
Terminal Block Stacking Connectors

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for Terminal Block Stacking connector. This connector is designed to terminate solid (0.03 to 4 mm²) or stranded (0.03 to 2.5 mm²) wire by means of a screw actuated clamp. Centerline spacings are 2.54, 3.5, 3.81, 5.00, 5.08, 7.50, 7.62, 10 and 10.16 mm.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in IEC 998-1 and IEC 998-2-1 Standards shall be used. All inspections shall be performed using the applicable product drawing.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. 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. Tyco Electronics Document

114-20079: Application Specification

2.2. International Standards

- IEC 112: Method of Determining the Comparative and the Proof-tracking Indices of Solid Insulating Materials Under Moist Conditions
- IEC 695: Fire Hazard Testing
- IEC 695-2-1 Part 2: Test Methods. Glow Wire Test and Guidance
- IEC 998-1: Connecting Devices for Low Voltage Circuits and Similar Purposes. Part 1: General Requirements
- IEC 998-2-1: Connecting Devices for Low Voltage Circuits and Similar Purposes. Part 2-1: Particular Requirements for Connecting Devices as Separate Entities With Screw-type Clamping Units

3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction and physical dimensions specified on the applicable product drawing and shall consider the requirements mentioned on IEC 998-2-1 paragraph 10, relevant to clamping units.

3.2. Materials

- Cage clamp: Brass, nickel plated
- Clamping screw: Brass, nickel plated
- Contact spring: Phosphor bronze, tin plated
- Housing: Polyamide 6-6, UL94-V0
- Terminal: Brass, tin plated (except for Terminal Block header assembly in which the terminal is phosphor bronze, tin plated)

3.3. Ratings

- Voltage: See Figure 1

Pitch	2.54 mm	3.5/3.81 mm	5/5.08 mm	7.5/7.62 mm	10/10.16 mm
Voltage	125 volts AC	200 volts AC	250 volts AC	450 volts AC	750 volts AC

Figure 1

- Current: See Figure 2

Terminal Block PCB Mounted				
Rated wire section	0.5 mm ²	1 mm ²	1.5 mm ²	2.5 mm ²
Stranded wire section	0.75 mm ²	1 mm ²	1.5 mm ²	2.5 mm ²
Solid wire section	1 mm ²	1.5 mm ²	2.5 mm ²	4 mm ²
Rated current	6 amperes	13.5 amperes	17.5 amperes	24 amperes

Terminal Block Plug and Header				
Rated wire section	0.5 mm ²	1 mm ²	-----	-----
Stranded wire section	1 mm ²	1.5 mm ²	-----	-----
Solid wire section	1.5 mm ²	2.5 mm ²	-----	-----
Rated current	6 amperes	12 amperes (*)	-----	-----

NOTE (*) Not in the IEC 998-1/998-2-1 specification.

Figure 2

- Temperature: -40 to 110°C
- Recommended screw torque:
 - 0.2 Nm for M1.6 screw equipped components
 - 0.25 Nm for M2 screw equipped components
 - 0.5 ÷ 0.8 Nm for M3 screw equipped components (excluded Terminal Block plug 90 degree and 180 degree)

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 3. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per IEC 160.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure										
Examination of product.	Meets requirements of product drawing and IEC 998-1, paragraph 17.	Visual, dimensional and functional.										
Marking.	Marking shall be legible after tests.	IEC 998-2-1, paragraph 8.										
ELECTRICAL												
Termination resistance, dry circuit.	$\Delta R \leq 5$ milliohms.	AMP Spec 109-6-1. Subject mated contacts assembled in housing to 50 millivolts open circuit at 100 milliamperes.										
Insulation resistance.	5 megohms minimum final. 500 volts DC applied with measurements made 1 minute after the application of the voltage.	IEC 998-1, paragraph 13e 13.3. Test made consecutively: (a) between all clamping units connected together and the body. (b) between each clamping unit and all others connected to the body.										
Dielectric withstanding voltage.	Sinewave voltage (50 Hz or 60 Hz) for 1 minute. Values specified below. <table style="margin-left: auto; margin-right: auto; border: none;"> <tr> <td style="text-align: center;">Rated Insulation Voltage</td> <td style="text-align: center;">Test Voltage</td> </tr> <tr> <td style="text-align: center;">≤ 130 V</td> <td style="text-align: center;">1250 V</td> </tr> <tr> <td style="text-align: center;">> 130 V and ≤ 250 V</td> <td style="text-align: center;">2000 V</td> </tr> <tr> <td style="text-align: center;">> 250 V and ≤ 450 V</td> <td style="text-align: center;">2500 V</td> </tr> <tr> <td style="text-align: center;">> 450 V and ≤ 750 V</td> <td style="text-align: center;">3000 V</td> </tr> </table>	Rated Insulation Voltage	Test Voltage	≤ 130 V	1250 V	> 130 V and ≤ 250 V	2000 V	> 250 V and ≤ 450 V	2500 V	> 450 V and ≤ 750 V	3000 V	IEC 998-1, paragraph 13e 13.4. Test between adjacent contacts of connector assemblies.
Rated Insulation Voltage	Test Voltage											
≤ 130 V	1250 V											
> 130 V and ≤ 250 V	2000 V											
> 250 V and ≤ 450 V	2500 V											
> 450 V and ≤ 750 V	3000 V											
Resistance to tracking.	CTI ≥ 175 V.	IEC 112. IEC 998-2-1, paragraph 19.										
Temperature rise vs current.	45°C maximum temperature rise at specified current. During testing, specimens are loaded with an AC current having the values shown in Figure 5.	IEC 998-1, paragraph 15. Temperature rise measurements are made when the specimen has reached thermal equilibrium.										
MECHANICAL												
Clamping securement and damage to the conductor test.	Conductor shall not slip out of the connecting device.	IEC 998-2-1, paragraph 10.104.										
Pull test.	Conductor shall not slip out of the connecting device.	IEC 998-2-1, paragraph 10.105. Subject conductor to a pull force for 1 minute in the axis of the tapping conductor. Pull force values listed in Figure 6 shall be used.										

