
AMPLIMITE* HDE-20 Insulation Displacement Connector

1. SCOPE

1.1. Content

This specification covers the performance, tests and quality requirements for AMPLIMITE* HDE connector with (removable) insulation displacement (and "F" crimp) contacts in a one piece plastic housing, with or without a metal shell. The assemblies can contain a combination of insulation displacement and "F" crimp HDE contacts.

1.2. Qualification

When tests are performed on the subject product line, the procedures specified in 109-Series Test Specifications shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1. TE Connectivity (TE) Documents

- A. 109-1: General Requirements for Test Specifications
- B. 109 Series: Test Specifications as indicated in Figure 1.
- C. 114-40002: Application Specification, Contact, AMPLIMITE, HDE-20
- D. 114-40003: Application Specification, Contact, AMPLIMITE, HDE-20, "F" Crimp
- E. 501-115: Test Report

3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction and physical dimensions specified on the applicable product drawing.

3.2. Materials

- A. Contact: Phosphor bronze, gold on mating end, tin plated on crimp end.
- B. Housing: Glass filled polyester, black, UL 94V-0

3.3. Ratings

- A. Voltage: 250 vac
- B. Current: Fully loaded and energized connectors
 - 1. 30-28 AWG 1.0 A
 - 2. 26 AWG 1.5 A
 - 3. 24 AWG 2.0 A
 - 4. 22 AWG 2.4 A
 - 5. 20 AWG 3.0 A
 - 6. 18 F crimp 3.7 A
- C. Temperature: -55° to 105°C

3.4. Performance and Test Description

The product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. All tests are performed at ambient temperature unless otherwise specified.

3.5. Test Requirements and Procedures Summary

| Test Description | Requirement | Procedure | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|---|---|-------------|--------------|-------------|------|---------------------|---|---|-----|----|---|----|-----|----|---|----|-----|----|---|----|------|----|--|
| Examination of Product | Meets requirements of product drawing and Application Specifications 114-40002 and 114-40003. | Visual, dimensional and functional per applicable quality inspection plan. | | | | | | | | | | | | | | | | | | | | | | |
| ELECTRICAL | | | | | | | | | | | | | | | | | | | | | | | | |
| Termination Resistance, Dry Circuit | 30 milliohms maximum. | Subject mated contacts assembled in housing to 50 mv open circuit at 100 ma maximum, see Figure 4; Test Specification 109-6-1. | | | | | | | | | | | | | | | | | | | | | | |
| Dielectric Withstanding Voltage | 1 kvac dielectric withstanding voltage, one minute hold. 1 milliampere maximum leakage current. | Test between adjacent contacts of unmated connector assemblies; Test Specification 109-29-1. | | | | | | | | | | | | | | | | | | | | | | |
| Insulation Resistance | 5000 megohms minimum initial. 500 megohms final | Test between adjacent contacts of unmated connector assembly; Test Specification 109-28-1. | | | | | | | | | | | | | | | | | | | | | | |
| Temperature Rise vs Current | Maximum temperature rise at specified current, 30°C. At a max. ambient temp. of 70°C | Measure temperature rise vs current; Test Specification 109-45-1. | | | | | | | | | | | | | | | | | | | | | | |
| MECHANICAL | | | | | | | | | | | | | | | | | | | | | | | | |
| Vibration, Random | No discontinuities greater than 1 microsecond. See note (a). | Subject mated connectors to 20 G's rms with 100 ma current applied 20 minutes each axis, see Figure 3; Test Specification 109-21-5, test level F. | | | | | | | | | | | | | | | | | | | | | | |
| Physical Shock | No discontinuities greater than 1 microsecond. See note (a). | Subject mated connector to 50 G's half-sine shock pulses of 11 millisecond duration; 3 shocks in each direction applied along the 3 mutually perpendicular planes total 18 shocks, see Figure 3; Test Specification 109-26-1. | | | | | | | | | | | | | | | | | | | | | | |
| Mating Force | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Pounds maximum</th> <th rowspan="2">All Plastics</th> <th rowspan="2">Metal Shell</th> </tr> <tr> <th>Size</th> <th>Number of Positions</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>9</td> <td>2.8</td> <td>30</td> </tr> <tr> <td>2</td> <td>15</td> <td>4.7</td> <td>33</td> </tr> <tr> <td>3</td> <td>25</td> <td>7.8</td> <td>37</td> </tr> <tr> <td>4</td> <td>37</td> <td>11.6</td> <td>40</td> </tr> </tbody> </table> | Pounds maximum | | All Plastics | Metal Shell | Size | Number of Positions | 1 | 9 | 2.8 | 30 | 2 | 15 | 4.7 | 33 | 3 | 25 | 7.8 | 37 | 4 | 37 | 11.6 | 40 | Measure force necessary to mate connector assembly incorporating free floating fixtures at a rate of 1.0 inch/minute; Test Specification 109-42, cond A. |
| Pounds maximum | | All Plastics | Metal Shell | | | | | | | | | | | | | | | | | | | | | |
| Size | Number of Positions | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 9 | 2.8 | 30 | | | | | | | | | | | | | | | | | | | | | |
| 2 | 15 | 4.7 | 33 | | | | | | | | | | | | | | | | | | | | | |
| 3 | 25 | 7.8 | 37 | | | | | | | | | | | | | | | | | | | | | |
| 4 | 37 | 11.6 | 40 | | | | | | | | | | | | | | | | | | | | | |
| Unmating Force | As above. | Measure force necessary to unmate connector assembly at a rate of 1.0 inch/minute; Test Specification 109-42, cond A. | | | | | | | | | | | | | | | | | | | | | | |

