
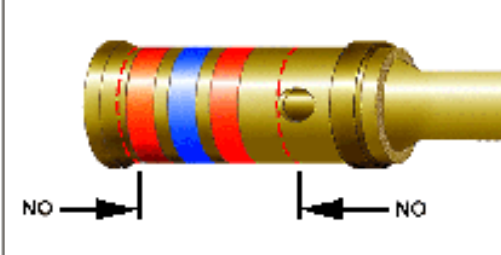
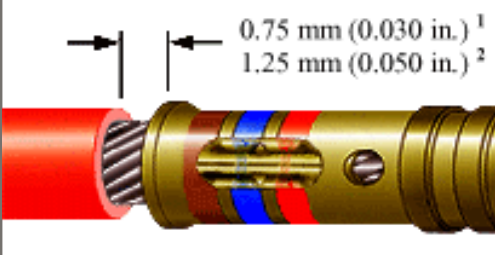
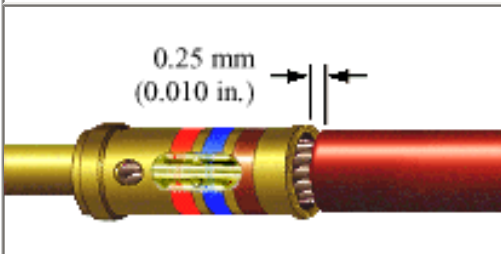



CRIMPED TERMINATIONS GENERAL REQUIREMENTS	
	<p style="text-align: center;">Crimped Terminations</p> <p>Crimping is an efficient and highly reliable method to assemble and terminate conductors, and typically provides a stronger, more reliable termination method than that achieved by soldering.</p> <p>Crimp terminations are available in different styles, depending upon the design application and connectivity requirements.</p> <p>This section details the generic accept/reject criteria of commonly used crimp termination styles. See 2.02 - 2.10 for specific accept/reject criteria applicable to individual crimp styles.</p>
	
<p>CRIMP LOCATIONS (ALL CRIMP TYPES)</p> <p>Crimp indents should be centered between the wire entry shoulder of the crimp barrel and the inspection hole/wire exit shoulder. Crimp indents shall not encroach on the wire entry shoulder or the inspection hole/wire exit shoulder.</p>	<p>MAXIMUM INSULATION CLEARANCE (ALL CRIMP TYPES)</p> <p>1. For conductors 20 AWG and smaller, the maximum clearance is 0.75 mm (0.030 in.). 2. For 18 AWG and larger conductors, the maximum clearance is 1.25 mm (0.05 in.). NASA-STD-8739.4 [10.1.7.b.2], [19.6.2.c.9]</p>
	
<p>MINIMUM INSULATION CLEARANCE (ALL CRIMP TYPES)</p> <p>The minimum insulation clearance for all crimped connections is 0.25 mm (0.010 in.). NASA-STD-8739.4 [10.1.7.b.1], [19.6.2.c.9]</p>	<p>SOLDER-TINNED STRANDED WIRE SOLID WIRE</p> <p>Crimping of solid wire, component leads, or stranded wire that has been solder-tinned, is prohibited. NASA-STD-8739.4 [4.3.4]</p>

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

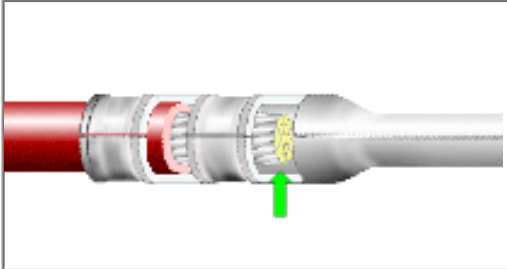
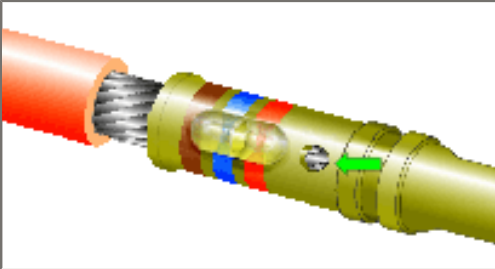
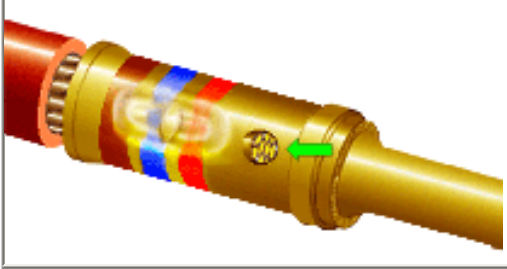
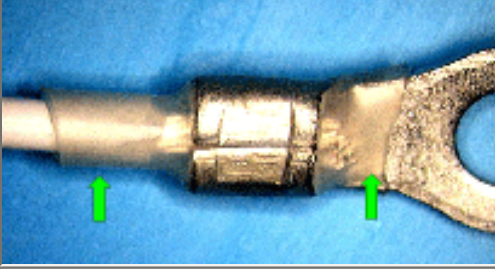
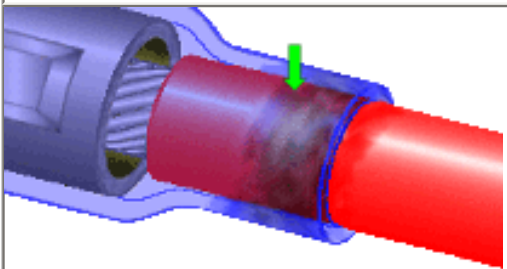
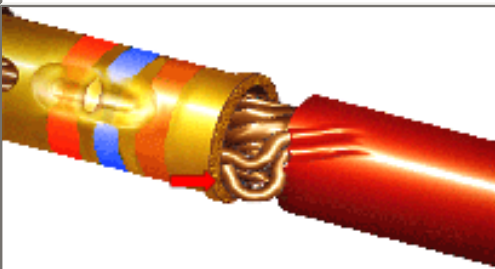
Revision:

Revision Date:

Book:
2

Section:
2.01

Page:
1

CRIMPED TERMINATIONS GENERAL REQUIREMENTS (cont.)	
	
<p>WIRE ENDS VISIBLE (LUG/OPEN BARREL CRIMPS)</p> <p>The wire ends shall be visible. The conductor should extend a minimum of even with, and a maximum of one wire diameter beyond, the conductor crimp edge.</p> <p>Best Workmanship Practice</p>	<p>WIRE STRANDS VISIBLE (PIN/CLOSED BARREL CRIMPS)</p> <p>The wire strands shall be visible in the inspection hole, indicating that the conductor is properly inserted. Preferably, the wire end should be bottomed in the crimp barrel.</p> <p>NASA-STD-8739.4 [19.6.1.c.3]</p>
	
<p>ACCEPTABLE (MINIMUM) WIRE ENDS VISIBLE (PIN/CLOSED BARREL CRIMPS)</p> <p>At a minimum, the ends of the wire strands shall be visible in the inspection hole, indicating that the conductor has been properly inserted in the crimp barrel.</p> <p>NASA-STD-8739.4 [19.6.1.c.3]</p>	<p>ACCEPTABLE HEAT SHRINK INSTALLATION</p> <p>Tubing is tight, symmetrical, undamaged (slight discoloration is acceptable). Overlaps meet minimum electrical spacing and provide strain relief. Termination is visible and inspectable.</p> <p>NASA-STD-8739.4 [9.8.1], [9.9]</p>
	
<p>ACCEPTABLE DISCOLORATION</p> <p>Slight discoloration of the shrink tubing is acceptable. Evidence of burning or charring is not acceptable.</p> <p>Best Workmanship Practice</p>	<p>UNACCEPTABLE BIRDCAGED STRANDS</p> <p>Birdcaged strands reduce the conductor's overall strength and increase the possibility of shorting.</p> <p>NASA-STD-8739.4 [19.6.2.c.3]</p>

