

Grip-Twist[®]



 **BarSplice**
PRODUCTS INC.
A SUBSIDIARY OF FC INDUSTRIES, INC.

GRIP-TWIST® — Type 2 Mechanical Splices and Anchorage for Reinforcing Bars



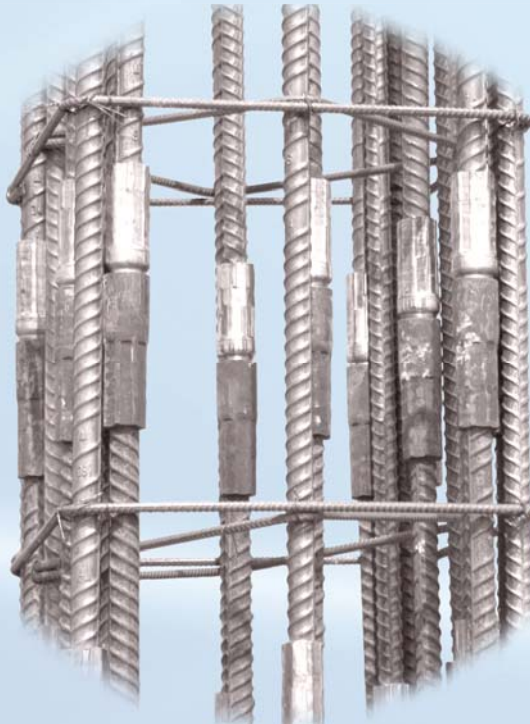
GRIP-TWIST® is a swaged splicing and anchorage system that incorporates the use of self-locating taper threaded ends on components for expeditious field assembly. Because parts are swaged to the bars and the threads are formed on the couplers instead of the reinforcing bars, there is no loss of cross-sectional area and the full ultimate design strength of the reinforcing system is maintained.

Reinforcing bar sizes No. 3 – 18 (Ø10 – 57 mm) can be spliced & anchored by Grip-Twist®. *Swaging in advance* means important time and cost savings for your project. Under fabrication shop conditions, with suitable equipment, just one or two pressings per coupler-half are all that is needed to install parts onto most bar sizes. Bars of different sizes may be connected using Transition Grip-Twist®.

In the field it is only necessary to rotate one of the two bars until the threads of male and female couplers are fully assembled...no specialized equipment or torque wrench is needed for this operation —only a simple pipe wrench may be needed to overcome bar weight in accordance with assembly instructions. For locations where rebars have a *bend* or *offset* and cannot be rotated, Grip-Twist® Position Couplers may be used.

GOOD REASONS FOR TAPER THREADED GRIP-TWIST® ON YOUR PROJECT...

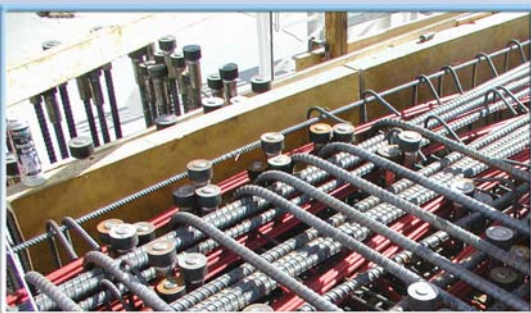
1. **Saves time** — pre-installed by cold swaging. INTERNAL STOPS FOR EASY POSITIONING
Minimal detailing — more design flexibility.
2. **No special bar preparation** — avoids roughing and thread cutting operation on rebars. No chasers, oils or cutting fluids.
3. **Self-location** — quick assembly — eases bar placement. NO SPECIAL TORQUE. Position Couplers for bent bars.
4. **No chemistry restrictions** — compatible with ASTM A 615, A 706 and equivalent bars.
5. **Thread Protection** — color coded plastic plugs and caps match the color of swaging dies.
6. **High strength** — TYPE 2 performance and true structural continuity, with load transfer independent of concrete. ROLLED EXTERNAL THREADS INHERENTLY HAVE HIGH FATIGUE STRENGTH.
7. **Full rebar cross-sectional area** — no undercutting of rebar or heat affected zones.
8. **In-situ installation** — although normally pre-installed, components can be swaged to existing bars, if needed; using BPI-Grip field presses.



Grip-Twist® is superior to rebar laps — because as a mechanical splice it does not rely on the surrounding concrete to transfer forces between bars.

