

# The Huck **Ti-Matic**<sup>®</sup> Blind Bolt **Catalog**

Light weight and all Titanium



**Huck  
Fasteners**

From Cordant Technologies

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The Ti-Matic Blind Bolt is an all-Titanium 95ksi structural system designed for assembly of metallic or composite airframe structure. It combines important features of structural capability, light weight and installation convenience. The following is a brief summary of the most significant features:

#### Materials

The Ti-Matic system is available in all Titanium for lightest weight or with a stainless steel sleeve for highest joint strength.

#### Configurations

The system is available in nominal diameters -4 through -10 diameter, in 100° flush, 130° flush and protruding head styles.

#### Specification Performance

The system meets all requirements of the appropriate Huck Standards Page and Huck Procurement Specification T0102.

#### Formation of the Foot Print

The bulb forming forces are largely absorbed by the fastener sleeve itself rather than against the structure. The radial and compressive forces exerted against the structure are minimal and do not cause delamination of composite or distortion of thin metallic structure.

#### Sheet Take-up

As the bulb forms and bears against the back side sheet, the gap closing mechanism begins.

#### Bulbed Foot Print

The large blind side foot print is ideal for applications in thick or thin structure (metallic or composite) and accommodates up to 10° back side slope without loss of joint properties.

#### Optimized Mechanical Properties of Components

A Combination of selected materials, cold working and thermal processing aims at the optimum balance between joint performance and functional reliability in both material combinations.

#### Installation Tooling

Installation of Ti-Matics is accomplished with traditional Huck Unimatic tools used for MS90353/354 or MS21140/141 blind bolts. Huck also offers a much improved, ergonomic installation tooling system, which helps to reduce operator fatigue. A unique "4 Jaw Pin Gripper™" design guarantees long tool life and improved productivity.

#### Drive Washer

To make it more user friendly in the factories and repair activities, the Ti-Matic is now available with an optional drive washer. This allows installation with diameter dedicated blunt tools. The integral drive washer offers the advantage of a new sharp driving anvil with each fastener. Poor installations due to worn nose inserts are avoided.

### Design, Construction and Function

**The Ti-Matic blind fastener consists of 3 basic components:** The rivet sleeve, the spindle (or pin) and the lock collar. In addition, the fasteners are available with an optional drive washer. After installation, the 3 basic components are locked together and work as a single unit to carry shear, tension and vibration loads. The (optional) drive washer has done its job and is discarded after installation.

- ▶ The sleeve component is in intimate contact with the structure and absorbs the applied joint loads. It has a manufactured head, a shank and the blind side upset.
- ▶ The spindle supports the rivet sleeve and shares the joint loads with the sleeve. In addition, the spindle functions as an installation tool to generate sheet take-up, to form the blind side upset and to set the lock collar.
- ▶ During installation, the lock collar is swaged into a lock pocket in the sleeve and a lock groove in the pin, thus locking sleeve and pin together. This allows the installed components to act as a single fastening unit.

## Installation Sequence

The Installation schematic shown below illustrates the Ti-Matic with the optional drive washer. The function principle however applies to all Ti-Matic fasteners. If equipped with the optional drive washer, the fasteners can be installed with a blunt nose assembly, yet have the advantage of a new drive anvil with each fastener.

### Step One

The Ti-Matic fastener is placed into a clearance fit hole. The installation tool is engaged.

### Step Two

Pulling the trigger starts movement of the spindle. The spindle head contacts the end of the sleeve and the blind side bulb starts to form. The sleeve bulbing loads are absorbed internally by the sleeve itself and do not exert delaminating loads on the structure. The pulling load is reacted against the drive washer.

### Step Three

The blind side bulb continues to form.

### Step Four

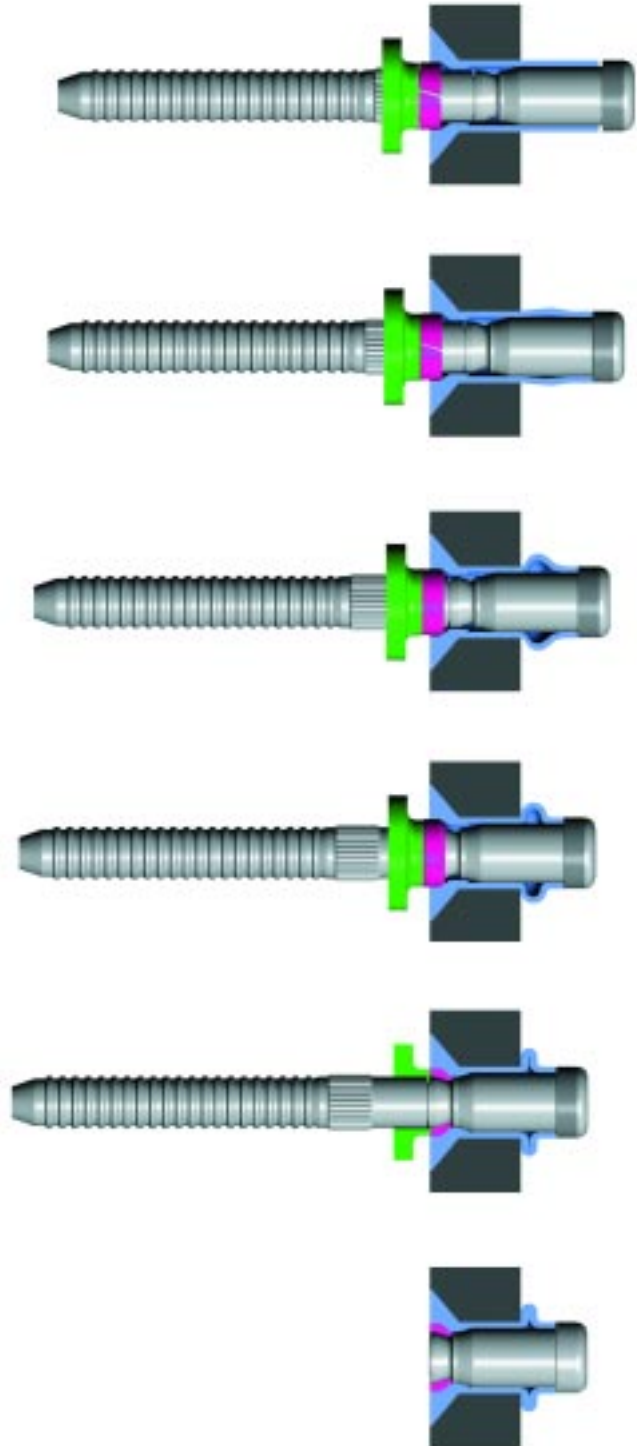
Continued motion of the spindle starts pulling the sheets together and forming the blind side bulb. The lock collar starts to enter the lock cavity.