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001


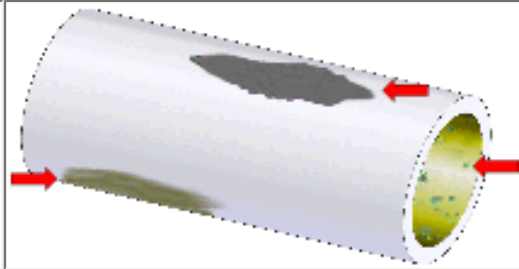
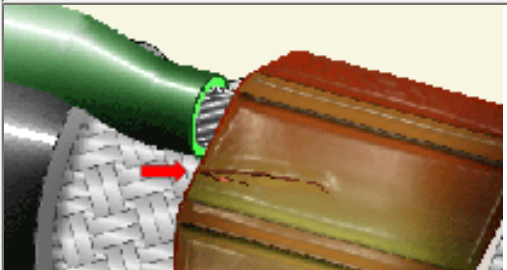
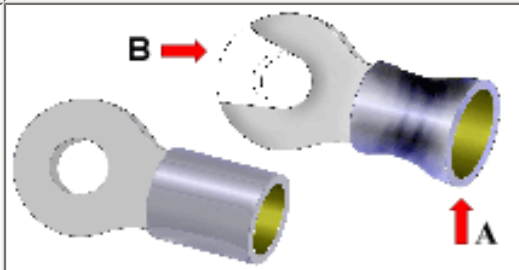
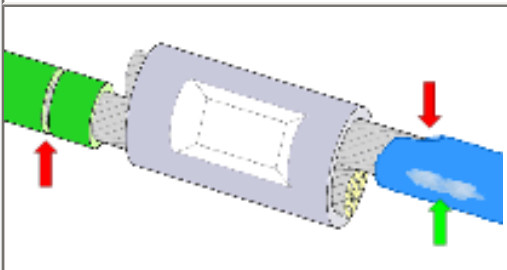
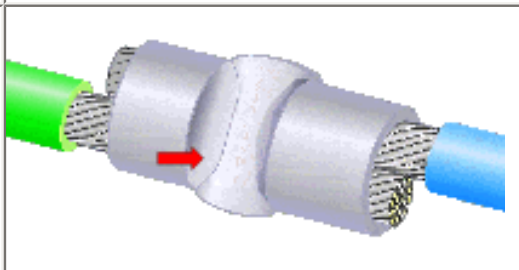
Revision:

Revision Date:

Book:
2

Section:
2.01

Page:
2

CRIMPED TERMINATIONS GENERAL REQUIREMENTS (cont.)	
	
<p>UNACCEPTABLE CHARRED/SPLIT HEAT SHRINK</p> <p>The heat shrink tubing has been exposed to excessive heat, resulting in charring and splitting of the sleeve and possible damage to the conductor. Slight discoloration is acceptable. NASA-STD-8739.4 [9.8.1]</p>	<p>UNACCEPTABLE CONTAMINATION</p> <p>Tarnish, corrosion and/or contamination reduces the reliability of the crimp contact. NASA-STD-8739.4 [12.2.2], [19.6.2.c.8]</p>
	
<p>UNACCEPTABLE CRIMP BARREL CRACKS</p> <p>Cracks in the crimp barrel reduce the mechanical reliability of the conductor-crimp termination. NASA-STD-8739.4 [19.6.2.c.2]</p>	<p>UNACCEPTABLE CRIMP MODIFIED TO FIT</p> <p>Modifying the crimp, to accommodate an undersized (A) or termination (B), reduces the mechanical strength and reliability of the conductor-crimp termination. NASA-STD-8739.4 [4.3.5.a], [12.3.3], [19.6.2.c.6]</p>
	
<p>UNACCEPTABLE DAMAGED INSULATION</p> <p>Cut, crushed, gouged, damaged or nicked insulation may result in reduced electrical isolation and/or short circuits. Slight scuffing or discoloration is acceptable. NASA-STD-8739.4 [19.6.2.a.1]</p>	<p>UNACCEPTABLE DEFORMED CRIMP</p> <p>A damaged or deformed crimp indicates the use of an incorrect crimp positioner and/or improper insertion into the crimp tool. NASA-STD-8739.4 [19.6.2.c.6]</p>

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

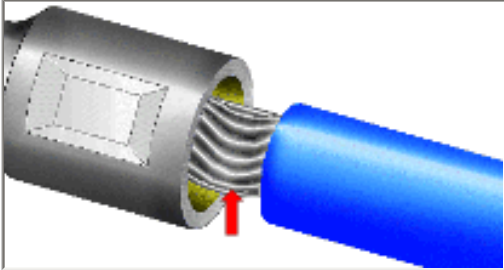
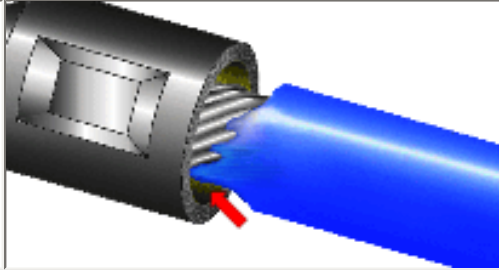
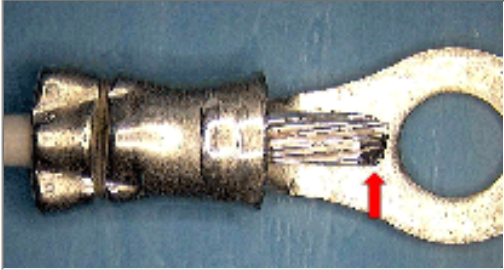
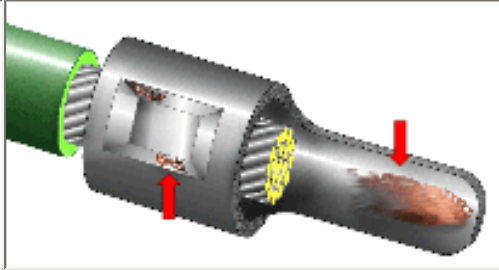
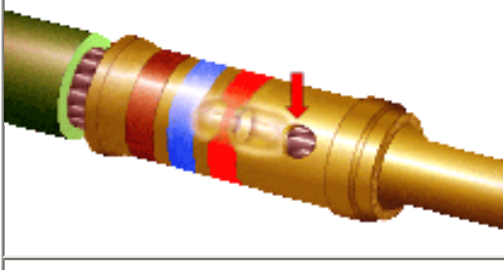
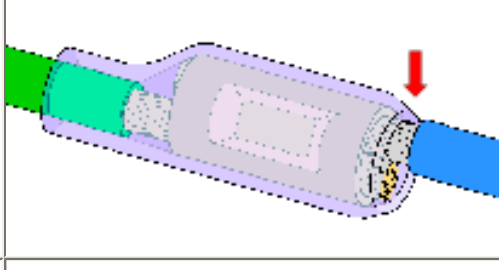
Revision:

Revision Date:

Book:
2

Section:
2.01

Page:
3

CRIMPED TERMINATIONS GENERAL REQUIREMENTS (cont.)	
	
<p>UNACCEPTABLE DISTURBED LAY</p> <p>Disturbing the lay of wire strands during crimping may reduce the reliability of the crimp termination.</p> <p>Best Workmanship Practice</p>	<p>UNACCEPTABLE EDGE FLASH/INSULATION WHISKERS</p> <p>Excessive edge flash or insulation whiskers that extend into the conductor crimp section may interfere with the proper mechanical and electrical termination of the crimp.</p> <p>NASA-STD-8739.4 [19.6.2.c.10]</p>
	
<p>UNACCEPTABLE EXCESSIVE CONDUCTOR LENGTH</p> <p>The conductor should extend a minimum of flush with, and a maximum of one (1) wire diameter beyond the conductor crimp edge.</p> <p>Best Workmanship Practice</p>	<p>UNACCEPTABLE EXPOSED BASE METAL</p> <p>Exposed base metal reduces the reliability of the crimp.</p> <p>NASA-STD-8739.4 [12.2.5], [19.6.2.c.6]</p>
	
<p>UNACCEPTABLE IMPROPER CRIMP LOCATION (INSPECTION HOLE)</p> <p>The indents shall not encroach on or distort the inspection hole.</p> <p>NASA-STD-8739.4 [19.6.2.c.7]</p>	<p>UNACCEPTABLE IMPROPER HEAT SHRINK LENGTH</p> <p>Heat shrink tubing conforms to the crimp outline, but does not extend over the wire to provide any sealing or strain relief to the conductor.</p> <p>NASA-STD-8739.4 [9.9]</p>

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

Revision:

Revision Date:

Book:
2

Section:
2.01

Page:
4

CRIMPED TERMINATIONS GENERAL REQUIREMENTS (cont.)	
<p>UNACCEPTABLE INCOMPLETE CONDUCTOR CRIMP</p> <p>An incomplete or improper conductor crimp will produce a conductor-crimp termination with reduced mechanical strength and reduced reliability.</p> <p>NASA-STD-8739.4 [19.6.2.c.6]</p>	<p>UNACCEPTABLE INCOMPLETE INSULATION CRIMP (MULTIPLE CRIMP PINS/SOCKETS)</p> <p>An incomplete or improperly set insulation crimp will produce a termination with reduced mechanical strength and reduced reliability.</p> <p>NASA-STD-8739.4 [19.6.2.c.6]</p>
<p>UNACCEPTABLE INCOMPLETE SHRINKAGE</p> <p>The heat shrink tubing conforms to the crimp outline and extends over the wire the proper length, but does not follow the contour of the wire, or provide any sealing or strain relief.</p> <p>NASA-STD-8739.4 [9.8.1]</p>	<p>UNACCEPTABLE OPAQUE HEAT SHRINK</p> <p>Heat shrink tubing is opaque, prohibiting visual inspection of the termination. Heat shrink tubing shall be transparent or translucent, allowing visual inspection of termination.</p> <p>Best Workmanship Practice</p>
<p>UNACCEPTABLE PEELING/FLAKING PLATING</p> <p>A contact exhibiting peeling or flaking plating indicates a component of questionable quality and shall be rejected.</p> <p>NASA-STD-8739.4 [12.2.3], [19.6.2.c.5]</p>	<p>UNACCEPTABLE PROTRUDING STRANDS</p> <p>Protruding strands reduce the current capacity of the termination, and present a puncture, sharp object damage or shorting risk.</p> <p>Best Workmanship Practice</p>

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

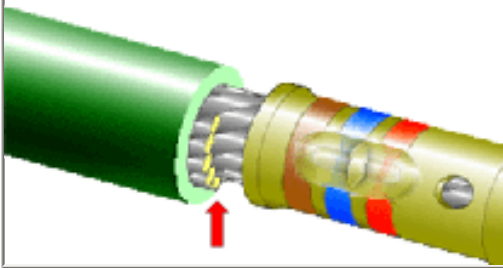
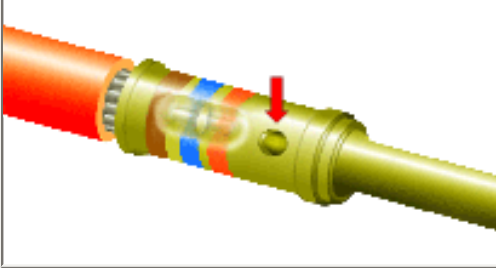
Revision:


Revision Date:

Book:
2

Section:
2.01

Page:
5

CRIMPED TERMINATIONS GENERAL REQUIREMENTS (cont.)	
	
<p>UNACCEPTABLE WIRE MODIFIED TO FIT</p> <p>Modifying wires to fit the crimp barrel reduces the current carrying capacity and mechanical reliability of the conductor-crimp termination. NASA-STD-8739.4 [4.3.5.a], [12.3.3], [19.6.2.a.2]</p>	<p>UNACCEPTABLE WIRE STRANDS NOT VISIBLE (PIN/CLOSED BARREL CRIMPS)</p> <p>Wire strands not visible in the inspection hole indicate that the conductor may not be properly inserted and shall be cause for rejection. NASA-STD-8739.4 [19.6.2.c.4]</p>

NASA WORKMANSHIP STANDARDS			
 <p>NATIONAL AERONAUTICS AND SPACE ADMINISTRATION JOHNSON SPACE CENTER HOUSTON, TEXAS USA 77058</p>	Released: 03.30.2001	Revision:	Revision Date:
	Book: 2	Section: 2.01	Page: 6



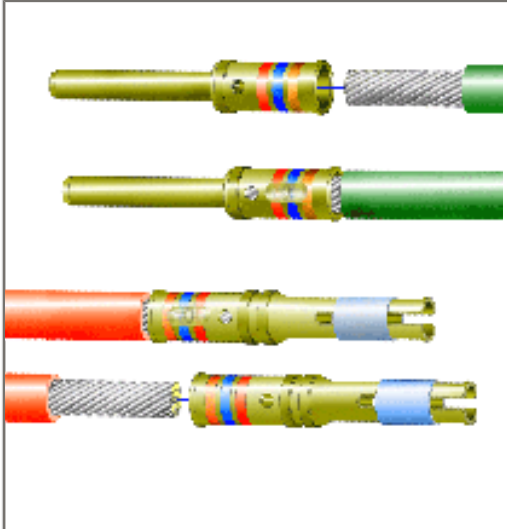
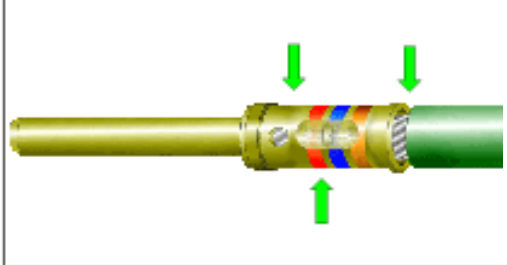
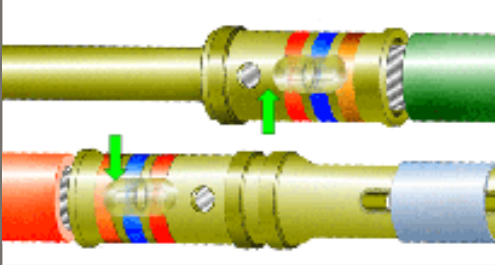
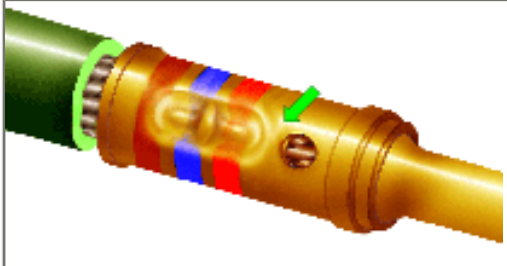
[Need a printed copy?](#)
(May take a while to load.)
 Requires Adobe Reader.



[Need Adobe Reader?](#)
[Click here to download.](#)



[Questions? Suggestions?](#)

CRIMPED TERMINATIONS CRIMP PINS & SOCKETS	
	<p style="text-align: center;">CRIMP PINS & SOCKETS</p> <p>The most common version of crimp terminations used in aerospace and military harness assemblies is the "pin and socket".</p> <p>See Section 2.01 "Crimped Terminations - General Requirements" for common accept/reject criteria.</p>
	
<p>PREFERRED</p> <p>The contact has been deformed only by tool indenters. Indents symmetrically and centered between the inspection hole and the wire entry shoulder. No exposed base metal or other damage. Wire strands are visible in the inspection hole. Proper insulation spacing.</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>	<p>ACCEPTABLE CRIMP LOCATION - VIEW 1</p> <p>The indents are at the maximum allowable positions (adjacent to the crimp boundary), but will not encroach on or distort the wire entry shoulder of the crimp barrel and the inspection hole if the contact is rotated (see view 2).</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>
	
<p>ACCEPTABLE CRIMP LOCATION - VIEW 2</p> <p>The indent is located adjacent to the inspection hole, but does not encroach on or distort the inspection hole.</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>	

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

Revision:

Revision Date:

Book:
2

Section:
2.02

Page:
1



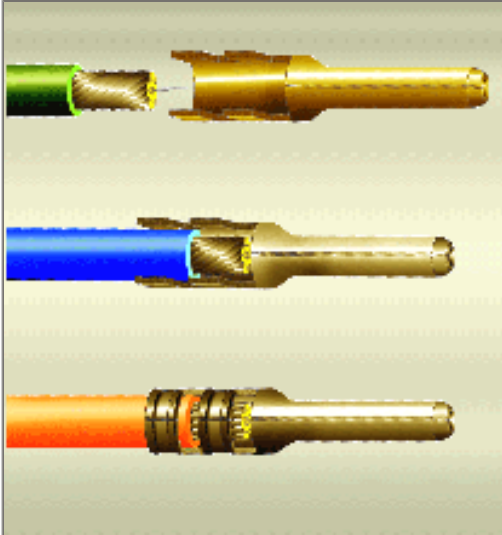
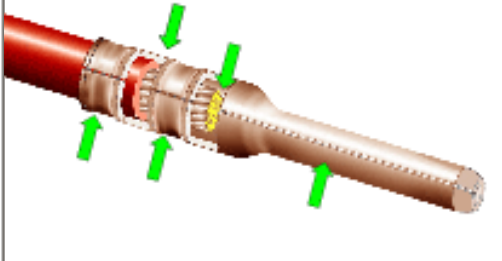
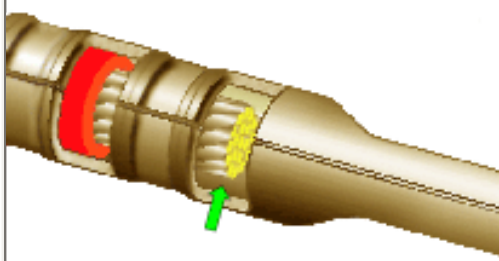
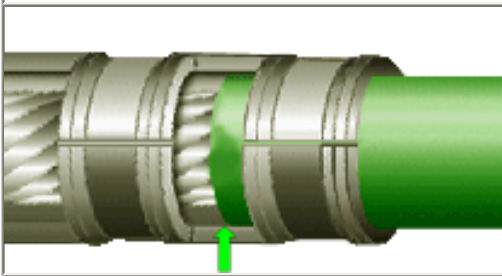
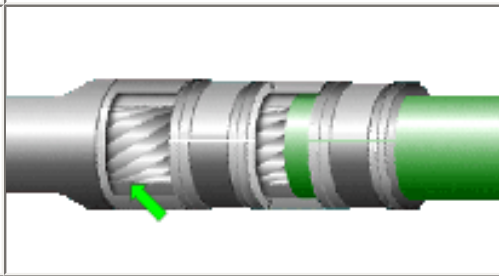
[Need a printed copy?](#)
(May take a while to load.)
Requires Adobe Reader.



