

BOMB-TAIL* Vinyl Splices
NOTE


All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters [and inches]. Unless otherwise specified, dimensions have a tolerance of ± 0.13 [$\pm .005$] and angles have a tolerance of $\pm 2^\circ$. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

This specification covers the requirements for application of BOMB-TAIL Splices that consist of a precision formed metal wire barrel encased in vinyl insulating material. There are splices available for a combination of solid and stranded wire sizes ranging from 24 through AWG or 590 through 42,700 CMA. Splices can be terminated with manual and pneumatically-powered hand held tools, and with bench mount machines.

When corresponding with Tyco Electronics Personnel, use the terminology provided on this specification to help facilitate your inquiry for information. Basic terms and features of the splices are provided in Figure 1.

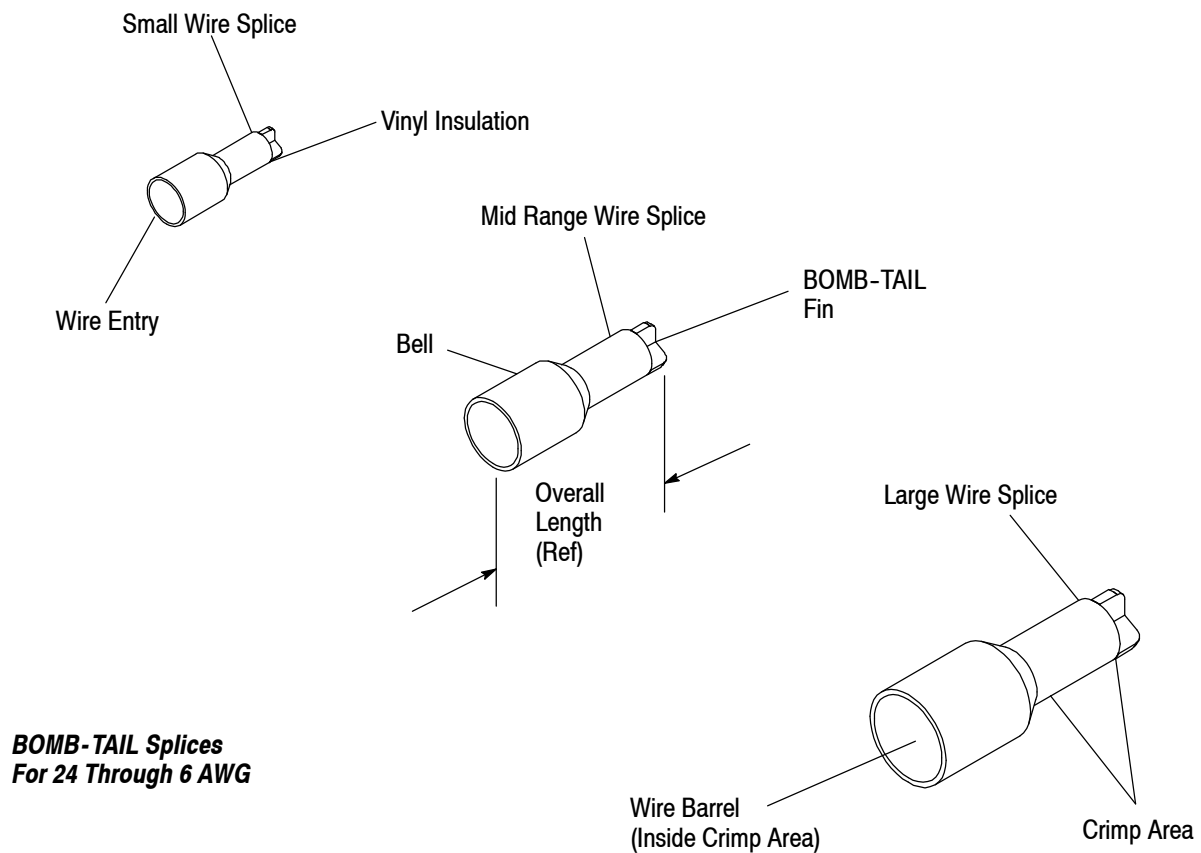


Figure 1

2. REFERENCE MATERIAL
2.1. Revision Summary

- Updated document to corporate requirements and new logo and format
- Deleted obsolete tooling and reference documentation in Paragraph 2.4.E and Figures 6 and 7

2.2. Customer Assistance

Reference Part Number 55843 and Product Code 3246 are representative numbers of BOMB-TAIL Vinyl Closed End Splices. Use of these numbers will identify the product line and expedite your inquiries through a service network established to help you obtain product and tooling information. Such information can be obtained through a local Tyco Electronics Representative or, after purchase, by calling the Tooling Assistance Center or Product Information number at the bottom of page 1.

