

# Product Data Sheet

**3M™ Mini-Clamp II  
Plug and Socket  
Wiremount Connectors**

---

## Table of Contents

1.0	SCOPE.....	2
2.0	PRODUCTS TESTED .....	2
2.1	Cables Tested.....	3
3.0	GENERAL CONDITIONS .....	4
3.1	Test Specimens .....	4
3.2	Standard Test Conditions.....	4
4.0	TEST RESULTS SUMMARY .....	5
5.0	TESTING .....	6
5.1	General .....	6
	<i>Visual (Appearance) — IEC 512-2 test 1a</i> .....	6
5.2	Environmental .....	6
	<i>Thermal Shock — IEC 512-6 test 11d</i> .....	6
	<i>Rapid change of temperature — IEC 512-6 test 11d</i> .....	6
	<i>Dry heat — IEC 512-6 test 11i</i> .....	6
	<i>Damp heat, cyclic — IEC 512-6 test 11m</i> .....	7
	<i>Cold — IEC 512-6 test 11j</i> .....	7
	<i>Corrosion, industrial atmosphere — IEC 68-2-60 TTD, Test Ke, Method C</i> .....	7
5.3	Mechanical.....	8
	<i>Bending of the cable / wire — IEC 352-4, Section 12.2.4</i> .....	8
	<i>Microsection — IEC 352-4 Section 12.2.4</i> .....	8
	<i>Vibration — IEC 512-4 test 6d</i> .....	9
5.4	Electrical.....	9
	<i>Low Level Contact Resistance — IEC 512-2 test 2a</i> .....	9
	<i>Electrical load and temperature — IEC 512-5 test 9b</i> .....	9

## 1.0 Scope

This data sheet summarizes test methods, test conditions and product performance for the 3M™ Mini-Clamp II Plug, 37104-AXXX-00E MB and 37104-BXXX-00E MB mated to various different cables types. Testings are conducted in accordance to IEC 352-4, full test schedule.

## 2.0 Products Tested

Product:	3M™ Mini-Clamp II Plug
Product Number:	37104-A206-00E MB 37104-A165-00E MB 37104-A124-00E MB 37104-B163-00E MB 37104-B122-00E MB 37104-B101-00E MB
Related Specification Sheet:	TS-2233
Related Specification Sheet of products not tested:	TS-2234
Mating Product:	3M™ Mini-Clamp II Wiremount Socket 3M™ Mini-Clamp Boardmount Socket
Mating Product Number:	373XX-AXXX-0XE MB 373XX-BXXX-0XE MB 372XX-62X3-00X PL