Strength requirements for mechanical splices established in ACI 318 are significantly higher than those for lap splices. Taper Threaded Grip-Twist has been qualified by in-air tests and protocols like AC-133 to sustain inelastic reinforcing bar strain excursions such as those that might be brought about by overload due to seismic activity — whereas the use of rebar laps in seismic zones is generally disallowed. The use of #14 and #18 lap splices is prohibited on all projects.

If spalling of concrete cover occurs around a lap bar by fire, corrosion or by another mechanism, the effectiveness of the rebar lap is severely compromised because its performance is 100% dependent upon the concrete that surrounds it. **Clearly GRIP-TWIST® mechanical splices supplant all classes of lap splice including A, B and C.**



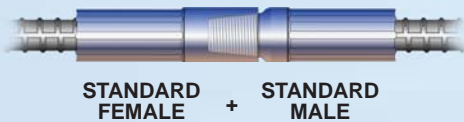
MECHANICAL ANCHORAGE is quickly and conveniently achieved using the GRIP-TWIST Taper Threaded **DoughNUT™**. Congestion problems brought about by hook bars are alleviated.



GRIP-TWIST® — Versatile modular splice and anchorage system

TAPER THREADED GRIP-TWIST

COLD-SWAGED STEEL COUPLER WITH TAPER THREADED ENDS



- **TYPE 2 SPLICE** – ACI 318 Chapter 21 Seismic Design and International Building Code. Develops specified tensile strength of black deformed bars ASTM A706 Grades 60 and 80 or A615 Grades 60 and 75. **Exceeds TYPE 1 requirements of Grades 60, 75 and 80 bar.***
- **CALTRANS SERVICE and CALTRANS ULTIMATE** – Meets slip test 670 and capable of developing the actual ultimate strength of black deformed bars ASTM A706 Grade 60.
- **SEISMIC LOADING** – Tested to withstand plastic strain excursions to 5 x rebar yield strain value and stress reversals in accordance with ICC Acceptance Criteria AC-133, **ICC Report No. ESR-2299**.
- **NUCLEAR APPLICATIONS** – Swaged splices exceeding a tensile strength of 90,000 psi (150% x specified yield, f_y) when used with ASTM A615 Grade 60 bar.
- **COMMERCIAL APPLICATIONS** – In accordance with Building Code Requirements for Structural Concrete, ACI 318 Chapter 12, used in columns, beams, walls, mats, tanks, parking garages.
- **DOT PROJECTS and COATED BARS** – Exceeds 125% x f_y and 135% x f_y , Grade 60 when swaged directly over black ASTM A615 bars, epoxy coated ASTM A775 bars or galvanized ASTM A767 bars. Coating removal or shielding is not necessary on the coated bars.

* For higher strength applications over 100,000 psi involving bar Grades 75, 80, 100 or 120, use the **GRIP-TWIST XT** series.

TRANSITION GRIP-TWIST

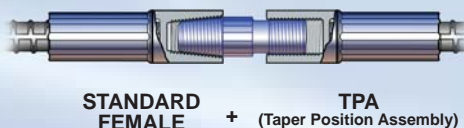
TRANSITION COLD-SWAGED COUPLER WITH TAPER THREADED ENDS



- **APPLICATIONS** – Anywhere a change of bar size is required, in accordance with Building Code Requirements for Structural Concrete, ACI 318 Chapter 12, typically in columns, walls, parking garages.
- **CONVENIENCE** – Components are color coded to match appropriate swaging dies. Standard MALE couplers are used on smaller bar. Thread protection is included.
- **VERSATILE** – Connect any size bar to any other by this method; typically 1, 2, 3 or 4 bar size changes.
- **TRANSITION-POSITIONS** – Can be achieved using a standard TPA (see below) on the small side and unwinding the pre-assembled stud into the adjoining Transition Female Grip-Twist.
- **TYPE 2 SPLICE** – ACI 318 Chapter 21 Seismic Design and International Building Code. Develops specified tensile strength of the *smaller* bar, ASTM A706 or A615. **Exceeds TYPE 1 requirements.**
- **SEISMIC LOADING** – Tested to withstand plastic strain excursions to 5 x rebar yield strain value and stress reversals in accordance with ICC Acceptance Criteria AC-133.
- **DOT PROJECTS and COATED BARS** – Exceeds 125% x f_y and 135% x f_y of the *smaller* Grade 60 bar when swaged directly over black ASTM A615 bars, epoxy coated ASTM A775 bars or galvanized ASTM A767 bars. Coating removal or shielding is not necessary on the coated bars.