### Step Five

As the lock groove on the spindle aligns with the lock pocket in the sleeve, the lock collar is swaged into the lock cavity, locking the assembly together. The pulling load continues to increase and the spindle separates at the break neck.

### Step Six

The spindle break is flush with the sleeve head, the lock is firmly in place, the drive washer is discarded and the installation is complete. The entire installation cycle is accomplished in less than 2 seconds.



**Head Markings**

Ti-Matic heads carry the following identification marks:

- ▶ The special “H” as manufacturer’s identification symbol.
- ▶ A material code letter.
- ▶ Titanium sleeve with Titanium pin = letters “MV”.
- ▶ A-286 sleeve with Titanium pin = letters “EV”.
- ▶ A grip identification number. Grip range = nominal grip  $\pm .031$ .

Example: figure “4” head marking = -4 grip (ranges from .219” to .282”).

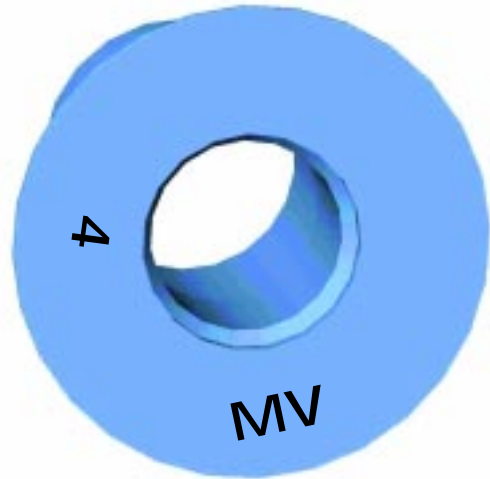


Illustration of head markings on sleeve head of UB100-MV06-04

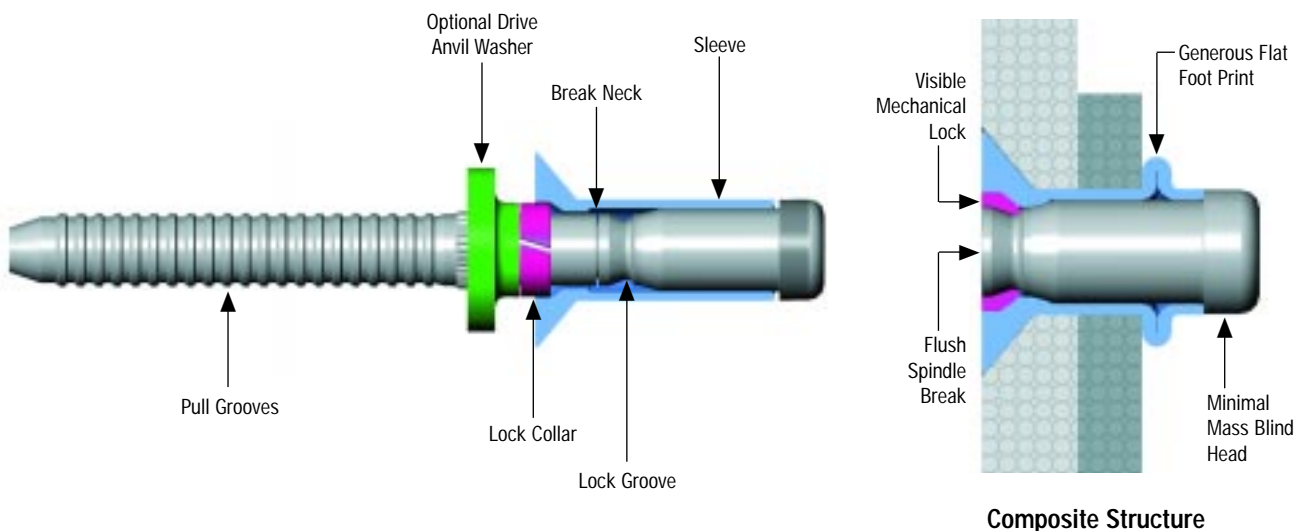
**Mechanical Performance**

**Shear, Tensile and Spindle Retention.**

Nom Diameter	All - Titanium “MV”			A - 286/Titanium “EV”		
	Single Shear	Ultimate Tensile	Spindle Retention	Single Shear	Ultimate Tensile	Spindle Retention
-4	1,120	600	200	n/a	n/a	n/a
-5	1,825	900	575	1,980	1,150	575
-6	2,925	1,400	845	2,925	1,690	845
-8	5,005	2,100	1,440	5,005	2,900	1,440
-10	7,216	3,100	2,080	7,215	4,170	2,080

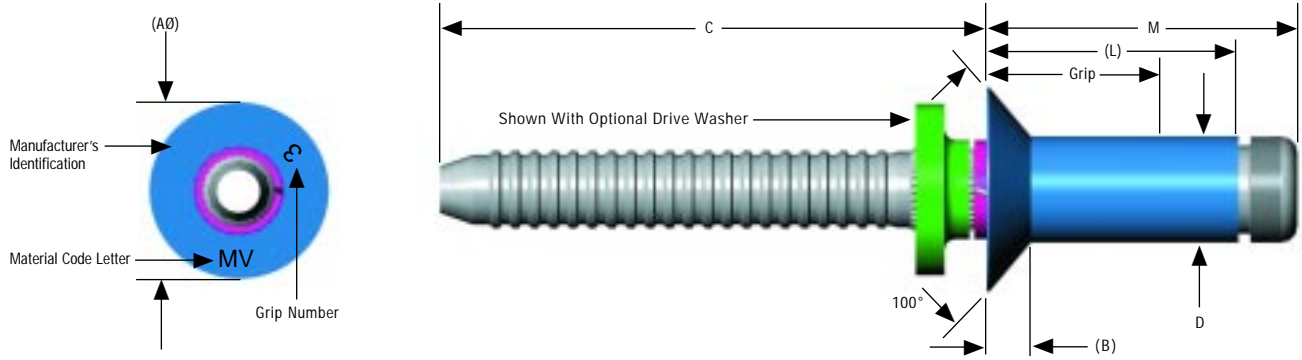
The above values are specification minimum requirements. Generally the products exceed these minimum values. Shear strength requirements for short grips are lower, commensurate with sheet bearing limits.