2.3. Drawings

Customer Drawings for specific products are available from the service network. The information contained in the Customer Drawings take priority if there is a conflict with this specification or with any other technical documentation supplied by Tyco Electronics.

2.4. Instructional Material

There are instruction sheets (408 Series) and customer manuals (409 Series) packaged with the different types of splices, hand crimping tools, and power assist tools. Some of the instruction sheets are wire combination charts providing recommended wire combination for the splice, while others are tooling instructions providing product placement in the crimp area and detail tool operation.

A. Wire Combination Charts

- For 24-14 AWG refer to 408-1394 and 408-9850
- For 22-16 AWG refer to 408-1395, 408-1396, and 408-2228
- For 22-12 AWG refer to 408-1479
- For 22-10 AWG refer to 408-1002, 408-1029, and 408-1395
- For 18-8 AWG refer to 408-1008
- For 18-6 AWG refer to 408-2605

B. Fixed Die Hand Crimping Tools for Loose Piece Splices

- For 24-14 AWG refer to 408-1552, 408-1578, and 408-1738
- For 22-16 AWG refer to 408-1804
- For 22-12 AWG refer to 408-1539
- For 22-10 AWG refer to 408-1544, 408-1578, and 408-1738
- For 18-8 AWG refer to 408-1873

C. Removable Dies for Loose Piece Splices

- For 24-10 AWG refer to 408-1634 and 408-9641

D. Crimping Jaw Tooling

- For 18-6 AWG crimping jaws and pneumatic unit refer to 408-2564 and 409-2426

E. Manual and Power Assist Tools

- Tooling selection chart, see 408-1910
- Manually Operated Hand Tool Frame Unit, see 408-2095
- Pneumatic Power Assist Tools see, 409-2426
- Adapter for Die Assemblies used in 626 Pneumatic Power Assist Tool System, see 408-4105

F. Crimping Head and Power Assist Tools for Loose Piece Splices

- Crimping Heads for wire range of 24-8 AWG, see 408-2498
- Crimping Jaw Power Unit for wire range of 18-6 AWG, see 409-2426
- Crimping Heads for wire range of 18-6 AWG, see 408-2564
- 626 Pneumatic Power Tool System for the wire range of 24-8 AWG, See 409-5862

G. Removable Dies and Bench Mount Machine for Tape Mounted Splices

- Removable Dies for 22-10 AWG and Bench Machine, see 408-2254 and 409-1993
- Tape Reel Storage, see 408-3295

3. REQUIREMENTS

3.1. Materials

A. Insulation

Vinyl material is used as an insulation for the splices. It is highly resistant to abrasion and will resist temperatures up to 90°C [194°F]. There are seven colors used for the splices that provide a visual reference to applicable wire range that can be used in the splice; black, blue, green, purple, red, transparent, and yellow.

B. Wire Barrel

There are splices manufactured from either copper or steel of various thicknesses, lengths, and diameters. They are available with tin plating or no plating at all.

3.2. Storage

A. Ultraviolet Light

The splices should not be stored near ultraviolet light. Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the vinyl insulation material covering the wire barrel.

B. Reel Storage

When using tape mounted splice reels, care must be used to prevent stretching, sagging, or other distortion that would prevent smooth feeding of the tape through the automatic feed mechanism of the machine. Coil wound reels should be stored horizontally, and transverse wound reels should be stored vertically.

C. Shelf Life

The splices should remain in the shipping container until ready for use to prevent deformation of the splice, abrasion of the insulation material, or any other damage to the splices. They should be used on a first in, first out basis to avoid storage contamination.

D. Chemical Exposure

Do not store near any chemicals listed below as they may cause stress, corrosion, cracking, or discoloration of the splices.

Alkalies	Ammonia	Citrates	Phosphates	Citrates	Sulfur Compounds
Amines	Carboates	Sulfides	Nitrites	Nitrites	Tartrates

3.3. Precautions

Care must be used during application to prevent product failure. The most common causes of malfunction are tooling, type of wire used, wire stripping, and wire placement in the splice.

A. Tooling

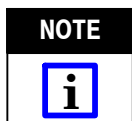
The tooling used must meet the requirements of Underwriters Laboratories Inc., and CSA International, and must be maintained under a regularly scheduled maintenance program to ensure adherence to standards. The tooling referenced on this specification has been designed and approved to apply these splices.

B. Wire Selection

The splices have been designed for solid and stranded copper wire only. The splices have not been designed for other types of wire which may or may not function properly in the splice.