GRIP-TWIST POSITION COUPLER

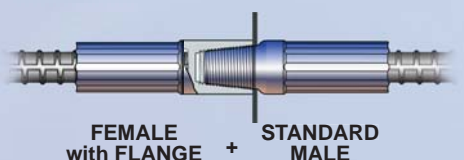
COLD-SWAGED POSITION COUPLER WITH THREADED STUD



- **APPLICATIONS** – Where bars are bent and cannot be rotated to engage the threads, or when bar lengths are long and impractical to rotate.
- **NO ROTATION OF BARS** – Assembly is completed in the field by unwinding a pre-assembled stud from a 'TPA' (Taper Position Assembly) into an adjoining standard Taper Threaded Female Grip-Twist.
- **FOR STANDARD REINFORCING BARS** – ASTM A706, ASTM A615, ASTM A996 and equal black deformed bars – exceeds specified ultimate tensile strength of Grades 40, 50 60 and 75.
- **CONVENIENCE** – Each TPA includes a parallel threaded coupler sleeve and a pre-installed stud that projects from one end. Each stud has an externally rolled thread with an axial taper.
- **TYPE 1 and TYPE 2 SPLICE** – ACI 318 Chapter 21 Develops both 1.25 f_y and the specified tensile strength of black deformed bars ASTM A706 Grades 60 and 80 or A615 Grades 60 and 75.
- **DOT PROJECTS and COATED BARS** – Exceeds 125% x f_y and 135% x f_y , Grade 60 when swaged directly over black ASTM A615 bars, epoxy coated ASTM A775 bars or galvanized ASTM A767 bars. Coating removal or shielding is not necessary on the coated bars.

GRIP-TWIST FLANGED COUPLER

COLD-SWAGED FLANGED COUPLER WITH TAPER THREADED ENDS

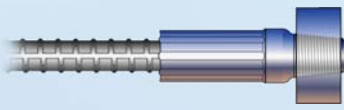


- **FOR STANDARD REINFORCING BARS** – ASTM A706, ASTM A615, ASTM A996 and equal black deformed bars – capable of exceeding specified ultimate strength of Grades 40, 50 60 and 75.
- **CONVENIENCE** – Flanged couplers have holes that permit nailing them to formwork. They can be fully embedded in concrete thereby relieving certain constructability problems and potential injuries.
- **NO DRILLING HOLES THROUGH FORMS** – No protruding rebar when concrete is poured. Continuity across construction joint is established when rebar with male coupler is engaged.
- **DOWEL BAR SPLICE** – Ideally suited for dowel bar replacement applications because fabricating shops can utilize their own bars at their own location, including drops.
- **TYPE 1 and TYPE 2 SPLICE** – ACI 318 Chapter 21 Develops both 1.25 f_y and the specified tensile strength of black deformed bars ASTM A706 Grades 60 and 80 or A615 Grades 60 and 75.
- **DOT PROJECTS and COATED BARS** – Exceeds 125% x f_y and 135% x f_y , Grade 60 when swaged directly over black ASTM A615 bars, epoxy coated ASTM A775 bars or galvanized ASTM A767 bars. Coating removal or shielding is not necessary on the coated bars.

GRIP-TWIST® — For rebar mechanical anchorage and choices

TAPER THREADED DOUGHNUT™

COLD-SWAGED HEADED ANCHORAGE WITH TAPER THREADS



STANDARD MALE + DoughNUT HEAD (5A_b or 10A_b)

- **5A_b HEAD – TDS series** for transmitting bond force from the reinforcing bar to concrete by a combination of head bearing and development length.* A 'standard' head size for most applications.
- **10A_b HEAD – TDX series** has larger area to transmit full force in bar by head bearing alone. Generally used in sections that may be required to withstand higher forces. *CALTRANS APPROVED.*
- **SHOP or FIELD INSTALLATION** – Attaches directly to standard MALE Taper Threaded Grip-Twist that is swaged to the reinforcing bar – no thread cutting required. Shop-installed or swaged in-situ.
- **HIGH STRENGTH** – Connections to bar exceed the specified yield strength of the bar, f_y , as required by ACI 318 section 12.6. Confirming in-air tensile tests develop $1.5 f_y$, or more, Grade 60 bar per A970.
- **REPLACES HOOKS – No special bend direction** – alleviates congestion – for beam-column joints, knee joints, pile caps, column roof slab connections; replaces stirrup bars used as confinement steel.
- **KEY ADVANTAGES** – Avoids lengthy hook extensions / complex stress patterns. No heat, welding or hot forging – no special chemistry or rebar grade requirements, no bending or cracking of rebars.