Figure 1 (continued)

| Test Description | Requirement | Procedure | | | | | | | | | | | | | | | | |
|------------------------------|---|---|------------------------------|--------------|-------------|--------|------------|-----|---------|-----|---|----|-----|----|-----|----|---|--|
| Contact Insertion Force | 3 pounds maximum per contact. | Measure force to insert contact into housing; Test Specification 109-41. | | | | | | | | | | | | | | | | |
| Contact Retention | Contacts shall not dislodge from the connector housing. | Apply axial load of 7 pounds to contacts; Test Specification 109-30. | | | | | | | | | | | | | | | | |
| Contact Engaging Force | 8 ounces maximum per contact. | Measure force using gage A, as indicated in Figure 5; Test Specification 109-35, engagement depth .220. | | | | | | | | | | | | | | | | |
| Contact Separating Force | .75 ounces minimum per contact. | Size 2 times using gage A, as indicated in Figure 5, insert gage B and measure force to separate; Test Specification 109-35, separation depth .220. | | | | | | | | | | | | | | | | |
| Crimp Tensile | <table border="1"> <thead> <tr> <th>Wire Size, AWG</th> <th>Crimp Tensile Pounds Minimum</th> </tr> </thead> <tbody> <tr> <td>18 (F Crimp)</td> <td>27</td> </tr> <tr> <td>20</td> <td>9.5</td> </tr> <tr> <td>22</td> <td>6</td> </tr> <tr> <td>24</td> <td>4</td> </tr> <tr> <td>26</td> <td>2.5</td> </tr> <tr> <td>28</td> <td>2.5</td> </tr> <tr> <td>30</td> <td>1</td> </tr> </tbody> </table> | Wire Size, AWG | Crimp Tensile Pounds Minimum | 18 (F Crimp) | 27 | 20 | 9.5 | 22 | 6 | 24 | 4 | 26 | 2.5 | 28 | 2.5 | 30 | 1 | Determine crimp tensile at a rate of 1 inch/minute; Test Specification 109-16. |
| Wire Size, AWG | Crimp Tensile Pounds Minimum | | | | | | | | | | | | | | | | | |
| 18 (F Crimp) | 27 | | | | | | | | | | | | | | | | | |
| 20 | 9.5 | | | | | | | | | | | | | | | | | |
| 22 | 6 | | | | | | | | | | | | | | | | | |
| 24 | 4 | | | | | | | | | | | | | | | | | |
| 26 | 2.5 | | | | | | | | | | | | | | | | | |
| 28 | 2.5 | | | | | | | | | | | | | | | | | |
| 30 | 1 | | | | | | | | | | | | | | | | | |
| Durability | See Note. | Mate and unmate connector assemblies for cycles listed, at a maximum rate of 200 cycles/hour; Test Specification 109-27. <table border="1"> <thead> <tr> <th colspan="2">Plating</th> </tr> <tr> <th>Microinches</th> <th>Cycles</th> </tr> </thead> <tbody> <tr> <td>Cold Flash</td> <td>100</td> </tr> <tr> <td>30 Gold</td> <td>500</td> </tr> </tbody> </table> | Plating | | Microinches | Cycles | Cold Flash | 100 | 30 Gold | 500 | | | | | | | | |
| Plating | | | | | | | | | | | | | | | | | | |
| Microinches | Cycles | | | | | | | | | | | | | | | | | |
| Cold Flash | 100 | | | | | | | | | | | | | | | | | |
| 30 Gold | 500 | | | | | | | | | | | | | | | | | |
| ENVIRONMENTAL | | | | | | | | | | | | | | | | | | |
| Thermal Shock | See Note. | Subject mated connectors to 5 cycles between -55° and 105°C; Test Specification 109-22. | | | | | | | | | | | | | | | | |
| Humidity-Temperature Cycling | See Note. | Subject mated connectors to 10 humidity-temperature cycles between 25° and 65°C at 95% RH; Test Specification 109-23-4, cond B. Electrical measurements shall be made within 5 hours of removal of samples from chamber. | | | | | | | | | | | | | | | | |
| Mixed Flowing Gas | See Note. | Precondition connectors to 10 durability cycles. Subject mated connectors to environmental class III for 20 days; Test Specification 109-85-3. | | | | | | | | | | | | | | | | |