[Need Adobe Reader?](#)
[Click here to download.](#)



[Questions? Suggestions?](#)

CRIMPED TERMINATIONS MULTIPLE CRIMP PINS & SOCKETS	
	<p>MULTIPLE CRIMP PINS & SOCKETS</p> <p>Multiple crimp pins and sockets are characterized by the presence of separate crimp devices to secure the conductor and the insulation jacket.</p> <p>The conductor crimp grips the conductor to complete the electrical termination. The insulation crimp grips the insulation jacket to provide strain-relief to the termination.</p> <p>See Section 2.01 "Crimped Terminations - General Requirements" for common accept/reject criteria.</p>
	
<p>PREFERRED</p> <p>Insulation and conductor crimps are properly set and exhibit proper insulation and conductor spacing. Wire strands visible. No exposed base metal or mechanical damage.</p>	<p>PREFERRED CONDUCTOR LENGTH</p> <p>The conductor should extend a minimum of flush with and a maximum of one (1) wire diameter beyond the conductor crimp edge.</p> <p>Best Workmanship Practice</p>
	
<p>PREFERRED INSULATION LENGTH</p> <p>The insulation should extend approximately midway between the insulation crimp and the conductor crimp.</p> <p>Best Workmanship Practice</p>	<p>ACCEPTABLE EXCESS CONDUCTOR LENGTH</p> <p>The conductor may extend into the pin or socket barrel, provided the excess conductor length does not interfere with the mechanical and electrical mating of the pin and/or socket.</p> <p>Best Workmanship Practice</p>

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

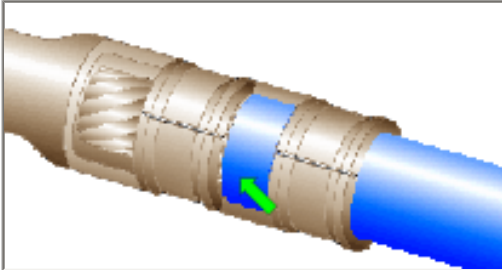
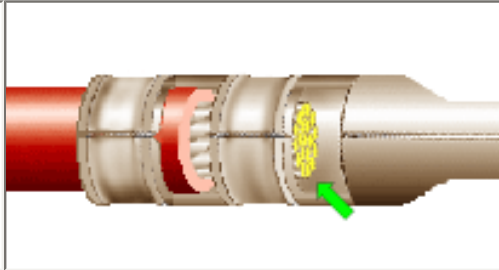
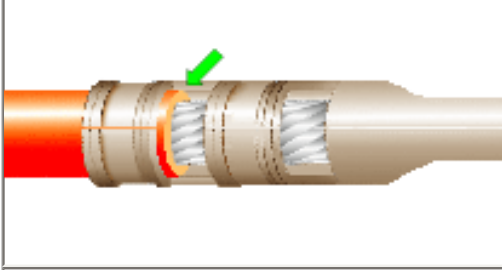
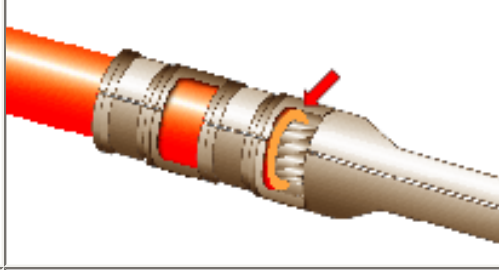
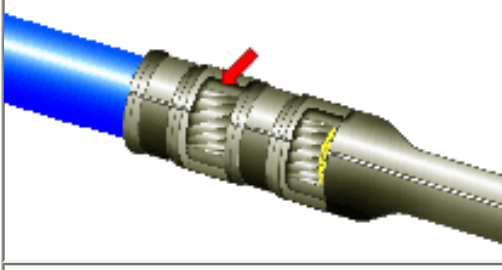
Revision:

Revision Date:

Book:
2

Section:
2.03

Page:
1

CRIMPED TERMINATIONS MULTIPLE CRIMP PINS & SOCKETS (cont.)	
	
<p>ACCEPTABLE EXCESS INSULATION LENGTH</p> <p>The insulation may extend to the leading edge of the conductor crimp, provided it can be determined visually that the insulation does not enter the conductor crimp.</p> <p>Best Workmanship Practice</p>	<p>ACCEPTABLE MINIMUM CONDUCTOR LENGTH</p> <p>The conductor should extend a minimum of flush with the conductor crimp edge.</p> <p>Best Workmanship Practice</p>
	
<p>ACCEPTABLE MINIMUM INSULATION LENGTH</p> <p>At a minimum, the insulation edge may be flush with the trailing edge of the insulation crimp.</p> <p>Best Workmanship Practice</p>	<p>UNACCEPTABLE INSULATION ENCRoACHMENT</p> <p>Insulation encroachment into the conductor crimp section may interfere with the proper mechanical and electrical termination of the crimp.</p> <p>NASA-STD-8739.4 [19.6.2.c.9]</p>
	
<p>UNACCEPTABLE IMPROPER STRAIN RELIEF</p> <p>The insulation jacket must extend beyond the edge of the insulation crimp, and the crimp must fully engage the jacket to ensure proper strain-relief to the termination.</p> <p>NASA-STD-8739.4 [19.6.2.c.9]</p>	

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

Revision:

Revision Date:

Book:
2

Section:
2.03

Page:
2



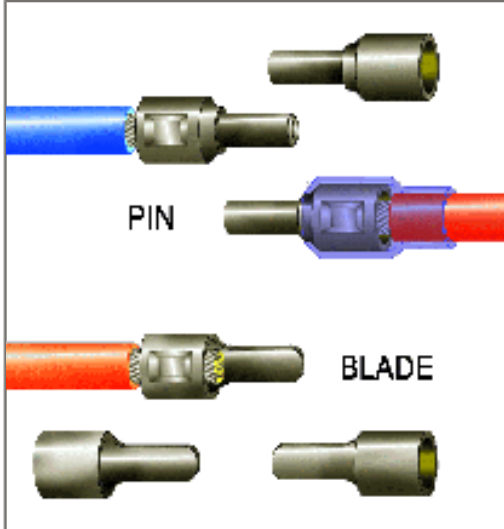
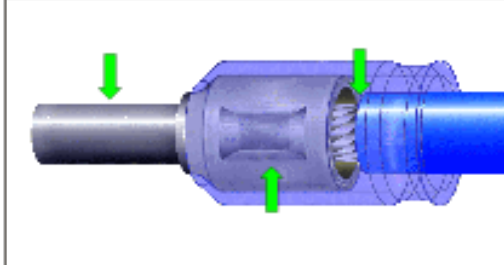
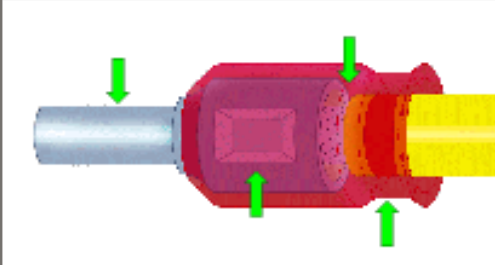
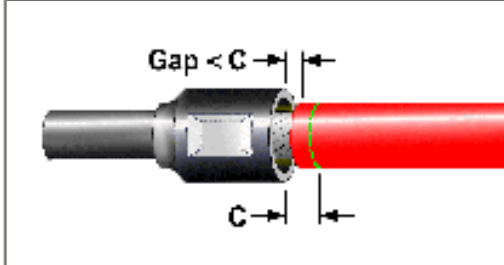
[Need a printed copy?](#)
(May take a while to load.)
Requires Adobe Reader.