* A_b = area of reinforcement. Minimum recommended anchorage length = 12 d_b where d_b = bar dia; ref: "Headed Reinforcement A Viable Option" John W. Wallace.

STRUCTURAL CONNECTOR

COLD-SWAGED TAPER THREADED WELDABLE CONNECTOR



STANDARD MALE + STRUCTURAL CONNECTOR

- **CONVENIENCE** – Cold swage standard MALE couplers to black ASTM A615 or epoxy coated ASTM A775 Grade 60 or galvanized ASTM A767 Grade 60. Assemblies have capacity to exceed $1.25 f_y$.
- **NUCLEAR STRENGTH CAPACITY** – ASME Section III, Division 2 = minimum joint strength 75,000 psi with average tensile strength 90,000 psi (150% x specified yield) used with ASTM A615 Grade 60.*
- **APPLICATIONS** – For attachment of rebars to liner plates, structural steel shapes or for creating headed anchorage. Structural-Positions can be achieved by using a standard TPA instead of a Male.
- **CERTIFIED LOW CARBON STEEL** – Weldable component conforms to CC-2310(c) material requirements of ASME Section III, Division 2. Meets chemistry AISI Grade 1018 and ASTM A36.
- **BEVELED FOR WELDING** – For full penetration, provided for greater strength, convenience and quality assurance. Suited to E7018 electrode.
- **BETTER THAN DIRECT BUTT WELD** – The outside diameter of the structural connector is larger than the reinforcing bar so the weld area is disposed over greater length. This means LESS weld stress.

*Welder qualification, weld procedure, integrity and strength are the responsibility of others.

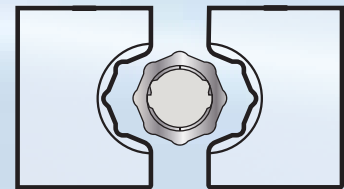
** HOW TO SPECIFY GRIP-TWIST® SPLICES and ANCHORAGE

	By Name:	By Generic Description:
BAR-TO-BAR	Taper Threaded Grip-Twist® and/or Grip-Twist® Position Couplers by BarSplice Products, Inc., Dayton OH	Mechanical Splices shall be the tension-compression cold-swaged taper-threaded type, comprising male/female couplers, and/or position couplers, which shall be assembled by rotating the reinforcing bar and/or position coupler stud.
BAR-TO-HEAD	Taper Threaded DoughNUT™ by BarSplice Products, Inc., Dayton OH	Mechanical Reinforcing Bar Anchorages shall be the cold-swaged taper-threaded coupler type, which shall be assembled with 5A _b or 10A _b Heads (Specify Head Size)
BAR-TO-STRUCTURAL STEEL	Grip-Twist® Structural Connectors and/or Grip-Twist® Structural Position Connectors by BarSplice Products, Inc., Dayton OH	Bar-to-structural steel connections shall be the cold-swaged taper-threaded weldable connector type with weld bevels inclined 30-degrees to the rebar axis and comprising male couplers, and/or positional components, which shall be assembled to the welded connectors by rotating the reinforcing bar and/or positional coupler stud.

** Include flange requirements, if any, bar size(s), bar type and grade. Include statement: "Parts shall be manufactured to the quality requirements of ISO 9001."

Grip-Twist® cold-swaged mechanical splice and anchorage components are made from high quality domestic steel and meet the chemistry, grade and "Class A" tensile properties of ASTM A519, A576 or A970 as applicable.

Powerful hydraulically actuated presses with color-coded octagonal die sets are utilized in fabricating shops for the most efficient swaging operation. Swaging pressure is factory preset and equipment is automated to release after each swaging 'bite' or pressing. When components have been compressed onto the reinforcing bar by cold-swaging they become mechanically interlocked with the rebar deformation.



Cold swaging technology for mechanical splicing of reinforcing bars is one of the most established, developed, and refined splicing methods worldwide. Key to cold swaging success is its simplicity, low cost and adaptability. There is no loss of reinforcing bar cross-sectional area at the splice location so the system is a natural choice when considering the objectives of seismic design and safety related applications. BPI-Grip swaging equipment is easy to use and may be leased or purchased. Splicing manuals provided with equipment explain step-by-step installation and safety information.

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