Figure 1 (continued)

| Test Description | Requirement | Procedure |
|------------------|---------------|---|
| Temperature Life | See note (a). | Subject mated connectors to temperature life; Test Specification 109-43, test level 10 (105°), test duration C (500 hours). |

NOTE *Shall meet visual requirements, show no physical damage, and shall meet requirements of additional tests as specified in the test sequence in Figure 2.*

Figure 1 (end)

3.6. Product Qualification and Requalification Tests

| Test of Examination | Test Group (a) | | | | | | | |
|-------------------------------------|-------------------|------|------|-------|------|------|------|---|
| | 1 | 2 | 3 | 4 (b) | 5 | 6 | 7 | 8 |
| | Test Sequence (c) | | | | | | | |
| Examination of Product | 3, 9 | 1, 6 | 1, 6 | 1, 5 | 1, 5 | 1, 8 | 1, 5 | 1 |
| Termination Resistance, Dry Circuit | 3, 7 | 2, 5 | 2, 5 | 2, 4 | 2, 4 | | | |
| Dielectric Withstanding Voltage | | | | | | 3, 7 | | |
| Insulation Resistance | | | | | | 2, 6 | | |
| Temperature Rise vs Current | | | | 3 | | | | |
| Vibration | 5 | | | | | | | |
| Physical Shock | 6 | | | | | | | |
| Mating Force | 2 | | | | | | | 2 |
| Unmating Force | 8 | | | | | | | 3 |
| Contact Insertion Force | | | | | | | 2 | |
| Contact Retention | | | | | | | 5 | |
| Contact Engaging Force | | | | | | | 3 | |
| Contact Separating Force | | | | | | | 4 | |
| Crimp Tensile | | | | | | | 6 | |
| Durability | 4 | 3 | 3 | | | | | |
| Thermal Shock | | | | | | 4 | | |
| Humidity-Temperature Cycling | | | 4 | | | 5 | | |
| Mixed Flowing Gas | | | | | 3 | | | |
| Temperature Life | | 4 | | | | | | |

NOTE (a) See Para 4.1.A.
 (b) Discontinuities shall not be measured for this test group.
 (c) Numbers indicate sequence in which tests are performed.

Figure 2

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Connectors housings and contacts shall be prepared in accordance with applicable Instruction Sheets. They shall be selected at random from current production. Test groups 1, 2, 3 and 4 shall consist of 37 position, all plastic plugs and receptacles; gold flash duplex plated contacts. Contacts in these groups shall be terminated as follows: 20 and 22 AWG to the number 3 slot, 24 and 26 AWG to the number 2 slot, and 30 AWG to the number 1 slot. Test group 5 shall consist of 25 position, all plastic plugs and receptacles; gold flash duplex plated contacts. Contacts in group 5 shall be terminated as follows: 22 AWG to the number 3 slot, 22 and 26 AWG to the number 2 slot, 26 and 30 AWG to the number 1 slot. Test group 6 shall consist of 37 position, all plastic plugs and receptacles; gold flash duplex plated contacts. Contacts in group 6 shall be terminated as follows: 20 and 22AWG to the number 3 slot. Test group 7 shall consist of 9 position, all plastic plugs and gold flash duplex plated F crimp replacement contacts. Contacts to be terminated as follows: 20 and 22 AWG to the number 3 slot, 22, 24 and 26 AWG to the number 2 slot, 26, 28 and 30 AWG to the number 1 slot. F crimp contacts to be terminated to 18, 20 and 22 AWG wire and 22, 24 and 26 AWG wire as applicable. Test group 8 shall consist of 9, 15, 25 and 37 position plugs and receptacles; all plastic and metal shall (any plating or slot size) un-terminated.

B. Test Sequence

Qualification inspection shall be verified by testing samples as specified in Figure 2.

4.2. Requalification Testing

If changes significantly affecting form, fit, or function are made to the product or to the manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality, and reliability engineering.