[Need Adobe Reader?](#)
[Click here to download.](#)



[Questions? Suggestions?](#)

CRIMPED TERMINATIONS BLADE/PIN TERMINALS	
 <p style="text-align: center;">PIN</p> <p style="text-align: center;">BLADE</p>	<p><u>BLADE / PIN TERMINALS</u></p> <p>Blade / Pin terminals are used to dress and terminate a conductor for insertion into a wire termination block (strip), providing a finished/non-fraying end to the conductor.</p> <p>See Section 2.01 "Crimped Terminations - General Requirements" for common accept/reject criteria.</p>
	
<p>PREFERRED SINGLE CRIMP INSULATED</p> <p>The contact has been deformed only by tool indenters. Indents are symmetrical and centered on the crimp barrel. No exposed base metal or other damage. Proper insulation spacing (C).</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>	<p>PREFERRED DUAL CRIMP INSULATED</p> <p>The contact has been deformed only by tool indenters. Indents are symmetrical and properly located. Insulation crimp is properly set to provide appropriate strain relief. No exposed base metal. Proper insulation spacing (C).</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>
	
<p>PREFERRED UNINSULATED</p> <p>The contact has been deformed only by tool indenters. Indents are symmetrical and centered on the crimp barrel. No exposed base metal or other damage. Proper insulation spacing (C).</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>	

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

Revision:

Revision Date:

Book:
2

Section:
2.04

Page:
1



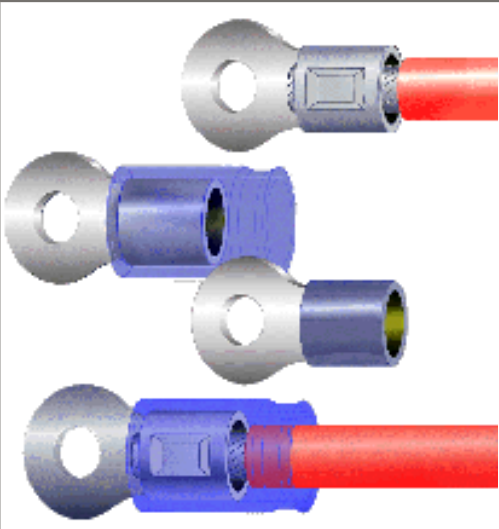
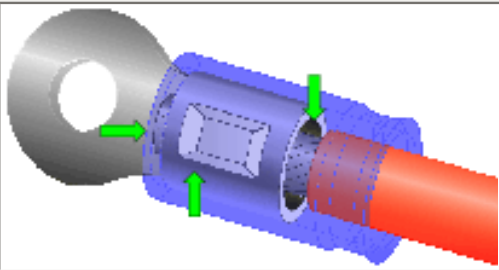
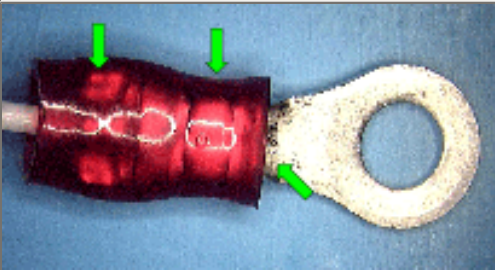
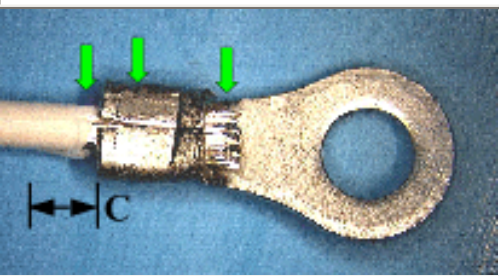
[Need a printed copy?](#)
(May take a while to load.)
Requires Adobe Reader.



[Need Adobe Reader?](#)
[Click here to download.](#)



[Questions? Suggestions?](#)

CRIMPED TERMINATIONS RING LUG TERMINALS	
	<p style="text-align: center;"><u>RING LUG TERMINALS</u></p> <p>Ring lug terminals are used to dress and terminate a conductor in a configuration requiring a mechanically captured connection to a termination point or post.</p> <p>The "capture" feature of a ring lug prevents the terminal from falling off the termination post, even if the compression nut has loosened. This additional security feature may be beneficial in high vibration applications.</p> <p>See Section 2.01 "Crimped Terminations - General Requirements" for common accept/reject criteria.</p>
	
<p>PREFERRED SINGLE CRIMP INSULATED</p> <p>The contact has been deformed only by tool indenters. Indents are symmetrical and centered on the crimp barrel. No exposed base metal or other damage. Wire strand ends are visible. Proper insulation spacing (C).</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>	<p>PREFERRED DUAL CRIMP INSULATED</p> <p>The contact has been deformed only by tool indenters. Indents are symmetrical and properly located. Insulation crimp is properly set to provide appropriate strain relief. Wire strand ends are visible. Proper insulation spacing (C).</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>
	
<p>PREFERRED UNINSULATED</p> <p>The contact has been deformed only by tool indenters. Indents are symmetrical and centered on the crimp barrel. No exposed base metal or other damage. Wire strand ends are visible. Proper insulation spacing.</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>	

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

Revision:

Revision Date:

Book:
2

Section:
2.05

Page:
1



[Need a printed copy?](#)
(May take a while to load.)
Requires Adobe Reader.



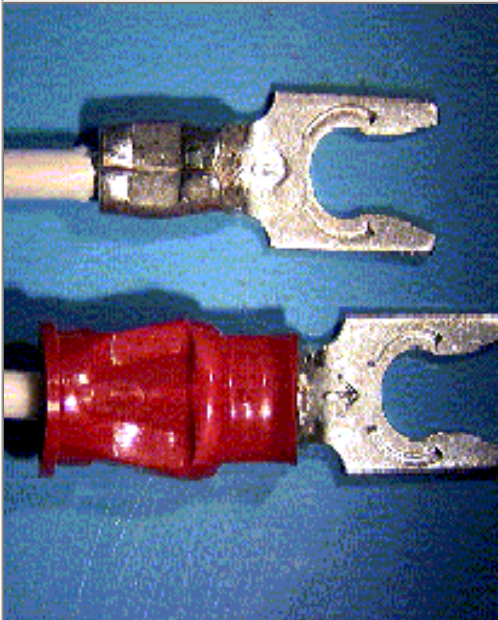
[Need Adobe Reader?](#)
[Click here to download.](#)



[Questions? Suggestions?](#)

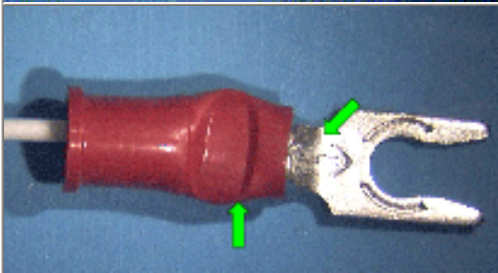
**CRIMPED TERMINATIONS
SPADE LUG TERMINALS**

SPADE LUG TERMINALS



Spade lug terminals are used to dress and terminate a conductor to a termination point or post with a mechanically secure, "partially captured" connection. The "partially captured" feature allows the terminal to be removed from a termination post without completely removing the compression nut (as is required with ring lugs). This security feature may be beneficial in moderate vibration environments where there is a requirement for the termination to be disconnected.

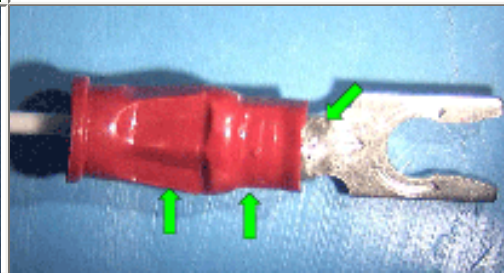
See Section 2.01 "Crimped Terminations - General Requirements" for common accept/reject criteria.



**PREFERRED
SINGLE CRIMP INSULATED**

The contact has been deformed only by tool indenters. Indents are symmetrical and centered on the crimp barrel. No exposed base metal or other damage. Wire strand ends are visible. Proper insulation spacing (C).

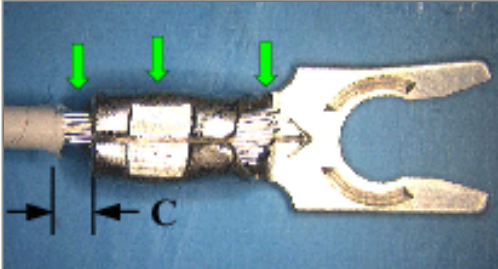
[NASA-STD-8739.4 \[19.6.1.c\]](#)



**PREFERRED
DUAL CRIMP INSULATED**

The contact has been deformed only by tool indenters. Indents are symmetrical and properly located. Insulation crimp is properly set to provide appropriate strain relief. Wire strand ends are visible. Proper insulation spacing (C).

[NASA-STD-8739.4 \[19.6.1.c\]](#)



**PREFERRED
UNINSULATED**

The contact has been deformed only by tool indenters. Indents are symmetrical and centered on the crimp barrel. No exposed base metal or other damage. Wire strand ends are visible. Proper insulation spacing (C).