2.1 Cables Tested and Approved

Cable List for Mini Clamps										Type A Products			
No.	Manufac-turer	Cable ID	AWG	metric mm <sup>2</sup>	no. of Strands	Temp Rating	Surface Plating	Insulation Type	OD mm	Origin	Cover Color	Description	Cover Color
1	Leoni	L45551-A32-B25	24	(0.22)	7	70	blank Cu	PE	1.2	Leoni		37104-A165-00E-MB	37104-A124-00E-MB
2	Phoenix *	0031 320	24	(0.22)	7	70	blank Cu	PE	1.2	Phoenix		37104-A165-00E-MB	37104-A124-00E-MB
3	Leoni	V45551-A122-A35	24	(0.22)	7	70	tinned Cu	PVC	1.0	Leoni		37104-A124-00E-MB	
4	Phoenix *	0022 502	24	(0.22)	7	80	tinned Cu	PVC	1.25	Phoenix		37104-A165-00E-MB	
5	Medi-Kabel	120247	24	(0.22)	7	90	tinned Cu	special PVC	1.5	Dikon		37104-A165-00E-MB	
30	Alpha Wire	1854/19	24		19	105	tinned Cu	PVC	1.09	3M USA		37104-A124-00E-MB	
6	Phoenix *	0031 371		0.25	14	70	blank Cu	PE	1.35	Phoenix		37104-A165-00E-MB	
8	Leoni	V45571-B110-A		0.25	14	70	tinned Cu	PVC	1.3	Leoni		37104-A165-00E-MB	
9	Leoni	L45467-J17-W6	22	0.34	7	70	blank Cu	PE	1.5	Leoni		37104-A165-00E-MB	
10	Leoni	L45467-J17-W6	22	0.34	7	70	blank Cu	FRNC	1.6	Leoni		37104-A165-00E-MB	37104-A206-00E-MB
49	Iso-Kabel	FLRY(A) 0.34		0.34	7		blank Cu		1.25	3M Swiss		37104-A165-00E-MB	
50	SAB Broeckskes	SABIX D 305 FRNC 0.34		0.34	7	85	blank Cu	flame-retard.	1.40	3M Swiss		37104-A165-00E-MB	
11	Medi-Kabel	122227	22	0.34	7	80	tinned Cu	semi-rigid PVC	1.3	Braun		37104-A165-00E-MB	
12	Leoni	L45467-J17-B15	22	0.34	7	70	tinned Cu	PE	1.5	Leoni		37104-A165-00E-MB	
13	Phoenix *	9156 540	22		7	?	tinned Cu	PVC	1.55	Phoenix		37104-A165-00E-MB	
14	Medi-Kabel	120227	22	0.34	7	90	tinned Cu	special PVC	1.6	Dikon		37104-A165-00E-MB	37104-A206-00E-MB
38	Medi-Kabel	120229	22		19	90	tinned Cu	special PVC	1.7	Dikon		37104-A206-00E-MB	
31	Alpha Wire	1855/19	22		19	105	tinned Cu	PVC	1.27	3M USA		37104-A165-00E-MB	
39	Medi-Kabel	124229	22		19	105	tinned Cu	special PVC, x-link	1.7	Dikon		37104-A206-00E-MB	
40	Medi-Kabel	404035		0.35	7	105	blank Cu	special PVC	1.3	Dikon		37104-A165-00E-MB	
15	SAB Broeckskes	SABIX D 305 FRNC 0.50		0.50	15	85	blank Cu	flame-retard.	1.55	3M Swiss		37104-A165-00E-MB	
16	Phoenix *	9155 523		0.50	16	?	blank Cu	PVC	1.6	Phoenix		37104-A165-00E-MB	37104-A206-00E-MB
17	Phoenix *	9154 546		0.50	16	?	blank Cu	PVC	1.7	Phoenix		37104-A206-00E-MB	
41	Medi-Kabel	404050		0.50	19	105	blank Cu	special PVC	1.6	Dikon		37104-A165-00E-MB	37104-A206-00E-MB
18	Leoni	V45571-C111-A		0.50	16	80	tinned Cu	PVC	1.8	Leoni		37104-A206-00E-MB	
46	Nexans ***	LL63878 ***	20	(0.56)	7	?	blank Cu	PVC	1.5	3M Sweden		37104-A165-00E-MB	
42	Medi-Kabel	122207	20		7	80	tinned Cu	semi-rigid PVC	1.5	Dikon		37104-A165-00E-MB	
19	Medi-Kabel	120207	20	(0.56)	7	90	tinned Cu	special PVC	1.87	Dikon		37104-A206-00E-MB	
33	Alpha Wire	3053	20		10	80	tinned Cu	PVC	1.8	3M USA		37104-A206-00E-MB	
20	Medi-Kabel	120200	20	(0.56)	18	90	tinned Cu	special PVC	1.90	Dikon		37104-A206-00E-MB	
43	Medi-Kabel	137209	20		19	125	tinned Cu	PE, x-linked	1.9	Dikon		37104-A206-00E-MB	
32	Alpha Wire	1856/19	20		19	105	tinned Cu	PVC	1.47	3M USA		37104-A165-00E-MB	
Cable List for Mini Clamps										Type B Products			
No.	Manufac-turer	Cable ID	AWG	metric mm <sup>2</sup>	no. of Strands	Temp Rating	Surface Plating	Insulation Type	OD mm	Origin	Cover Color	Description	Cover Color
24	Phoenix *	4125003S	(26)	0.14	17	80	blank Cu	PVC	1.1	Phoenix		37104-B122-00E-MB	
25	Phoenix *	9155 747	(26)	0.14	18	80	blank Cu	PVC	0.9	Phoenix		37104-B101-00E-MB	
26	Phoenix *	9155 929	26	(0.13)	7	50	blank Cu	PE	0.9	Phoenix		37104-B101-00E-MB	
27	Phoenix *	9155 756	26	(0.13)	19	50	blank Cu	PTFE	0.81	Phoenix		37104-B101-00E-MB	
45	roline ***	FTP Patch cable Cat. 5e	26	(0.14)	7	?	blank Cu	PVC	1.0	3M Sweden		37104-B122-00E-MB	37104-B101-00E-MB
21	Phoenix *	? 1 ?		0.14	18	?	blank Cu	PVC	0.9	Phoenix		37104-B101-00E-MB	
22	Phoenix *	? 2 ?		0.14	18	?	blank Cu	PVC	0.9	Phoenix		37104-B101-00E-MB	
23	Phoenix *	? 3 ?		0.14	18	?	blank Cu	PVC	0.9	Phoenix		37104-B101-00E-MB	
34	Dearborn	172619-100	26		19	105	tinned Cu	PVC	0.99	3M USA		37104-B101-00E-MB	
35	Medi-Kabel	122267	26		7	80	tinned Cu	semi-rigid PVC	1.0	Dikon		37104-B122-00E-MB	37104-B101-00E-MB
36	Medi-Kabel	120267	26		7	90	tinned Cu	special PVC	1.35	Dikon		37104-B163-00E-MB	
44	Leoni	V45571-A106-A60	26	(0.14)	7	?	tinned Cu	PVC	1.4	Leoni		37104-B163-00E-MB	
37	Medi-Kabel	101014		0.14	18	70	tinned Cu	PVC	1.1	Dikon		37104-B122-00E-MB	
1	Leoni	L45551-A32-B25	24	(0.22)	7	70	blank Cu	PE	1.2	Leoni		37104-B163-00E-MB	37104-B122-00E-MB
2	Phoenix *	0031 320	24	(0.22)	7	70	blank Cu	PE	1.2	Phoenix		37104-B163-00E-MB	37104-B122-00E-MB
3	Leoni	V45551-A122-A35	24	(0.22)	7	70	tinned Cu	PVC	1.0	Leoni		37104-B122-00E-MB	37104-B101-00E-MB
4	Phoenix *	0022 502	24	(0.22)	7	80	tinned Cu	PVC	1.25	Phoenix		37104-B163-00E-MB	
5	Medi-Kabel	120247	24	(0.22)	7	90	tinned Cu	special PVC	1.5	Dikon		37104-B163-00E-MB	
30	Alpha Wire	1854/19	24		19	105	tinned Cu	PVC	1.09	3M USA		37104-B122-00E-MB	
6	Phoenix *	0031 371		0.25	14	70	blank Cu	PE	1.35	Phoenix		37104-B163-00E-MB	
8	Leoni	V45571-B110-A		0.25	14	70	tinned Cu	PVC	1.3	Leoni		37104-B163-00E-MB	