**Anatomy of the Ti-Matic Blind Fastener**



Composite Structure

100° Flush Head – All Titanium – UB100-MV (\*\*) - (\*\*)



Part Number Key	Nominal Dia	DØ ±.001	(AØ) Theo Ref	(B) Ref	C Min	(S) Ref	Hole Dia Recomm
UB100-MV 06 - 03 W [Note B]	-4	.128	.229	.042	.812	.172	.129/.132
	-5	.163	.333	.072	.844	.232	.164/.167
	-6	.198	.386	.080	.875	.292	.199/.202
	-8	.259	.507	.105	1.000	.361	.260/.263
	-10	.311	.634	.137	1.218	.408	.312/.315

(S) Ref is installed blind side protrusion

Grip Dash	Grip Range		-4 Dia (.128)		-5 Dia (.163)		-6 Dia (.198)		-8 Dia (.259)		-10 Dia (.311)	
	Min	Max <sup>1</sup>	(L) Ref	M Max	(L) Ref	M Max	(L) Ref	M Max	(L) Ref	M Max	(L) Ref	M Max
-02	See Note A	.157	.285	.392	.336	.476	.363	.521				
-03	.156	.220	.348	.455	.398	.539	.429	.584	.465	.645		
-04	.219	.282	.410	.517	.460	.602	.487	.647	.528	.708	.576	.779
-05	.281	.345	.473	.580	.523	.664	.549	.709	.590	.770	.638	.841
-06	.344	.407	.535	.642	.585	.727	.612	.772	.653	.833	.701	.904
-07	.406	.470	.598	.705	.648	.789	.674	.834	.715	.895	.763	.966
-08	.469	.532	.660	.767	.710	.852	.737	.897	.778	.958	.826	1.029
-09	.531	.595			.773	.914	.799	.959	.840	1.020	.888	1.091
-10	.594	.657			.835	.977	.862	1.022	.903	1.083	.951	1.155
-11	.656	.720			.898	1.039	.924	1.084	.965	1.145	1.013	1.219
-12	.719	.782					.987	1.147	1.028	1.208	1.076	1.279
-13	.781	.845					1.049	1.209	1.090	1.270	1.138	1.341
-14	.844	.907					1.112	1.272	1.153	1.332	1.201	1.404
-15	.906	.970							1.215	1.395	1.263	1.466
-16	.969	1.032							1.278	1.458	1.326	1.529

Note 1: Fasteners may be installed in grips up to .015" above maximum grip indicated in table.

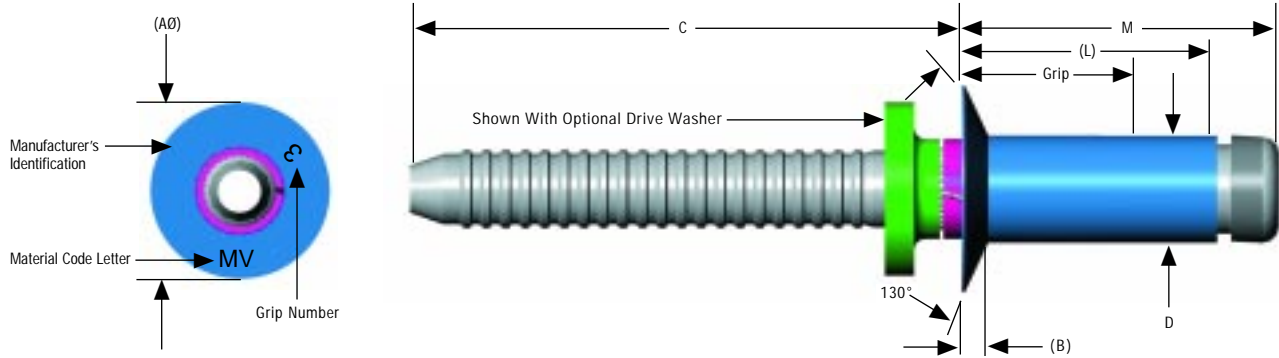
Note B: Code letter "W" for optimal drive washer after grip dash number.

NOTE A

Grips	Diameters		
	-04	-05	-06
-02	.094	.120	.125

Basic P/N	Material			Finish		
	Sleeve	Pin	Lock Ring	Sleeve	Pin	Lock Ring
UB100-MV	CP Titanium	Beta "C" Titanium	A-286	None	None	Passivated

# 130° Flush Shear Head – All Titanium UB130-MV (\*\*)- (\*\*)



Part Number Key		Nominal Dia	DØ ±.001	(AØ) Theo Ref	(B) Ref	C Min	(S) Ref	Hole Dia Recomm
UB130-MV 06 - 03 W [Note] ↳ Nom Grip in 1/16th ↳ Basic Dia in 1/32nd ↳ Basic Part Number	-5	.163	.332	.039	.844	.232	.164/.167	
	-6	.198	.386	.043	.875	.292	.199/.202	
	-8	.259	.507	.057	1.000	.361	.260/.263	

