

Getting you a quality product, delivered on time, at the most economical cost starts with your documentation.



ESAM workmanship standards are per IPC/WHMA-A-620B, Class 2
Always specify on drawing if other workmanship standards are required

ESAM testing standards are per IPC/WHMA-A-620B, Class 2, para. 19.5.1 and 19.5.2

Always specify on drawing if other testing is required

IPC/WHMA-A-620B can be interpreted as either class 1, 2, or 3

Drawings should always use industry standards

- ASME Y14.100, Engineering Drawing Practices
- ANSI/IEEE 91, Graphic Symbols for Logic Functions
- ASME Y14.5M-1994 (R1999), Dimensioning and Tolerancing
- IEEE 315, Graphic Symbols for Electrical and Electronic Diagrams

Complete 100% electrical test leads to economical, rapid integration into your device.



Standard continuity testing verifies that all point-to-point connections conform to an assembly drawing. 4-wire (Kelvin) testing can be specified at additional cost.



VSWR/RL & IL Testing can also be specified.



Custom testing can be designed and implemented.

ESAM Form 977 Copyright #



**HELPFUL HINTS WHEN
DESIGNING WIRE/CABLE
ASSEMBLIES & HARNESSSES**

Exceptional Service American Made



For additional information, please call 1-800-621-0483 and ask for a customer service representative.

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HELPFUL HINTS for WIRE/CABLE ASSEMBLIES & HARNESES

Dimensioning*

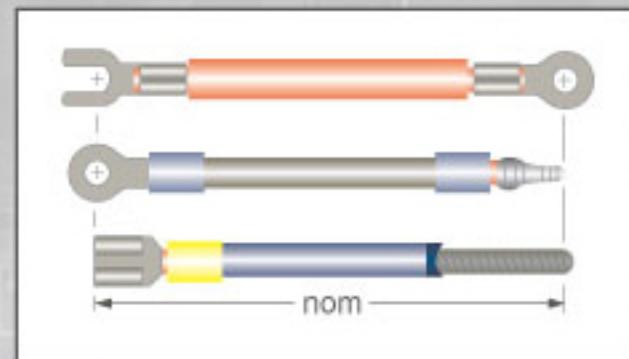


Figure 11-7

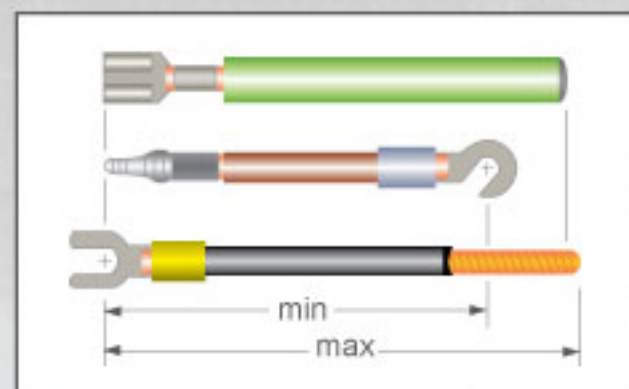


Figure 11-8

Tolerances*

Length English/Metric	Tolerance English/Metric
≤ 1 ft / ≤0.3 mm	+ 1 in / 25 mm – 0 in/0 mm
>1 ft-5 ft / 03 mm-1.5 m	+2 in -0 in / +50 mm -0 mm
>5 ft-10 ft / 1.5 m - 3 m	+4 in -0 in / +100 mm -0 mm
>10 ft-25 ft / 3 m - 7.5 m	+6 in -0 in / +150 mm -0 mm
>25 / 7.5 m	+5% - 0%

* Data taken from IPC/WHMA-A620

Are tighter tolerances available when needed?

Yes, but we recommend you contact an ESAM engineer as early as possible in your design process in order to determine the degree of feasibility and to minimize the additional cost for reduced tolerances.

What wire type do you need?

Wire type refers to the type of conductor and the type of insulation covering the conductor. Environmental conditions and Installation will drive the type of wire used in the application.

Do you need wire to be extra flexible?

Wire with the largest amount of strands is more flexible..

Which to use - Tie-Straps or Tape-On Clips?

Tie-strap clips are more robust and cost effective.

How should wires be protected?

Tape, convolute, sleeving, shrink and braids are common coverings. Select material based on application with respect to installation and environmental conditions.

Material Section

- > Teflon jacketed material is often used in military and space applications due to rugged requirements – irradiated and similar materials are sometimes a better choice
- > PVC jacketed material is often used in commercial applications due to lower cost
- > Make sure the same materials are specified for interconnections (e.g. gold to gold, tin to tin, etc.)
- > Select material based on the specifics of your application, especially with respect to environment, weight, rugged reliability, out-gassing/smoke, installation, and electrical characteristics
- > Good references can be found in the back of most wire/cable manufacturers catalogs for insulating materials

Wire to Pin Convention

- > Soldering is more costly from a labor standpoint
- > Make sure to check pin and wire to insure a match (AWG and insulation size)
- > It is normally better to “combo crimp” rather than add a splice when two wires terminate at the same location
- > Crimp connections may be more robust when vibration is a concern

Labeling

- > Use Brady® wrap around product or equivalent for least cost
- > For low volume product, where cost is not a major concern, use the same wire color for all runs and use labels for identification
- > For medium to high volume product, use different wire colors for identification rather than labels
- > For the type of label consider stage of product development, field maintenance and environment

Sealed or unsealed?

Sealed components are used in areas that are exposed to moisture. Unsealed components are used in dry areas.

Potting

- > Good for “hiding” proprietary hardware
- > Generally low cost option compared to over molding
- > Moderate tooling costs
- > Limit undercuts to reduce tooling and potting costs
- > Over Molding
 - > Will potting be sufficient?
 - > High tooling cost, but if high volume, could be the best option
- > Good for “hiding” proprietary hardware
- > Limit undercuts to reduce tooling and molding costs
- > Single color
- > Uniform wall

Connector Pin Convention

- > Use manufacturer's pin designation wherever possible to avoid confusion
- > Use ASME standards when creating drawings

Testing

- > All assemblies must receive 100% continuity and point-to-point testing where appropriate
- > Identify any “active” components that need to be functionally tested
- > Include a test procedure for any “special” testing requirements



In-process inspection steps are used whenever possible. Here crimp height and strength are monitored and data is stored for process control. This kind of process control insures long term reliability in the field.

Lead Time Drivers

- > Custom parts
- > Custom product built outside the USA and not stocked locally
- > Out-of-stock parts or materials
- > Obsolete component replacement
- > Incomplete documentation
- > Special tooling

Cost Drivers

- > Use COTS parts where possible
- > If custom parts are required – check with factory to determine lead time and cost before adding to drawing
- > Minimum order quantities on parts or materials
- > Tight tolerances
- > Type and amount of labeling
- > Laborious assembly process
- > Delicate or damage prone components
- > Misuse or misapplication of components
- > Not designed for manufacturing (not DFM)



Electrical test is performed on 100% of product. Wherever possible, functional tests are also designed and performed. Test engineering works with you to insure that completed tested product comes to you all the time.

Reference Links

www.ipc.org/ContentPage.aspx?pageid=IPC-WHMA-A-620