[NASA-STD-8739.4 \[19.6.1.c\]](#)

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

Revision:

Revision Date:

Book:
2

Section:
2.06

Page:
1



[Need a printed copy?](#)
(May take a while to load.)
Requires Adobe Reader.



[Need Adobe Reader?](#)
[Click here to download.](#)



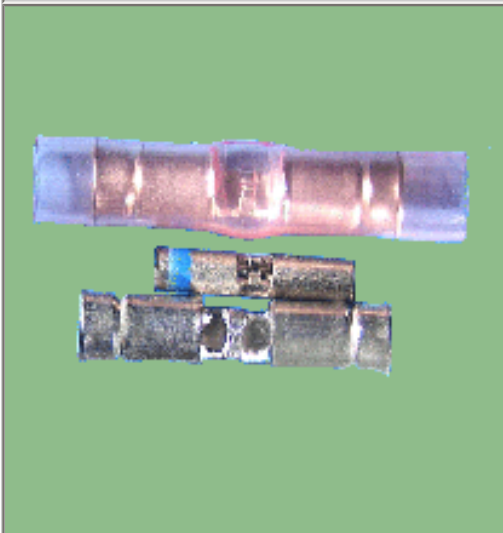
[Questions? Suggestions?](#)

**CRIMPED TERMINATIONS
BUTT SPLICES**

BUTT SPLICES

Butt splices are used to dress and terminate multiple conductors of the same or different gauges in an end-to-end or series configuration.

See Section 2.01 "Crimped Terminations - General Requirements" for common accept/reject criteria.



**PREFERRED
SINGLE CRIMP INSULATED**

The contact has been deformed only by tool indenters. Indents are symmetrical and centered on the crimp barrel. No exposed base metal or other damage. Wire strand ends are visible. Proper insulation spacing (C).

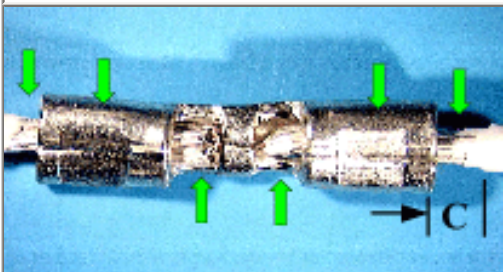
[NASA-STD-8739.4 \[19.6.1.c\]](#)



**PREFERRED
DUAL CRIMP INSULATED**

The contact has been deformed only by tool indenters. Indents are symmetrical and properly located. Insulation crimp is properly set, providing appropriate strain relief. Wire strand ends are visible. Proper insulation spacing (C).

[NASA-STD-8739.4 \[19.6.1.c\]](#)



**PREFERRED
UNINSULATED**

The contact has been deformed only by tool indenters. Indents are symmetrical and centered on the crimp barrel. No exposed base metal or other damage. Wire strand ends are visible. Proper insulation spacing (C).

[NASA-STD-8739.4 \[19.6.1.c\]](#)

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

Book:
2

Revision:

Section:
2.07

Revision Date:

Page:
1



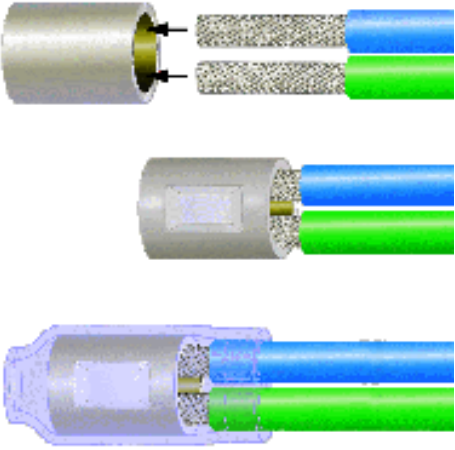
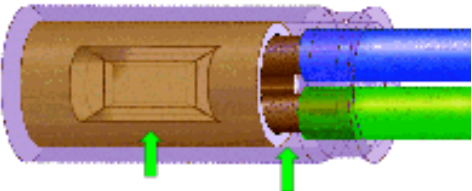
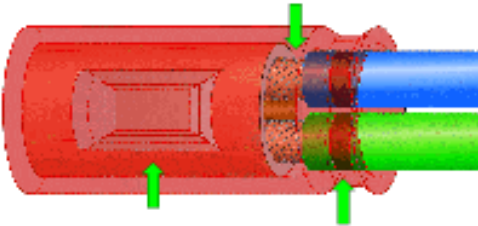
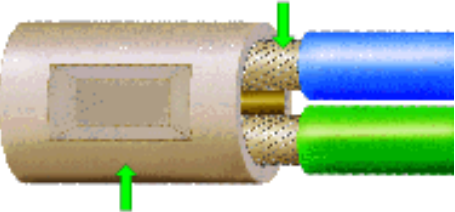
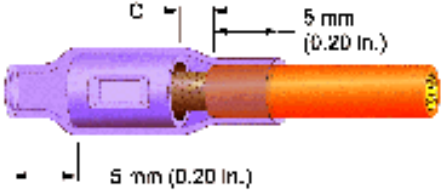
[Need a printed copy?](#)
(May take a while to load.)
Requires Adobe Reader.



[Need Adobe Reader?](#)
[Click here to download.](#)



[Questions? Suggestions?](#)

CRIMPED TERMINATIONS END SPLICES	
	<p style="text-align: center;">END SPLICES</p> <p>End splices are used to terminate two or more conductors in a "pig-tail" configuration, and to "dead-end" a single conductor. They can be used as inline splices if proper strain relief is provided.</p> <p>See Section 2.01 "Crimped Terminations - General Requirements" for common accept/reject criteria.</p>
	
<p>PREFERRED SINGLE CRIMP INSULATED</p> <p>The contact has been deformed only by tool indenters. Indents are symmetrical and centered on the crimp barrel. No exposed base metal or other damage. Proper insulation spacing (C).</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>	<p>PREFERRED DUAL CRIMP INSULATED</p> <p>The contact has been deformed only by tool indenters. Indents are symmetrical and properly located. Insulation crimp is properly set to provide appropriate strain relief. No exposed base metal. Proper insulation spacing (C).</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>
	
<p>PREFERRED UNINSULATED</p> <p>The contact has been deformed only by tool indenters. Indents are symmetrical and centered on the crimp barrel. No exposed base metal or other damage. Proper insulation spacing (C).</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>	<p>ACCEPTABLE DEAD-END CONFIGURATION</p> <p>The contact has been deformed only by tool indenters. Indents are symmetrical and centered on the crimp barrel. No exposed base metal or other damage. Proper insulation spacing (C). Shrink tubing has been properly installed.</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

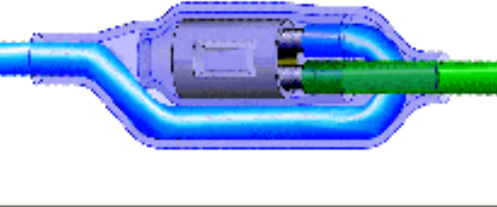
Book:
2


Revision:

Section:
2.08

Revision Date:

Page:
1

CRIMPED TERMINATIONS END SPLICES (cont.)	
	
<p>ACCEPTABLE INLINE CONFIGURATION</p> <p>Tubing is tight and symmetrical. Overlaps meet minimum electrical spacing, while providing strain relief. The termination is visible. Conductor(s) exhibit proper bend radius and strain relief.</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>	

NASA WORKMANSHIP STANDARDS			
 <p>NATIONAL AERONAUTICS AND SPACE ADMINISTRATION JOHNSON SPACE CENTER HOUSTON, TEXAS USA 77058</p>	Released: 03.30.2001	Revision:	Revision Date:
	Book: 2	Section: 2.08	Page: 2



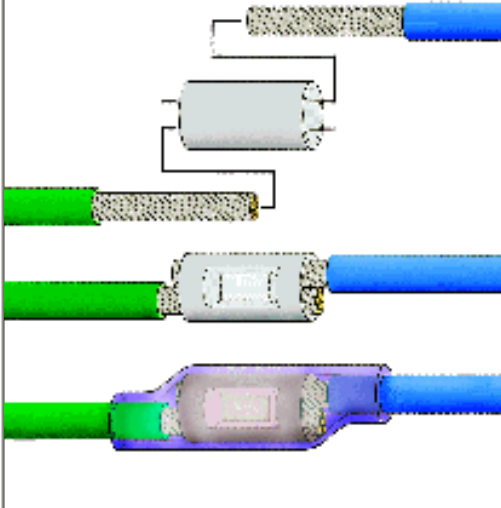
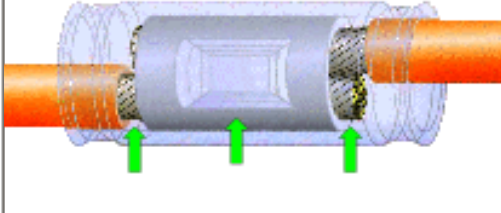
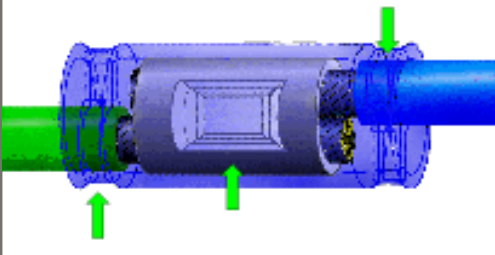
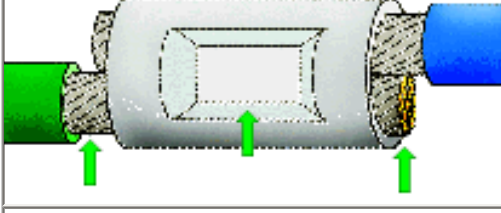
[Need a printed copy?](#)
(May take a while to load.)
Requires Adobe Reader.