(S) Ref is installed blind side protrusion

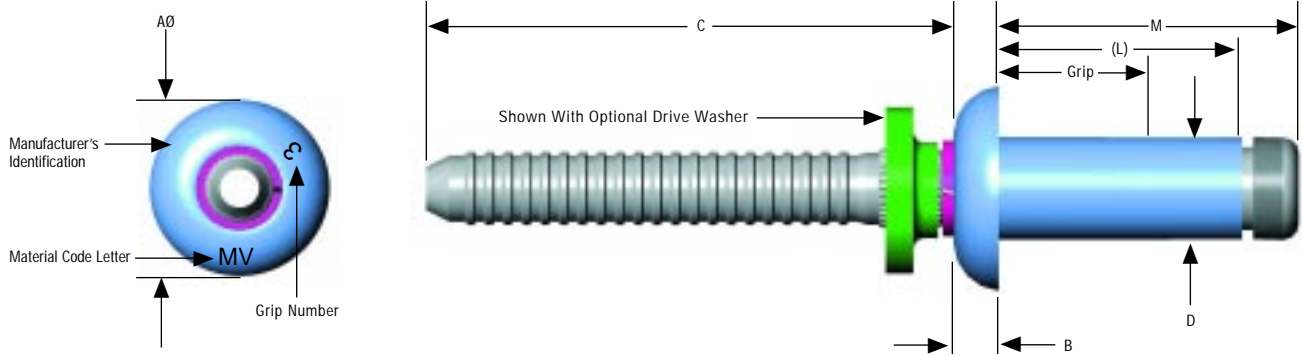
Grip Dash	Grip Range		-5 Dia (.163)		-6 Dia (.198)		-8 Dia (.259)	
	Min	Max <sup>1</sup>	(L) Ref	M Max	(L) Ref	M Max	(L) Ref	M Max
-02	.094	.157	.336	.476	.363	.521		
-03	.156	.220	.398	.539	.429	.584	.465	.645
-04	.219	.282	.460	.602	.487	.647	.528	.708
-05	.281	.345	.523	.664	.549	.709	.590	.770
-06	.344	.407	.585	.727	.612	.772	.653	.833
-07	.406	.470	.648	.789	.674	.834	.715	.895
-08	.469	.532	.710	.852	.737	.897	.778	.958
-09	.531	.595	.773	.914	.799	.959	.840	1.020
-10	.594	.657	.835	.977	.862	1.022	.903	1.083
-11	.656	.720	.898	1.039	.924	1.084	.965	1.145
-12	.719	.782			.987	1.147	1.028	1.208
-13	.781	.845			1.049	1.209	1.090	1.270
-14	.844	.907			1.112	1.272	1.153	1.332
-15	.906	.970					1.215	1.395
-16	.969	1.032					1.278	1.458

**Note 1:** Fasteners may be installed in grips up to .015" above maximum grip indicated in table.

**Note:** Code letter "W" for optimal drive washer after grip dash number.

Basic P/N	Material			Finish		
	Sleeve	Pin	Lock Ring	Sleeve	Pin	Lock Ring
UB130-MV	CP Titanium	Beta "C" Titanium	A-286	None	None	Passivated

# Protruding Head – All Titanium – UBP-MV (\*\*) - (\*\*)



Part Number Key	Nom Dia	DØ ±.001	AØ Head Dia	B ±.005	C Min	(S) Ref	Hole Dia Recomm
	UBP-MV 06 - 03 W [Note]	-4	.128	.250 ± .012	.057	.812	.172
———— Nom Grip in 1/16th ———— Basic Dia in 1/32nd ———— Basic Part Number	-5	.163	.312 ± .016	.072	.844	.232	.164/.167
	-6	.198	.375 ± .019	.085	.875	.292	.199/.202
	-8	.259	.500 ± .025	.112	1.000	.361	.260/.263
	-10	.311	.600 ± .025	.133	1.218	.408	.312/.315

(S) Ref is installed blind side protrusion

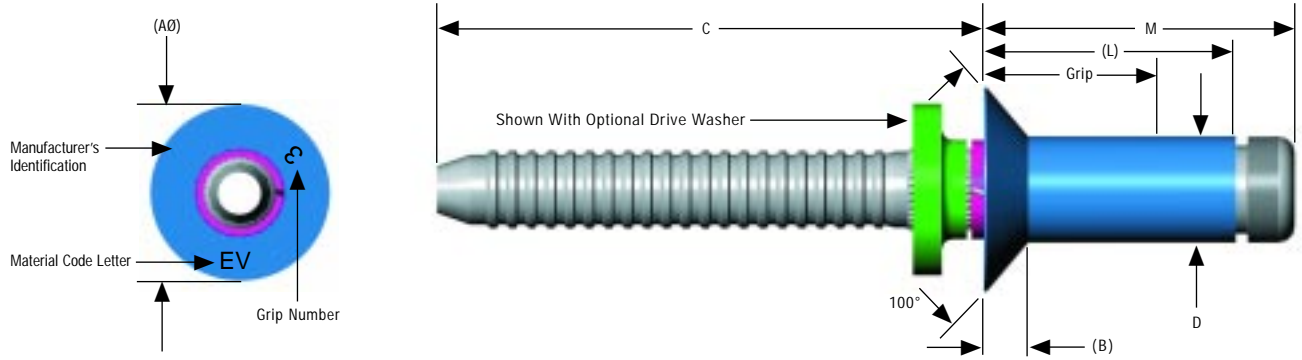
Grip Dash	Grip Range		-4 Dia (.128)		-5 Dia (.163)		-6 Dia (.198)		-8 Dia (.259)		-10 Dia (.311)	
	Min	Max <sup>1</sup>	(L) Ref	M Max	(L) Ref	M Max	(L) Ref	M Max	(L) Ref	M Max	(L) Ref	M Max
-01	.031	.093	.254	.361	.305	.445						
-02	.094	.157	.285	.392	.336	.476	.363	.521				
-03	.156	.220	.348	.455	.398	.539	.429	.584	.465	.645		
-04	.219	.282	.410	.517	.460	.602	.487	.647	.528	.708	.576	.779
-05	.281	.345	.473	.580	.523	.664	.549	.709	.590	.770	.638	.841
-06	.344	.407	.535	.642	.585	.727	.612	.772	.653	.833	.701	.904
-07	.406	.470	.598	.705	.648	.789	.674	.834	.715	.895	.763	.966
-08	.469	.532	.660	.767	.710	.852	.737	.897	.778	.958	.826	1.029
-09	.531	.595			.773	.914	.799	.959	.840	1.020	.888	1.091
-10	.594	.657			.835	.977	.862	1.022	.903	1.083	.951	1.155
-11	.656	.720			.898	1.039	.924	1.084	.965	1.145	1.013	1.219
-12	.719	.782					.987	1.147	1.028	1.208	1.076	1.279
-13	.781	.845					1.049	1.209	1.090	1.270	1.138	1.341
-14	.844	.907					1.112	1.272	1.153	1.332	1.201	1.404
-15	.906	.970							1.215	1.395	1.263	1.466
-16	.969	1.032							1.278	1.458	1.326	1.529

**Note 1:** Fasteners may be installed in grips up to .015" above maximum grip indicated in table.

**Note:** Code letter "W" for optional drive washer after grip dash number.

Basic P/N	Material			Finish		
	Sleeve	Pin	Lock Ring	Sleeve	Pin	Lock Ring
UBP-MV	CP Titanium	Beta "C" Titanium	A-286	None	None	Passivated