C. Wire Stripping and Placement

Care must be used when stripping wire to prevent nicking or cutting of the wire strands. When inserting stranded conductors into a splice, care must be used to be sure all wire strands enter the wire barrel of the splice and that none are folded back over the insulation of the wire. Twisting the conductors together into one bundle before inserting them into the splice will prevent them from flaring out and leaving some strands outside of the wire barrel.



Check your local requirements; some local codes may not allow twisting of the wires prior to inserting them into the splice.

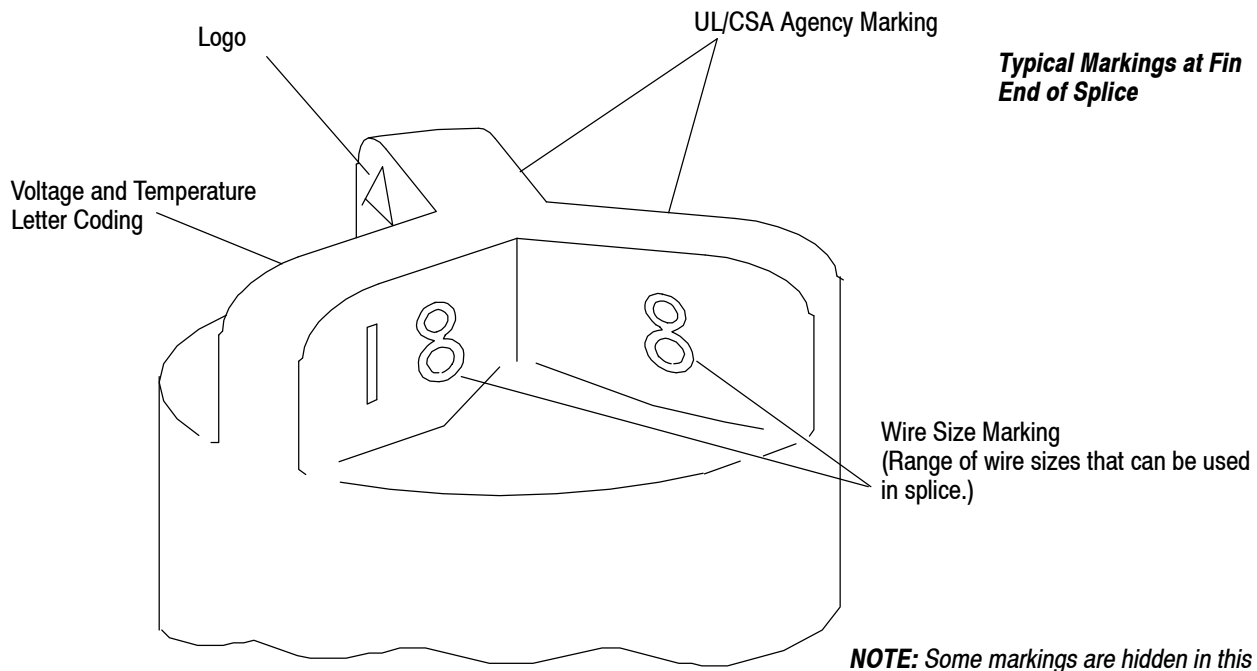
3.4. Special Characteristics

The splice fins are marked with the a logo, the wire range of the splice, letter coding that indicates the maximum voltage and temperature for the splice (VS or ECV), and listing agency (UL or CSA). The wire size marking indicates the range of wire sizes that can be used in combination in the splice.

Different size splices may have the same color but the wire size and letter code markings will be different. A size concept for each splice is provided in Figure 2.



One wire of the smallest size and the quantity specified under each additional wire size would be the maximum number of wires that can be used in the splice. For example, the first entry in the chart is for a purple splice using 24-14 AWG. The total number of size 24 wires would be 11; one of the smallest wires in the wire size range plus ten additional size 24 wires for a total of eleven. The various combinations of all wires size for each splice is provided on the applicable wire combination table packaged with the splice.



LETTER CODES	SPLICE COLOR CODE	WIRE RANGE (AWG)	SMALLEST WIRE SIZE OF SPLICE	WIRE SIZES AND MAXIMUM QUANTITY PER SPLICE									
				24	22	20	18	16	14	12	10	8	6
VS 300 Volts UL and CSA 90°C [194°F]	PURPLE ♦	24-14	24 (1 + ⚡)	10	6	4	2	1	1	No	No	No	No
	RED ♦	24-14	24 (1 + ⚡)	10	6	4	2	1	1	No	No	No	No
	BLUE	22-16	22 (1 + ⚡)	No	4	3	2	1	No	No	No	No	No
	YELLOW	22-10	22 (1 + ⚡)	No	7	6	5	3	2	1	1	No	No
ECV 600 V for Buildings or 1000 V for Fixture and Sign Wiring UL 105°C [221°F] and CSA 90°C [194°F]	TRANS.	22-12	22 (1 + ⚡)	No	5	4	2	1	No	No	No	No	No
	BLACK ♦	18-8	18 (1 + ⚡)	No	No	No	11	7	4	2	1	1	No
	GREEN ♦	18-8	18 (1 + ⚡)	No	No	No	11	7	4	2	1	1	No
	BLUE	18-6	18 (1 + ⚡)	No	No	No	15	13	7	5	3	1	No