[Need Adobe Reader?](#)
[Click here to download.](#)



[Questions? Suggestions?](#)

CRIMPED TERMINATIONS PARALLEL SPLICES	
	<p><u>PARALLEL SPLICES</u></p> <p>Parallel splices are used to dress and terminate multiple conductors, of the same or different gauges, in a parallel configuration.</p> <p>See Section 2.01 "Crimped Terminations - General Requirements" for common accept/reject criteria.</p>
	
<p>PREFERRED SINGLE CRIMP INSULATED</p> <p>The contact has been deformed only by tool indenters. Indents are symmetrical and centered on the crimp barrel. No exposed base metal or other damage. Wire strand ends are visible. Proper insulation spacing (C).</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>	<p>PREFERRED DUAL CRIMP INSULATED</p> <p>The contact has been deformed only by tool indenters. Indents are symmetrical and properly located. Insulation crimps are properly set to provide appropriate strain relief. No exposed base metal. Proper insulation spacing (C).</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>
	
<p>PREFERRED UNINSULATED</p> <p>The contact has been deformed only by tool indenters. Indents are symmetrical and centered on the crimp barrel. No exposed base metal or other damage. Wire strand ends are visible. Proper insulation spacing (C).</p> <p>NASA-STD-8739.4 [19.6.1.c]</p>	

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

Revision:

Revision Date:

Book:
2

Section:
2.09

Page:
1



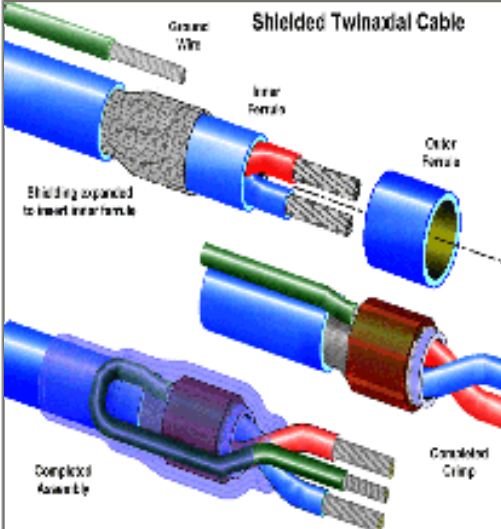
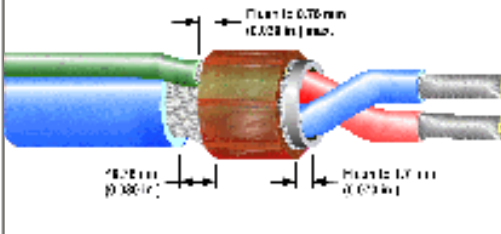
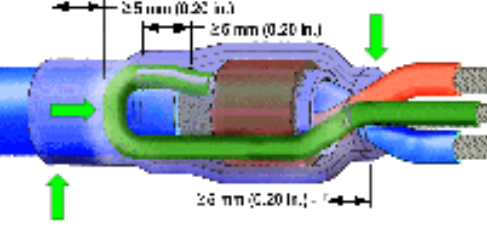
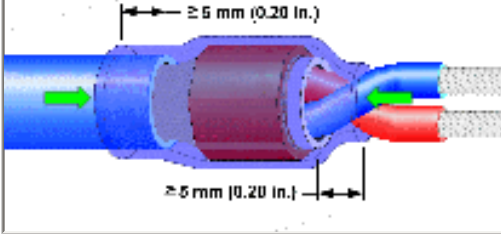
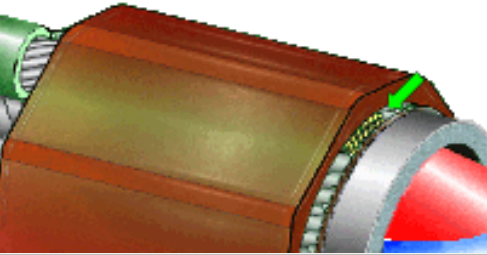
[Need a printed copy?](#)
(May take a while to load.)
Requires Adobe Reader.



[Need Adobe Reader?](#)
[Click here to download.](#)



[Questions? Suggestions?](#)

CRIMPED TERMINATIONS SHIELD CRIMPS	
	<p style="text-align: center;">SHIELD CRIMPS</p> <p>Shield crimps are used to mechanically "finish" the end of individually shielded cables.</p> <p>For ground shield terminations, the crimp assembly will have a grounding wire attachment, allowing the cable shield to be electrically terminated to ground.</p> <p>For floating shield terminations, the crimp assembly will be completed without the ground wire attachment.</p> <p>See Section 2.01 "Crimped Terminations - General Requirements" for common accept/reject criteria.</p>
	
<p style="text-align: center;">ACCEPTABLE INTERIM ASSEMBLY VIEW</p> <p>Outer crimp ring has been deformed only by tool indenters, with indents properly located and symmetrical. Inner crimp ring has not been deformed. No exposed base metal. Ground wire has proper insulation spacing and end is visible.</p> <p>NASA-STD-8739.4 [11.5]</p>	<p style="text-align: center;">ACCEPTABLE GROUND SHIELD TERMINATION</p> <p>Heat shrink sections are properly installed, tightly shrunk, and the termination is visible. Overlaps meet minimum electrical spacing. Ground wire exhibits proper bend radius and strain relief.</p> <p>NASA-STD-8739.4 [7.3.22], [9.8.1], [9.9], [11.5], [19.6.1]</p>
	
<p style="text-align: center;">ACCEPTABLE FLOATING SHIELD TERMINATION</p> <p>Heat shrink tubing is properly installed, tightly shrunk, and the termination is visible. Overlaps are of sufficient length to meet minimum electrical spacing.</p> <p>NASA-STD-8739.4 [9.8.1], [9.9], [11.5], [19.6.1]</p>	<p style="text-align: center;">MANDATORY GROUND WIRE OVERHANG</p> <p>The end of the ground wire shall be flush with the outer ferrule edge, but shall not overhang the inner ferrule edge.</p> <p>NASA-STD-8739.4 [11.5]</p>

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

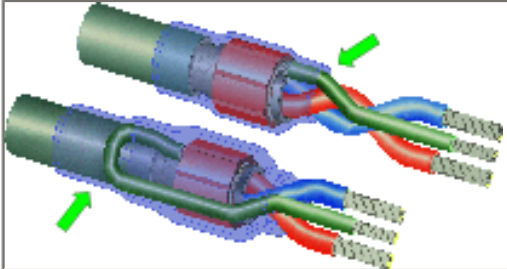
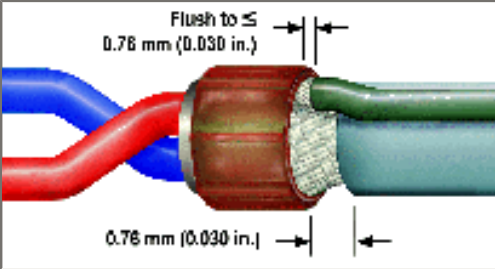
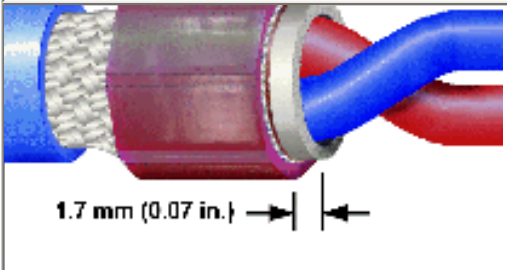
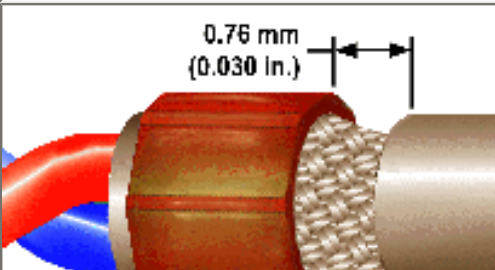
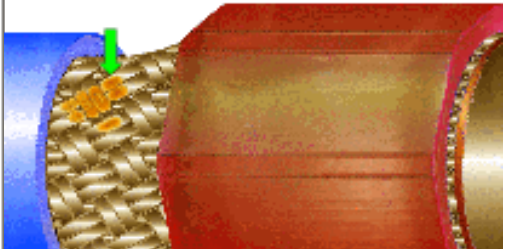

Revision:

Revision Date:

Book:
2

Section:
2.10

Page:
1

CRIMPED TERMINATIONS SHIELD CRIMPS (cont.)	
	