# 100° Flush Head – Titanium/Cres – UB100-EV (\*\*) - (\*\*)



Part Number Key		Nominal Dia	DØ ±.001	(A0) Theo Ref	(B) Ref	C Min	(S) Ref	Hole Dia Recomm
UB100-EV 06 - 03 W [Note B] ↳ Nom Grip in 1/16th ↳ Basic Dia in 1/32nd ↳ Basic Part Number	-4							
	-5	.163	.333	.072	.844	.232	.164/.167	
	-6	.198	.386	.080	.875	.292	.199/.202	
	-8	.259	.507	.105	1.000	.361	.260/.263	
	-10							

(S) Ref is installed blind side protrusion

Grip Dash	Grip Range		-4 Dia (.128)		-5 Dia (.163)		-6 Dia (.198)		-8 Dia (.259)		-10 Dia (.311)	
	Min	Max <sup>1</sup>	(L) Ref	M Max	(L) Ref	M Max	(L) Ref	M Max	(L) Ref	M Max	(L) Ref	M Max
-02	See Note A	.157			.300	.466	.329	.511				
-03	.156	.220			.363	.529	.392	.574	.433	.648		
-04	.219	.282			.425	.591	.454	.636	.495	.710		
-05	.281	.345			.488	.654	.517	.699	.558	.773		
-06	.344	.407			.550	.716	.579	.761	.620	.835		
-07	.406	.470			.613	.779	.642	.824	.683	.898		
-08	.469	.532			.675	.841	.704	.886	.745	.960		
-09	.531	.595			.738	.904	.767	.949	.808	1.023		
-10	.594	.657			.800	.966	.829	1.011	.870	1.085		
-11	.656	.720			.863	1.029	.892	1.074	.933	1.148		
-12	.719	.782					.954	1.136	.995	1.210		
-13	.781	.845					1.017	1.199	1.058	1.273		
-14	.844	.907							1.120	1.335		
-15	.906	.970							1.183	1.398		
-16	.969	1.032							1.245	1.460		

**Note 1:** Fasteners may be installed in grips up to .015" above maximum grip indicated in table.

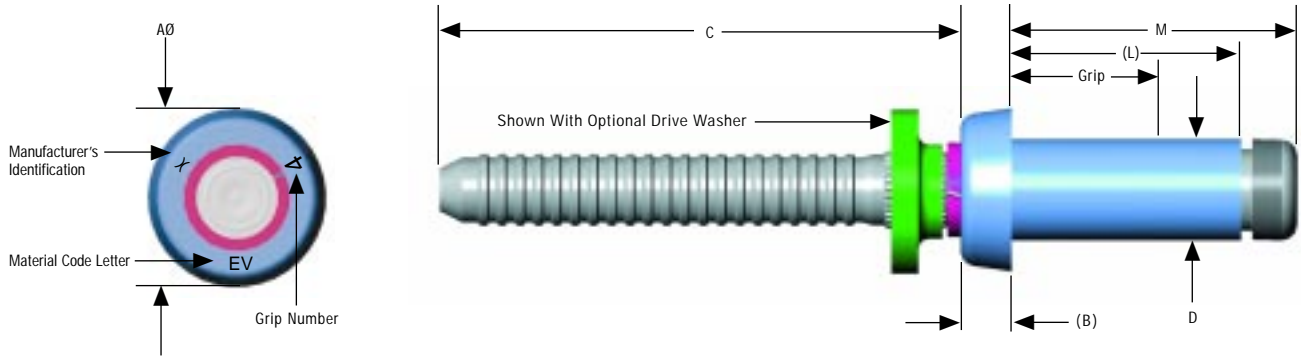
**Note B:** Code letter "W" for optimal drive washer after grip dash number.

**NOTE A**

Grips	Diameters		
	-04	-05	-06
-02	.094	.120	.125

Basic P/N	Material			Finish		
	Sleeve	Pin	Lock Ring	Sleeve	Pin	Lock Ring
UB100-EV	A-286	Beta "C" Titanium	A-286	Passivated	None	Passivated

# Protruding Head – Titanium/Cres – UBP-EV (\*\*)- (\*\*)



Part Number Key	Nom Dia	DØ ±.001	AØ Head Dia	B Hd Height	C Min	(S) Ref	Hole Dia Recomm
	UBP - EV 06 - 03 W [Note]	-4					
———— Nom Grip in 1/16th ———— Basic Dia in 1/32nd ———— Basic Part Number	-5	.163	.260 ±.010	.064 ±.006	.844	.202	.164/.167
	-6	.198	.318 ±.013	.128 ±.008	.875	.231	.199/.202
	-8	.259	.416 ±.016	.130 ±.010	1.000	.279	.260/.263
	-10						

(S) Ref is installed blind side protrusion

Grip Dash	Grip Range		-4 Dia (.128)		-5 Dia (.163)		-6 Dia (.198)		-8 Dia (.259)		-10 Dia (.311)	
	Min	Max	(L) Ref	M Max	(L) Ref	M Max	(L) Ref	M Max	(L) Ref	M Max	(L) Ref	M Max
-01	.031	.095			.238	.404						
-02	.094	.157			.300	.466	.329	.511	.370	.585		
-03	.156	.220			.363	.529	.392	.574	.433	.648		
-04	.219	.282			.425	.591	.454	.636	.495	.710		
-05	.281	.345			.488	.654	.517	.699	.558	.773		
-06	.344	.407			.550	.716	.579	.761	.620	.835		
-07	.406	.470			.613	.779	.642	.824	.683	.898		
-08	.469	.532			.675	.841	.704	.886	.745	.960		
-09	.531	.595			.738	.904	.767	.949	.808	1.023		
-10	.594	.657			.800	.966	.829	1.011	.870	1.085		
-11	.656	.720			.863	1.029	.892	1.074	.933	1.148		
-12	.719	.782					.954	1.136	.995	1.210		
-13	.781	.845					1.017	1.199	1.058	1.273		
-14	.844	.907							1.120	1.335		
-15	.906	.970							1.183	1.398		
-16	.969	1.032							1.245	1.460		

Note: Code letter "W" for optimal drive washer after grip dash number.

Basic P/N	Material			Finish		
	UBP-EV	Sleeve A-286	Pin Beta "C" Titanium	Lock Ring A-286	Sleeve Passivated	Pin None

## Hole Preparation

Drill Sizes should be chosen to generate holes within the hole diameter limits recommended in the table below. If holes are drilled at the low limit, or if sealant is used in assembly, spindles sometimes break low and installations are incomplete. An easy remedy is to drill the holes slightly larger (within the recommended limits). This provides a little extra space for sealant trapped in the holes.