Figure 2

♦ Purple and red splices have an identical wire size of 24 to 14 AWG, and black and green splices have an identical wire size of 18 to 8. A detectable difference is in the variation of the bell opening and/or variation in the overall length of the splice .

3.5. Wire Selection and Preparation

The combination of wires selected must be suitable to the voltage, temperature, and area of application. These same factors will determine which splice to use. Note that the wire barrel length of the splice determines the strip length required and that all wires selected for a single splice must be stripped to the same length, regardless of wire size. The wire strip length for each splice is provided in Figure 3.

NOTE



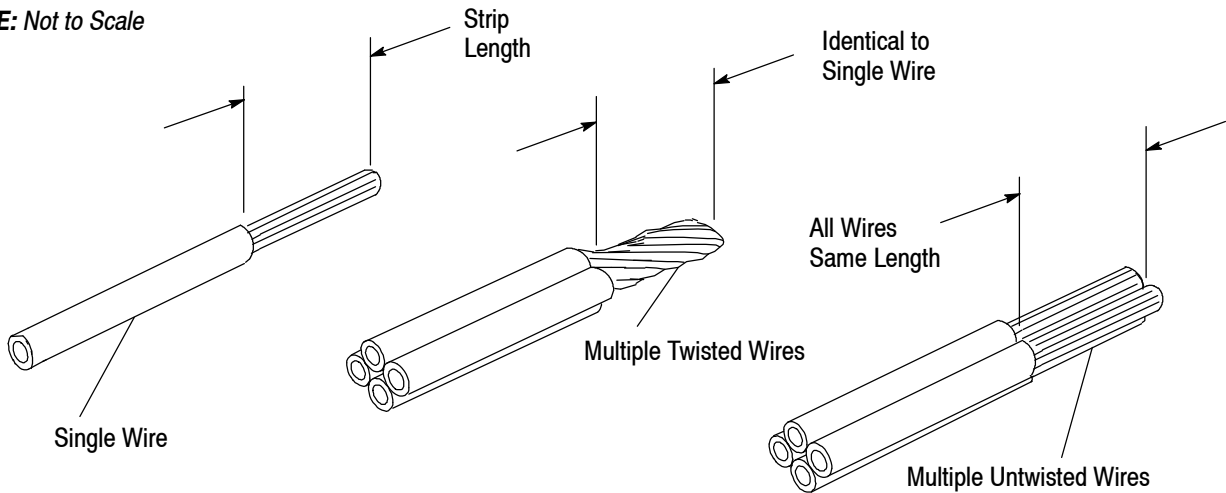
If local codes allow, stripped wires may be twisted together before insertion into splice. When this application is used the strip length of each wire must be increased slightly so the wire twist is comparable the length of a single wire.

CAUTION



Use care to prevent cutting or nicking of wire strands during the wire stripping process.

NOTE: Not to Scale



WIRE SIZE RANGE (AWG)	SPLICE COLOR	OVERALL LENGTH	WIRE STRIP LENGTH
24 - 14	PURPLE	18.80 [.740]	8.33-9.12 [.328-.359]
		19.68 [.775]	
		22.86 [.900]	
22 - 16	TRANSPARENT	18.52 [.729]	7.95-8.74 [.313-.344]
		25.40 [1.000]	
	20.96 [.825]	8.74-10.31 [.344-.406]	
BLUE	19.05 [.750]		
20.32 [.800]			
22 - 12	TRANSPARENT	27.76 [1.093]	10.72-11.51 [.422-.453]
		38.10 [1.500]	
22 - 10	PURPLE	28.58 [1.125]	14.30-15.88 [.563-.625]
		25.65 [1.010]	
	YELLOW	24.76 [.975]	11.13-12.70 [.438-.500]
		25.65 [1.010]	
18 - 8	GREEN	40.00[1.575]	18.26-19.84 [.719-.781]
	BLACK	32.08[1.263]	
18-6	BLUE	40.64[1.600]	18.26-19.84 [.719-.781]

Figure 3

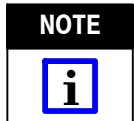
3.6. Wire Placement

The stripped wire conductors must be gathered together so that the ends are even. If production requirements allow, the conductors should be twisted around each other to form a tight bundle before inserting them into the splice. The wires must be inserted into the wire barrel until bottomed.