<p>PREFERRED GROUND WIRE ORIENTATION</p> <p>The ground wire should be dressed to the rear of the crimp termination, to allow the inclusion of a stress relief loop in the completed assembly. The ground wire may also dress forward, provided sufficient stress relief is provided.</p> <p>NASA-STD-8739.4 [11.5]</p>	<p>ACCEPTABLE GROUND WIRE INSULATION GAP</p> <p>The ground wire insulation gap shall be ≤ 0.76 mm (0.030 in.). The minimum gap shall be flush with the edge of the outer crimp ring.</p> <p>NASA-STD-8739.4 [11.5]</p>
	
<p>ACCEPTABLE INNER/OUTER FERRULE SPACING</p> <p>The inner ferrule may extend a minimum of flush with, and a maximum of 1.7 mm (0.07 in.) beyond the front edge of the outer ferrule.</p> <p>NASA-STD-8739.4 [11.5]</p>	<p>ACCEPTABLE MIN./MAX. SHIELD/BRAID GAP</p> <p>Min.: The placement of the crimp rings shall be such that the dress of the shield stranding is not subjected to flexure stress or tensile load. Max.: The maximum shield gap shall not exceed 0.76 mm (0.030 in.).</p> <p>NASA-STD-8739.4 [11.5]</p>
	
<p>ACCEPTABLE NICKED SHIELD STRANDS</p> <p>Nicked shield strands shall not exceed 10% of the total number of strands.</p> <p>NASA-STD-8739.4 [19.6.2.b.2]</p>	<p>UNACCEPTABLE EXCESSIVE GROUND CONDUCTOR LENGTH</p> <p>The ground wire end shall be flush with the outer ferrule edge, but shall not overhang the inner ferrule.</p> <p>NASA-STD-8739.4 [11.5]</p>

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

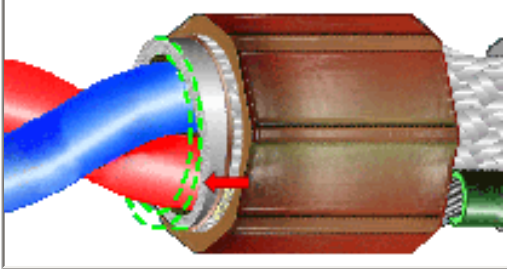
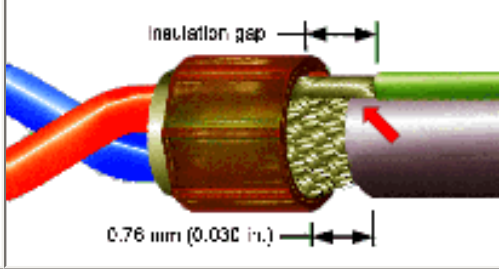
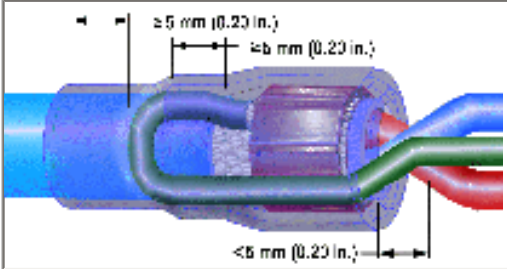
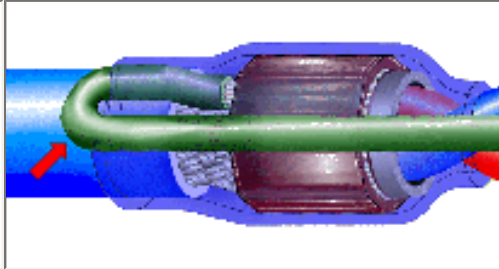
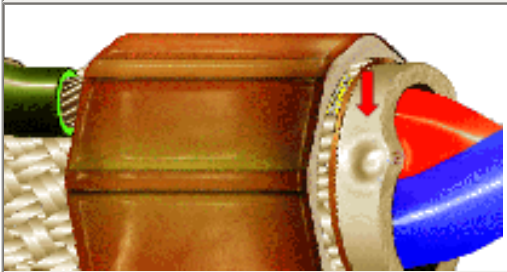
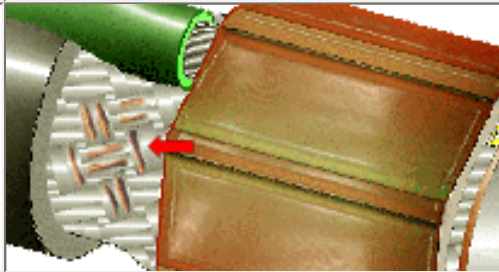
Book:
2

Revision:

Section:
2.10

Revision Date:

Page:
2

CRIMPED TERMINATIONS SHIELD CRIMPS (cont.)	
	
<p>UNACCEPTABLE IMPROPER ALIGNMENT</p> <p>Improper alignment of the ferrules reduces the reliability of the termination and indicates the use of an incorrect crimp positioner and/or improper insertion into the crimp tool.</p> <p>NASA-STD-8739.4 [19.6.2.b.4]</p>	<p>UNACCEPTABLE IMPROPER GROUND WIRE INSULATION GAP</p> <p>The ground wire insulation gap shall be ≤ 0.76 mm (0.030 in.). The minimum gap shall be flush with the edge of the outer crimp ring.</p> <p>NASA-STD-8739.4 [11.5]</p>
	
<p>UNACCEPTABLE IMPROPER HEAT SHRINK LENGTH</p> <p>Heat shrink tubing conforms to crimp outline, but does not extend over the wire to provide any sealing or strain relief.</p> <p>NASA-STD-8739.4 [9.8.1], [9.9], [19.6.2.b.8]</p>	<p>UNACCEPTABLE IMPROPER STRAIN RELIEF/IMPROPER BENDS</p> <p>Wiring must be properly dressed to ensure a reliable termination. Wire bends shall meet minimum radius bend requirements.</p> <p>NASA-STD-8739.4 [7.3.22]</p>
	
<p>UNACCEPTABLE INNER FERRULE DAMAGE/DISTORTION</p> <p>The inner ferrule shall be sized so that the inward distortion caused by the crimping process will not affect the insulated wires it surrounds.</p> <p>NASA-STD-8739.4 [11.5]</p>	<p>UNACCEPTABLE NICKED SHIELD STRANDS</p> <p>Nicked shield strands shall not exceed 10% of the total number of strands.</p> <p>NASA-STD-8739.4 [19.6.2.b.2]</p>

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

Revision:

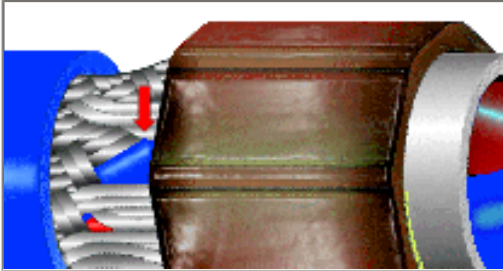
Revision Date:

Book:
2

Section:
2.10

Page:
3

**CRIMPED TERMINATIONS
SHIELD CRIMPS (cont.)**



**UNACCEPTABLE
UNEVEN SHIELD COVERAGE**

The shield braid shall be dressed to provide uniform coverage and dispersion. Uneven coverage may result in electrical interference in sensitive circuits and may interfere with the reliability of the crimp assembly.

[Best Workmanship Practice](#)

NASA WORKMANSHIP STANDARDS



NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
JOHNSON SPACE CENTER
HOUSTON, TEXAS USA 77058

Released:
03.30.2001

Revision:

Revision Date:

Book:
2

Section:
2.10

Page:
4



[Need a printed copy?](#)
(May take a while to load.)
[Requires Adobe Reader.](#)



[Need Adobe Reader?](#)
[Click here to download.](#)



[Questions? Suggestions?](#)