Ti-Matic Dia	Recommended Hole Limits	Recommended Drill Sizes	Approx. C'sink Dia (Note)
-4	.129/.132	#30; 3.3mm	~.229
-5	.164/.167	#19; 4.2mm	~.333
-6	.199/.202	#7; 5.1mm	~.386
-8	.260/.263	G; 6.6mm	~.507
-10	.312/.315	5/16"; 7.94mm	~.634

Note: For best head flushness results, a fastener can be used to adjust c'sink depth.

## Suggestions On Good Hole Preparation Practice

**Clean round holes within tolerance and with minimal burrs are fundamental for good joint durability. Below are a few suggestions, which should help to achieve good installations:**

- Clamping of the structure with temporary devices is very helpful in avoiding sheet separation, burrs/chips between the sheets and hole misalignment.
- Drills should be sharp. Optimized drill point geometry has surprising benefits for hole quality, productivity and minimizing operator fatigue.
- Drill speeds are critical to achieve hole quality and productivity while minimizing operator fatigue.
  - Aluminum structure 4,000 to 6,000 RPM are recommended.
  - For stainless or titanium 300 to 1,000 RPM are recommended.
  - For composite structure, carbide drills and c'sink cutters are recommended.
- Lubrication of drills is very helpful in reducing drill wear, burrs and effort. Each shop has its favorite drill lube.
- Excessive "push" on the drill motor (dull drill) can create sheet separation, burrs and chips between the sheets and should be avoided.
- Hole normality is important. Angularity beyond 2° should be avoided.
- Countersink concentricity is critical. Generally countersinks are normal to the structural surface. Angularity problems are caused by hole angularity beyond the 2° limit. Undersize countersink pilots are the most common cause of eccentricity problems and resulting cosmetics issues.
- A relief radius at the base of the countersink is required for proper rivet head seating. Typically, .020/.030" radius relief is sufficient.
- "Straightening-out" misaligned holes with a drill or reamer can cause "figure 8" holes and in turn may hinder blind side bulb formation.

## Suggestions For Good Installation Practice

- The installation tool should be properly aligned and firmly pushed against the structure. This helps to avoid premature breaking of pintails and minor sheet gapping due to misalignment and presence of sealant.
- The trigger must be depressed until pin break indicates completion of the installation cycle.
- Worn and dirty installation tools can cause bad installations. Of particular importance are gripping jaws. Worn and dirty jaws may cause stripping of pull grooves and pin fracture in the pull groove area.

# Installation Tooling & Grip Gauging

## Models 202, 244 & 2025 Guns

Bolt Dia	Short	Standard	Long
-04	99-2724	99-2725	99-2726
-05	99-2700	99-2701	99-2702
-06	99-2706	99-2707	99-2708
-08	99-2712	99-2713	99-2714

## Models 245 & 246 Gun

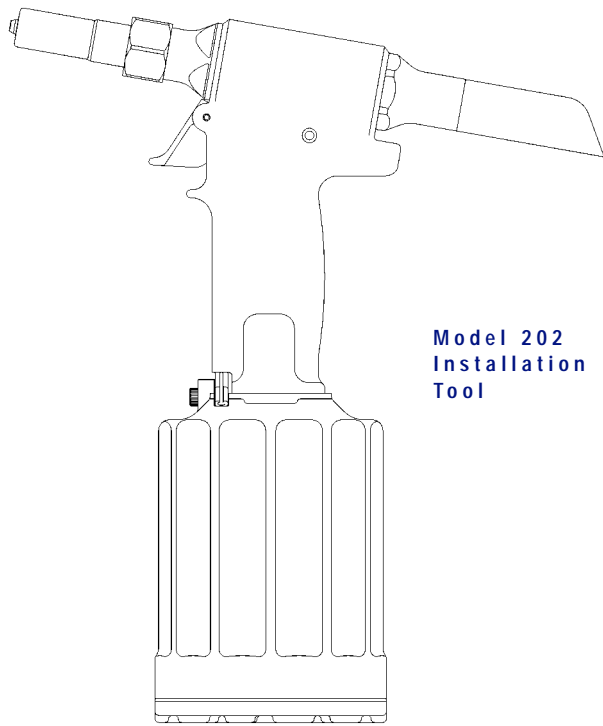
Bolt dia	Short	Standard	Long
-08	99-2715	99-2716	99-2717
-10	99-2718	99-2719	99-2720
-12	99-2721	99-2722	99-2723

**Note:** Models 202, 244 & 2025 are new ergonomic lightweight tools.

**Note:** Models 202 or 244 will not pull -8 diameter fastener.

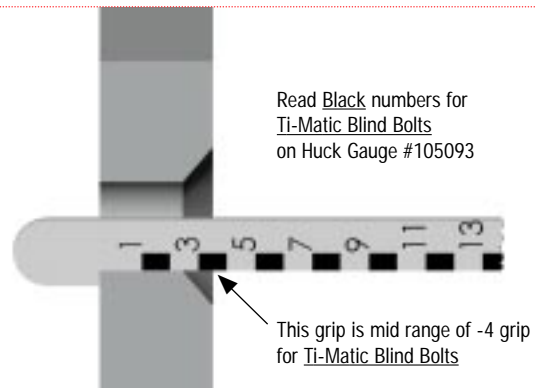
**Note:** Model 245 will not pull -12 diameter fastener.

**Note:** The tools shown above are recommended as most current and best suitable to install Ti-Matic fasteners. Some older models, if in inventory, may be used also, but are not recommended for new purchase.



## Grip Gauging

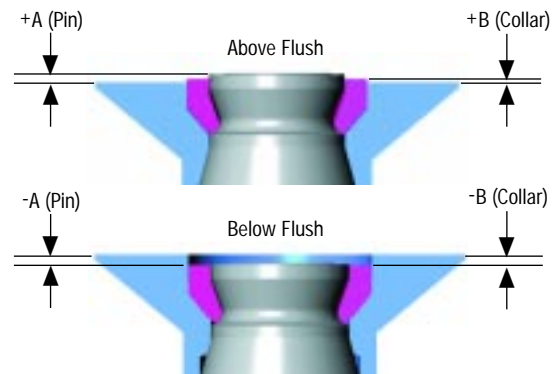
Correct gauging of grip thickness will help to insure sound installations. Huck offers grip measurement gages, which help assure proper fastener grip selection. Huck Gage # 105093 (Black letters only) is configured to gage structural thickness for Ti-Matic. Care should be taken, that possible sheet gap does not affect grip measurement and does not result in selection of a rivet too long for the job.