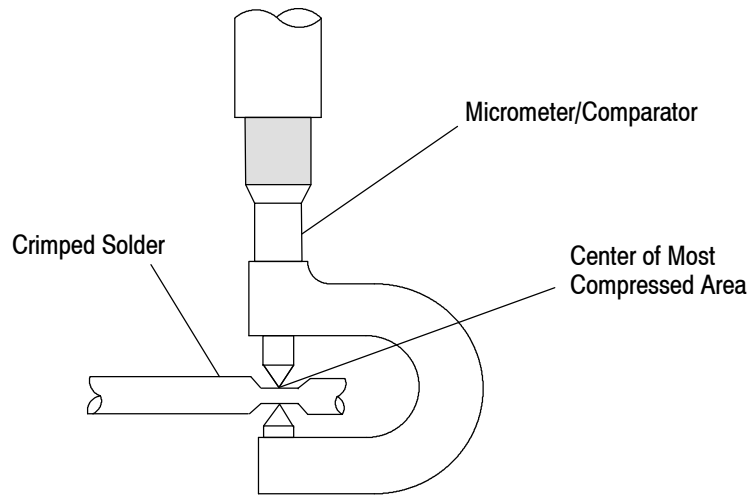
3.7. Crimped Splice Requirements

A. Crimp Height

The splice must be crimped to the wires according to the instructions packaged with the crimping tool (refer to Section 5, TOOLING), and crimped to the specified crimp height to ensure optimum performance of the splice. Due to spring back of the insulating material covering the wire barrel of the splice, the splice can not be measured to the precise accuracy to which the tool was designed. Therefore, instead of measuring the splice, a piece of 60% tin and 40% lead solder with a diameter comparable to the wire size should be crimped and measured. See Figure 4.



The measurement may be made with a micrometer or the crimp height comparator as specified on Instruction Sheet 408-7424.



SPLICE		SOLDER DIAMETER	CRIMP HEIGHT DIMENSION
COLOR CODE	WIRE SIZE RANGE		
BLACK	18-8	3.18 [.125]	5.31-5.44 [.209-.214]
BLUE (Large Dia)	18-6	4.76 [.1875]	6.02-6.15 [.237-.242]
BLUE (Small Dia)	22-16	3.18 [.125]	1.02-1.50 [.040-.059]
GREEN	18-8	3.18 [.125]	5.31-5.44 [.209-.214]
PURPLE	24-14	6.35 [.250]	2.31-2.54 [.091-.100]
	22-10	6.35 [.250]	3.12-3.25 [.123-.128]
RED	24-14	4.76 [.1875]	2.31-2.54 [.091-.100]
TRANSPARENT	22-16	3.18 [.125]	2.67-2.79 [.105-.110]
	22-12	6.35 [.250]	2.92-3.05 [.115-.120]
	18-8	3.18 [.125]	3.53-3.66 [.139-.144]
	18-6	4.76 [.1875]	2.67-2.79 [.105-.110]
YELLOW	22-16	3.18 [.125]	2.67-2.79 [.105-.110]
	22-10	6.35 [.250]	4.29-4.42 [.169-.174]

Figure 4

B. Physical Conditions

All wire strands must be crimped and held firmly inside the wire barrel. The crimp must be centered on the wire barrel of the splice. The crimp must be visually symmetrical on both sides. The bell and the fin end of the splice must not be deformed by the crimping tool. See Figure 5.