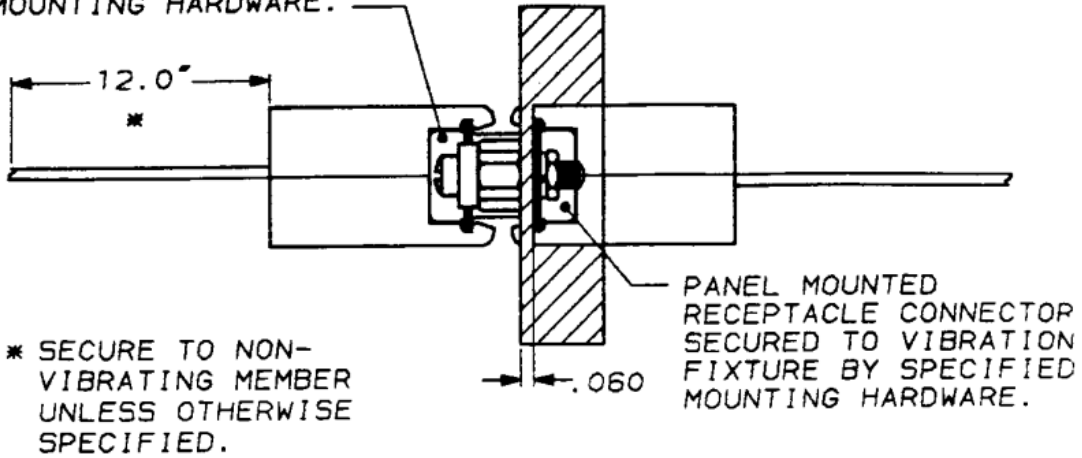
4.3. Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test setup, or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4. Quality Conformance Inspection

The applicable quality inspection plan will specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.

PLUG CONNECTOR FULLY MATED
AND FASTENED TO MATING
CONNECTOR BY SPECIFIED
MOUNTING HARDWARE.



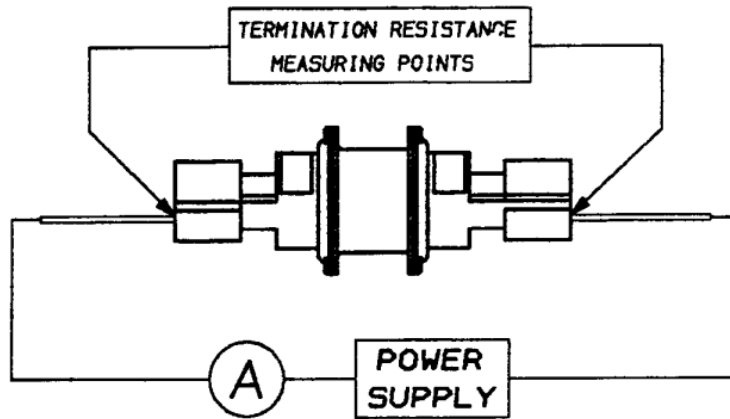
NOTE Receptacle connector to be mounted on vibration fixture unless otherwise specified.



| SHELL SIZE | FIXTURE NUMBER |
|------------|----------------|
| 1 | |
| 2 | |
| 3 | 468165 |
| 4 | |
| 5 | 468165 |

VIBRATION LEVEL IS APPLIED TO THE SPECIFIED CONNECTOR MOUNTING AREA () OF THE VIBRATION FIXTURE.

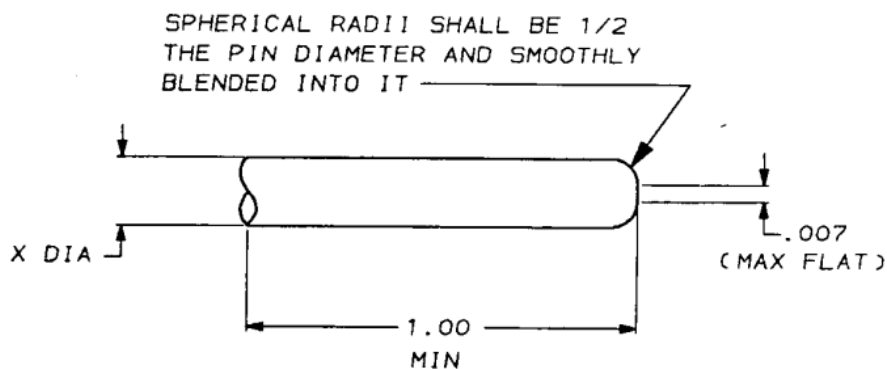
Figure 3
Mounting and Clamping Locations
for Vibration and Physical Shock



TERMINATION RESISTANCE MAY BE MEASURED OUTBOARD OF THE POINTS SHOWN. THE BULK RESISTANCE MUST THEN BE SUBTRACTED.

Figure 4
Resistance and Temperature Measurement Points

| Gage | TE P/N | X |
|------|---------|------------------------|
| A | 27280-8 | .0410 +.0000 -.0001 |
| B | 27280-7 | .0390 +.0001 -.0000 |



NOTES

1. Gage material: 100-97
2. Heat treat to Rc 68-70
3. This gage is for contact size 20
4. Pin to comply with MS 3197
5. Finish: 6-10 microinches rms

Figure 5