## Inspection of Installed Ti-Matics

The position of the spindle break and the lock collar provide important information about the quality of the installation. The table below shows the limits published in the applicable procurement specifications. Spindle and collar flushness per this table indicate good installations, which meet mechanical performance requirements of Huck Procurement Specification T0102 and of relevant OEM specifications.

Nom Dia	Pin Position "A"	Collar Position "B"
-4	±.010	±.010
-5	±.010	+.010 /-.017
-6	±.010	+.010 /-.022
-8	±.015	+.015 /-.029
-10	+.020 /-.015	+.020 /-.037



## Offset Tooling

### Hydraulic Power Tool Model 206-375

Rivet dia	1 1/4" Off-Set	1 7/8" Off-Set
-04	99-1715	99-1715-1
-05	99-1712	99-1712-1
-06	99-1713	99-1713-1
-08	99-1714	99-1714-1

**Trouble Shooting Suggestions**

<b>Problem</b>	<b>Possible Cause</b>	<b>Remedy</b>
Spindle breaks high	Oversize hole	1. Check hole diameter and drilling technique. 2. Remove & replace with oversize fastener.
	Fastener grip too long	Remove and replace with proper grip fastener.
	Installation tool	Defective or wrong tool/nose piece.
	Defective fastener	Inspect fasteners and test function in a test hole.
Spindle breaks low	Undersize hole	Remove fastener, ream hole to size and install a new fastener. Note: When working with wet sealant, allow for a little extra hole clearance to provide space for the sealant.
	Fastener grip too short	Remove and replace with proper grip fastener.
	Misaligned hole	Review hole preparation and assembly technique.
	Tool cocked	Align installation tool with axis of fastener.
	Installation tool	Defective or wrong tool/nose piece.
	Defective fastener	Inspect fasteners and test function in a test hole.
Gripping jaws slipping	Build-up of debris in jaws	Disassemble and clean jaws; replace jaws if worn.
Lock ring not seated	Tool worn	Replace anvil in tool nose.
Head not seated	Hole cocked	Hole should be normal to surface within 2°.
	Tool cocked	Align installation tool with axis of fastener.
	Eccentric countersink	Good fit between hole and c'sink pilot.
	No relief radius at base of c'sink	Radius juncture of hole & c'sink
	Undersize hole	Increase hole size and reduce amount of sealant applied.
Bulb off sheet	Fastener grip too long for the job	Remove and replace with proper size fastener.

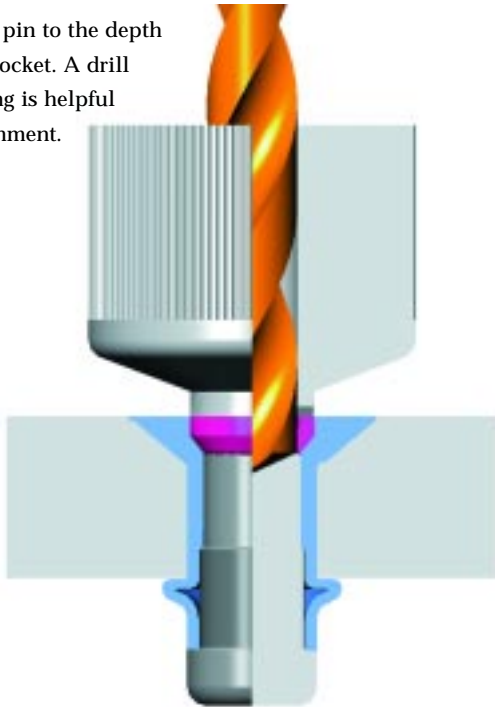
**Installed Weights**

100° Flush Head (UB100-MV) Installed Weight in lbs/1000					130° Flush Head (UB130-MV) Installed Weight in lbs/1000				Protruding Head (UBP-MV) Installed Weight in lbs/1000				
Grip Dash	-04fl	-05fl	-06fl	-08fl	Grip Dash	-05fl	-06fl	-08fl	Grip Dash	-04fl	-05fl	-06fl	-08fl
-02	0.68	1.50	2.39	-	-02	1.31	2.10	-	-02	0.94	1.80	3.07	-
-03	0.82	1.71	2.70	5.28	-03	1.52	2.41	4.73	-03	1.08	2.01	3.38	7.15
-04	0.96	1.92	3.01	5.81	-04	1.73	2.72	5.26	-04	1.22	2.22	3.69	7.68
-05	1.10	2.13	3.32	6.34	-05	1.94	3.03	5.79	-05	1.36	2.43	4.00	8.21
-06	1.24	2.34	3.63	6.87	-06	2.15	3.34	6.32	-06	1.50	2.64	4.31	8.74
-07	1.38	2.55	3.94	7.40	-07	2.36	3.65	6.85	-07	1.64	2.85	4.62	9.27
-08	1.52	2.76	4.25	7.93	-08	2.57	3.96	7.38	-08	1.78	3.06	4.93	9.80
-09		2.97	4.56	8.46	-09	2.78	4.27	7.91	-09		3.27	5.24	10.33
-10		3.18	4.87	8.99	-10	2.99	4.58	8.44	-10		3.48	5.55	10.86
-11		3.39	5.18	9.52	-11	3.20	4.89	8.97	-11		3.69	5.86	11.39
-12			5.49	10.05	-12		5.20	9.50	-12			6.17	11.92
-13			5.80	10.58	-13		5.51	10.03	-13			6.48	12.45
-14			6.11	11.11	-14		5.82	10.56	-14			6.79	12.98
-15				11.64	-15			11.09	-15				13.51
-16				12.17	-16			11.62	-16				14.04
Note 1:UB100-EV parts are 30% heavier. Note 2:Contact Huck for -10 dia weights.					Note 1:UB130-EV parts are 30% heavier.				Note 1:UBP-EV parts are 30% heavier. Note 2:Contact Huck for -10 dia weights.				