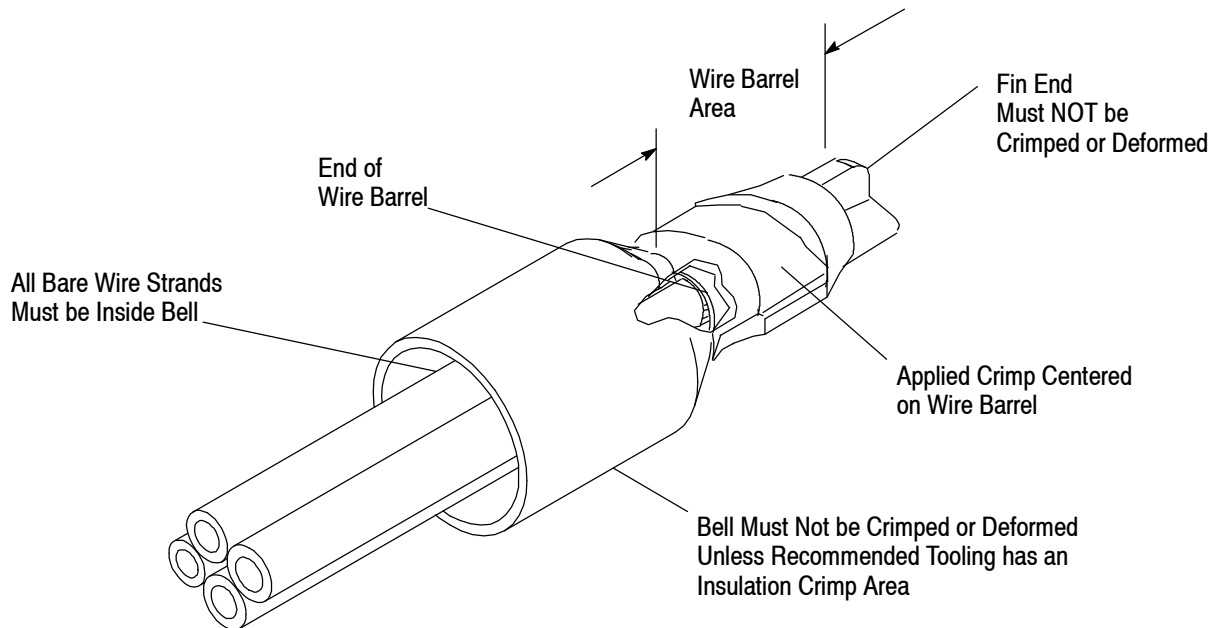


Figure 5

3.8. Repair

A splice that is damaged or that does not meet the crimp dimension requirements must be removed from the wires, discarded, and replaced with a new one. When removing a splice, cut the wires as close as possible to the end of the wire barrel to conserve wire. See Figure 5.

4. QUALIFICATIONS

BOMB-TAIL Vinyl Splices for wire sizes 22 through 6 AWG are Listed by Underwriters Laboratories Inc. (UL) in file E13288 and Certified by CSA International in file LR7189.

NOTE



Tyco Electronics has tested and approved size 24 AWG for the red and purple splices with the wire size marking of 22 through 14. They are not Listed by UL nor are they Certified by CSA International.

5. TOOLING

There is a variety of manual and power-assisted tools available for crimping the splices. The tool selection will depend on production requirements such as quantity of terminations, operator training and skill, and the supporting equipment in the work area. See Figures 6 and 7.

5.1. Fixed Head Crimping Tools for 24-8 AWG

These manually-operated tools consist of a handle with a ratchet that will ensure full crimping pressure is applied to the splice, and integral crimping jaws or dies that are designed for a specific wire size and splice type.

5.2. Crimping Die Assemblies

A. Loose Piece (LP) Splice Dies 24- 10 AWG

These assemblies consist of stationary and movable die halves that are designed for a specific wire size and splice type. Their interchangeability among the manual and power assist tools provides versatility of crimping tools.

B. Tape Mounted (TM) Splice Dies for 24-10 AWG

These assemblies consist of stationary and movable die halves that are designed for a specific wire size and splice type. They are designed to be used in stationary bench-mounted machines.

5.3. Hand Tool Frame Assemblies for 24-8 AWG

These manually operated hand tools have a ratchet that will ensure full crimping of the splice. They accept the variety of die assemblies designed for loose piece splices.

5.4. Portable Pneumatic Tools

A. Hand Held for 24-8 AWG

These pneumatically-powered tools are designed for maximum portability within the limits of the air supply hose and are light weight to reduce operator fatigue. All of the crimping die assemblies for loose piece splices can be used in this tool.

B. Bench Rest for 24-6 AWG

These pneumatically-powered tools are designed to be used on a flat support surface. They can be moved from one location to another with relative ease.

1. The loose piece die pneumatic unit will accept all loose piece die assemblies with a wire size range of 24 through 10 AWG.
2. The crimping jaw pneumatic power unit is designed to crimp the largest splices which have a range of 18 to 6 AWG.

C. 626 System 24-8 AWG

This pneumatically operated tooling will crimp the full wire size range of all splices with exception of the largest wire size (6 AWG). It consists of a pneumatic power unit with or without logic control that can be operated by hand or foot pedal operation. It is designed to function with various types of crimping heads.

