suggested to use rotation only mode for soft or hollow materials.
	2. Identify position of bed joint reinforcement, reinforcing steel and/or other embedded items prior to drilling holes for ties. Exercise care in drilling to avoid damaging existing reinforcing or embedded items. Notify the registered Design Professional of Record if reinforcing steel or other embedded items are encountered during hole drilling procedures.
	3. Drill holes for helical wall ties accurately and squarely without excessive drill bit wobble at locations and spacing specified in the Contract Documents. Drill holes perpendicular to base material, unless otherwise specified.
	4. Drill holes continuously and to the specified embedment depth through all facing and back-up base materials to be tied together.
	5. Install helical ties into holes predrilled in base materials using the manufacturer’s recommended installation tool.
	6. Position correct end of helical tie into the manufacturer’s installation tool set in an SDS-Plus rotohammer and drive the helical tie into the predrilled hole with the rotohammer set in hammer mode. Drive the helical tie into the base material until the helical tie is countersunk beyond the facing base-material surface as specified or to the depth permitted by the installation tool. Install specified patch / repair material to match existing finish surface material.
	7. Where the helical tie manufacturer recommends use of special tools for installation of ties, such tools shall be used, unless otherwise specifically permitted by the registered Design Professional of Record.
2. For Stitching Tie applications
	1. Remove bed joint mortar for minimum 20" length on either side of the affected area (crack) to a depth of approximately 1 1/4", or as otherwise specified, with a rotary grinding wheel. Unless specified otherwise on the contract documents, vertical spacing of installation sites should be every fourth course for red brick or every other course for concrete masonry units.
	2. Clear bed joint of all loose debris and condition mortar joint and adjacent units to a saturated surface dry moisture condition.
	3. Mix nonshrink repair grout or mortar per product instructions and place into the prepared bed joint, filling the void to approximately two-thirds of its depth.
	4. Embed the Stitching Tie at one-half the depth of the void. Trowel displaced grout to fully encapsulate the tie.
	5. Fill and tool any remaining void of the bed joint with mortar to match existing adjacent mortar.
	6. Fill and finish any vertical cracks with approved repair material to conceal repair site.

**3.03 FIELD QUALITY CONTROL**

1. Special Inspection
	1. When Special Inspection is required under the Contract, the Contractor shall notify the Owner’s selected Special Inspection Agency of the helical tie Installer’s intent to commence work, providing at least 72 hours advanced notice.
	2. The Contractor shall provide the Special Inspector with safe access to the work and a representative from the Contractor shall accompany the Special Inspector at all time during Special Inspection, unless otherwise agreed between the Contractor, Owner, and Special Inspection Agency.

**3.04 FIELD TESTING**

1. Helical tie installations shall be tested during construction by qualified field technicians acceptable to the Owner and registered Design Professional of Record using properly calibrated, manufacturer-recommended, proprietary testing equipment when such field testing is specified under the Contract.
2. Frequency of helical wall tie testing shall be in accordance with the Contract Documents.
3. Contact manufacturer for additional information related to field testing.

**END OF SECTION**