Figure 3

Test Description	Requirement	Procedure
Mechanical strength.	Tests normally carried out without conductors. See Note.	IEC 998-1, paragraph 14.2 Specimens tested in a tumbling barrel.
Mating force.	8 N maximum per contact/post pair.	AMP Spec 109-42, Method A. Measure force necessary to mate specimens with locking latches using free floating features at a rate of 25.4 mm per minute.
Unmating force.	1 N minimum per contact/post pair.	AMP Spec 109-42, Method A. Measure force necessary to unmate specimens with locking latches removed or released at a rate of 25.4 mm per minute.
Durability.	See Note.	AMP Spec 109-27. Mate and unmate specimens for 25 cycles.
ENVIRONMENTAL		
Temperature aging.	Specimens shall show no cracks visible to the naked eye nor shall the material become sticky or greasy. See Note.	IEC 998-2-1, paragraph 12.1. Subject specimens to 140 ± 2°C for 168 hours.
Damp heat, steady state.	After treatment, specimens shall show no damage within the meaning of the relevant standard. See Note.	IEC 998-2-1, paragraph 12.2. Subject specimens to relative humidity of 91 to 95% for 48 hours.
Resistance to heat.	Specimens shall not undergo any change impairing their further use. Marking shall be legible and distances listed in Figure 7 shall be verified. See Note.	IEC 998-1, paragraph 16. Subject specimens to 155 ± 5°C for 1 hour.
Glow-wire test.	Specimens with no visible flame and no sustained glowing; or flames and glowing on the specimen extinguished 30 seconds after the removal of the glow-wire.	IEC 695-2-1, paragraphs 4 to 10. IEC 998-2-1, paragraph 18. Apply the glow-wire once for no longer than 5 seconds.

NOTE *Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 4.*

Figure 3 (end)

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)				
	1	2	3	4	5(b)
	Test Sequence (c)				
Examination of product	1	1	1	1	1,8
Marking	8				
Termination resistance dry circuit					3,6
Insulation resistance	4				
Dielectric withstanding voltage	5				
Resistance to tracking			3		
Temperature rise vs current				2	
Clamp securement and damage to the conductor test		2			
Pull test			2		
Mechanical strength	6				
Mating force					2
Unmating force					7
Durability					4
Temperature aging	2				
Damp heat, steady state	3				
Resistance to heat	7				
Glow-wire test		3			

- NOTE** (a) See paragraph 4.1.A.
 (b) Sequence applicable only to Terminal Block two piece connectors.
 (c) Numbers indicate sequence in which tests are performed.

Figure 4

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production.

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figure 4.

4.2. Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 3. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and specimens resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

Terminal Block PCB Mounted		Terminal Block Plug and Header	
Rated Wire Section	Test Current	Rated Wire Section	Test Current
0.5 mm ²	6 amperes	0.5 mm ²	6 amperes
1 mm ²	13.5 amperes	1 mm ²	12 amperes (*)
1.5 mm ²	17.5 amperes	-----	-----
2.5 mm ²	24 amperes	-----	-----

NOTE (*) Not in the IEC 998-1/998-2-1 specification.

Figure 5
Temperature Rise vs Current Values

Rated Wire Section	0.5 mm ²	1.0 mm ²	1.5 mm ²	2.5 mm ²
Pull Force	30 N	35 N	40 N	50 N

Figure 6
Pull Test Values

Insulation Voltage Rating	Distance (minimum)
≤ 130 volts AC	1.5 mm
>130 and ≤250 volts AC	3 mm
>250 and ≤450 volts AC	4 mm
>450 and ≤750 volts AC	6 mm
>750 volts AC	8 mm

Figure 7
Creepage Distances and Clearances