WIRE SIZE (AWG)	LOOSE PIECE SPLICE TOOLING							TAPE MOUNT SPLICE TOOLING	
	FIXED TOOL ASSY		LOOSE PIECE DIES		626 FIXED CRIMPING HEADS			TAPE MOUNT DIES	
	TOOL NO.	INSTR	DIE NO. (INSTR)	POWER UNITS	FEED TYPE	HEAD NO.	INSTR	DIE NO.	INSTR
24-14	48087	408-1552	45218 (408-1634)	69710	TOP	354422-1	408-9893	69951	408-2254
	45216	408-1578			SIDE	314833-1	408-9761		
	48208	408-1738							
22-16	45329	408-1544	69303-2, 69820, & 45218 (408-1634)	69710	SIDE	217205-1	408-9761	69973	408-2254
	48087	408-1552							
	69145	408-1804							
	45330	408-1552							
22-12	46749-2	408-1606	47811, & 45221 (408-9641 & 408-1634)	69710	SIDE	189466-1	408-4175	69952	408-2254
22-10	45219-2	408-1578			TOP	354422-2	408-9906	69952 & 69950	
	45324	408-1544							
	48208	408-1738							
18-8	69335	408-1873	NONE	NONE	SIDE	189896-1	408-4111	NONE	NONE
18-6	NONE	NONE	NONE	NONE	SIDE	68268-1 ■■	408-2564 ■■	NONE	NONE

Figure 6

■■ These items are not used with the 626 Tool System. They are crimping jaws and instructions for Pneumatic Bench Tool 68068 which are covered in Customer Manual 409-2426.

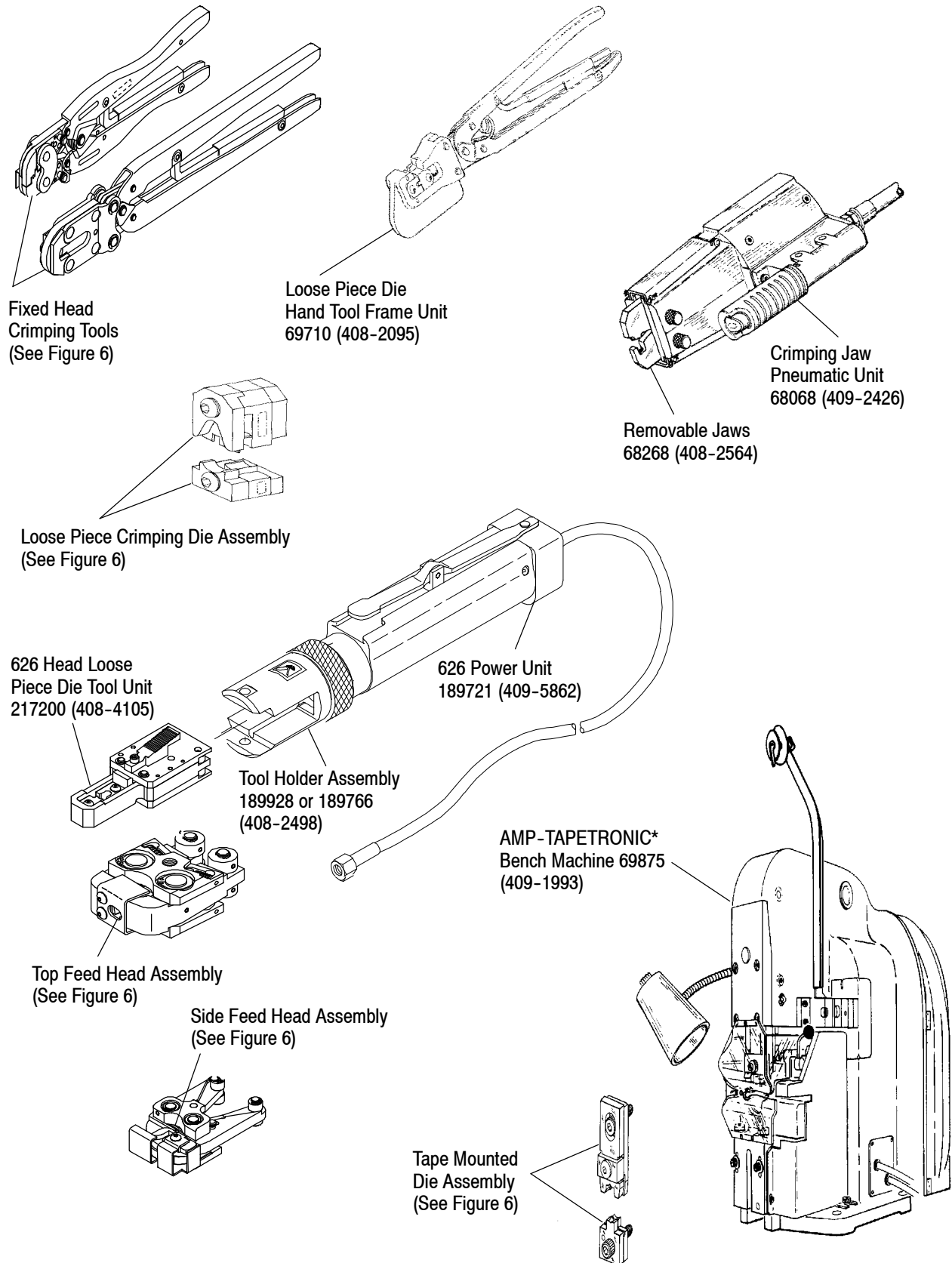


Figure 7

6. VISUAL AID

Figure 8 shows a typical installation and is intended for use by production personnel to visually ensure suitable applications. Installations that appear to be incorrect should be inspected using the dimensional information in the preceding pages of this application specification.