Removal of installed fasteners is accomplished with drills, punches and skill. For some types of fasteners, special Removal Kits are available from Huck, which ease the task of removal. Principal steps are as follows:

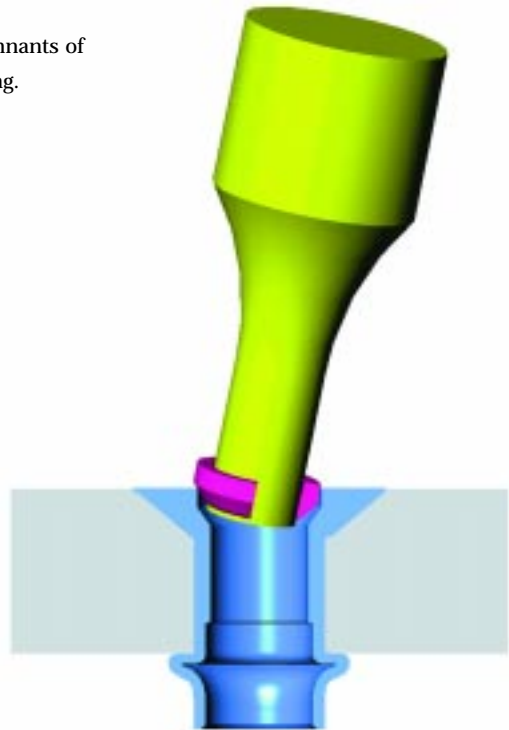
#### Step 1

Drill out the pin to the depth of the lock pocket. A drill guide bushing is helpful for drill alignment.



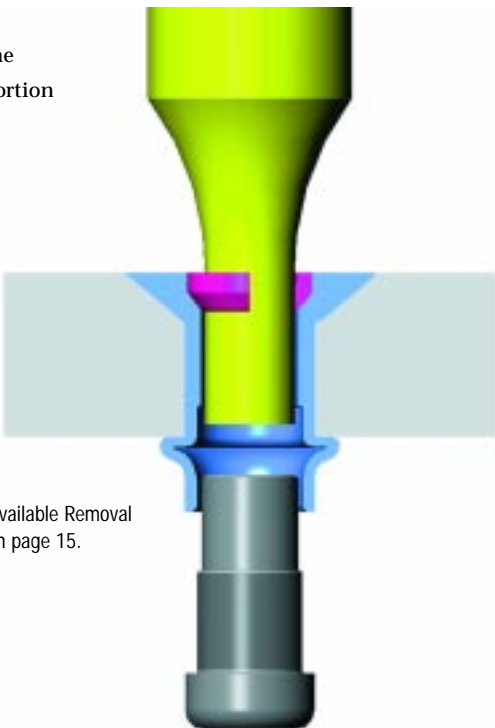
#### Step 3

Pry out remnants of the lock ring.



#### Step 2

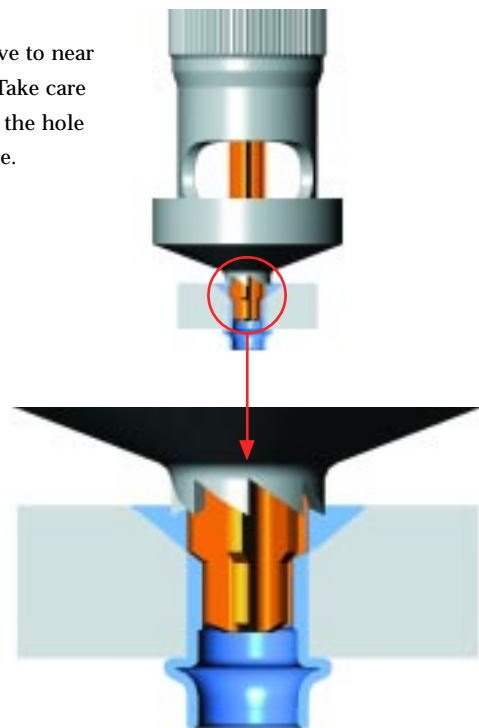
Punch out the remaining portion of the pin.



**Note:** a list of available Removal Kits is shown on page 15.

#### Step 4

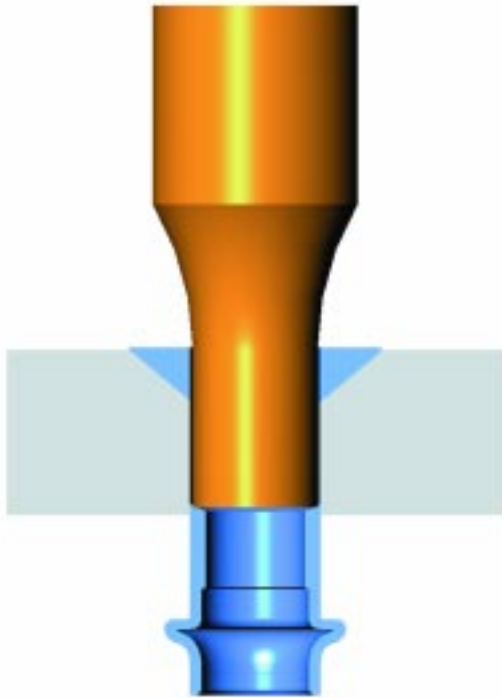
Ream out sleeve to near base of head. Take care not to damage the hole in the structure.



Ti-Matic Removal Continued

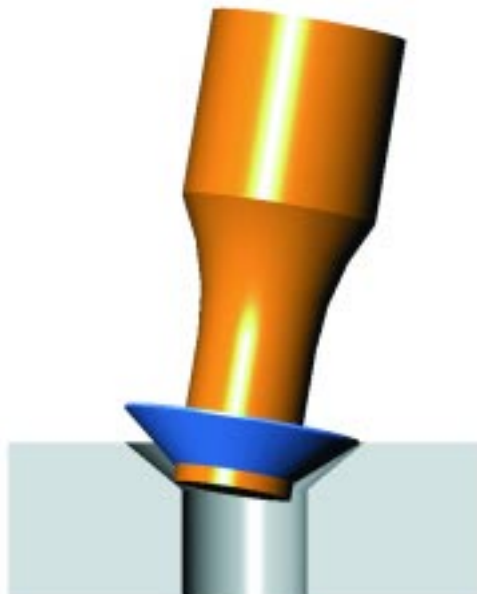
Step 5

Punch out remnant of sleeve.



Step 6

Pry out remnant of sleeve head.



Ti-Matic Removal Kits

Dia	Kit Nr
-5	105-50
-6	105-60
-8	105-80
-10	105-100
-12	105-120



For more information, visit our web site at [www.huckaerospace.com](http://www.huckaerospace.com).  
There you'll find all the technical information you need to maximize the  
benefits of Huck fasteners.

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