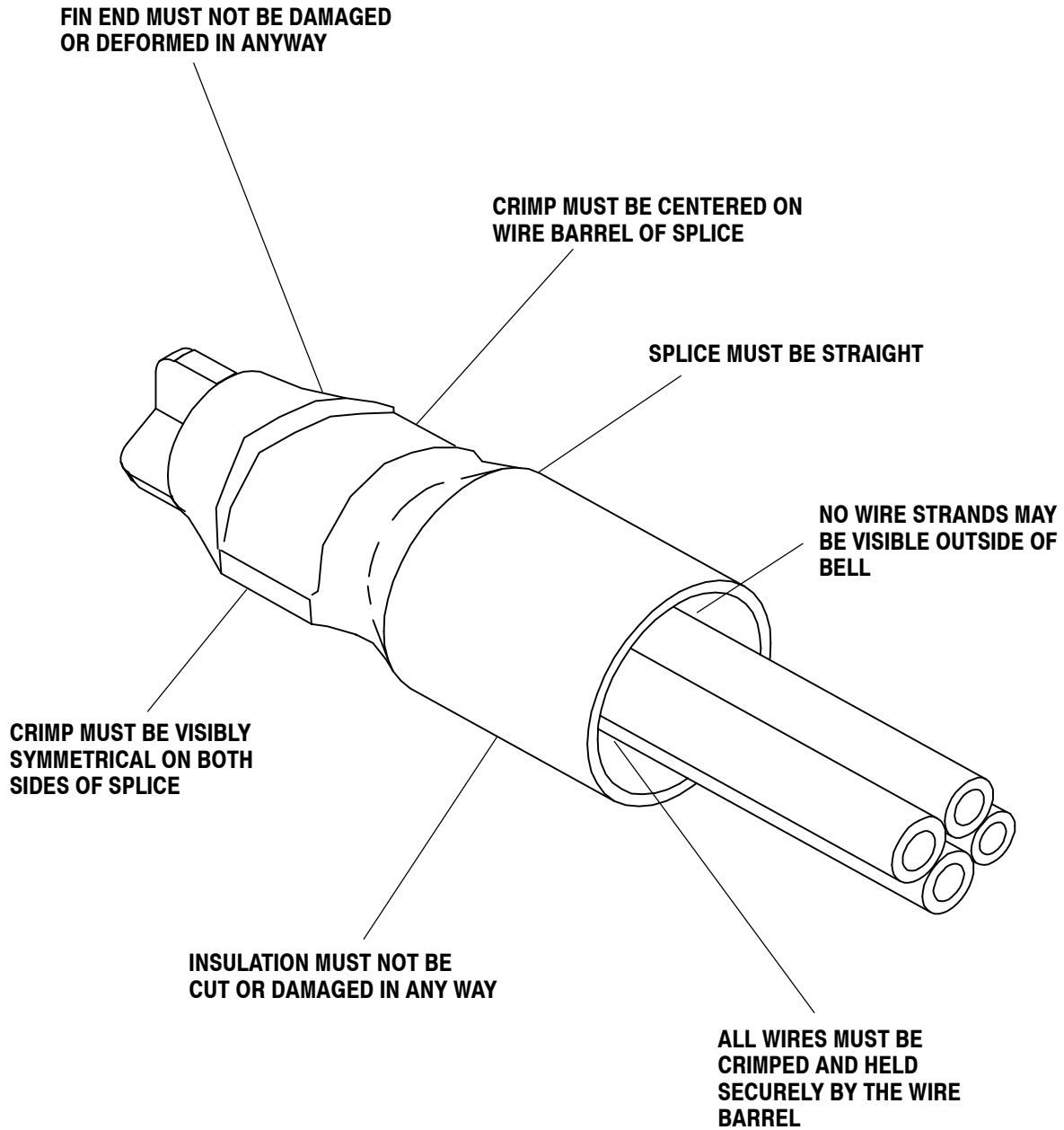


FIGURE 8. VISUAL AID