\* cable supplied by customer Phoenix, listed with customer ID.  
 \*\* cable no. 7 and cable no. 28 are the same cable  
 \*\*\* no full specification available

Table 1. Cables approved during the test series.

In the most right columns the contact types to which the cables are tested, are shown.

The Phoenix cables 9156 362 and 9155 748 and 9155 747 could not be identified, thereby these cables are referred to as cable ? 1 ? and ? 2 ? and ? 3 ?. One of these 3 cables then thus must be the same as cable no.25.

### 3.0 General Conditions

#### 3.1 Test Specimens

The test specimens shall be strictly in compliance with the design, construction details and physical properties detailed in the relevant Technical Specification Sheet (See Section 2).

#### 3.2 Standard Test Conditions

The test shall be done under the following conditions:

Temperature:	15°C to 35°C
Relative Humidity:	45% to 75%
Atmospheric pressure:	650 to 800 mmHg

#### 4.0 Test Results Summary

	Items	Specification	Test Method	Results
<b>General</b>	Visual	No defects such as deformation, blister, damage, crack, etc.	IEC 512-2 Test 1a	Pass
<b>Environmenta l</b>	Thermal Shock	No Physical abnormalities after test Max. $\Delta R$ : < 10 m $\Omega$ 100 Cycles -55 °C to +85 °C	IEC 512-6 Test 11d	Pass
	Rapid change of temperature	No Physical abnormalities after test Max. $\Delta R$ : < 10 m $\Omega$ 5 Cycles -55 °C to +85 °C	IEC 512-6 Test 11d	Pass
	Dry heat	Max. $\Delta R$ : < 10 m $\Omega$ Conditions: 100 °C / 16 hours	IEC 512-6 Test 11i	Pass
	Damp heat, cyclic	Max. $\Delta R$ : < 10 m $\Omega$ 6 Cycles +25 °C to +55 °C / 95%	IEC 512-6 Test 11m	Pass
	Cold	Max. $\Delta R$ : < 10 m $\Omega$ -55 °C / 2 hours	IEC 512-6 Test 11j	Pass
	Corrosion, industrial atmosphere	No Physical abnormalities after test Max. $\Delta R$ : < 10 m $\Omega$	IEC 68-2-60 TTD Test Ke Method C	Pass
<b>Mechanical</b>	Bending of the cable / wire	No Physical abnormalities after test Max. $\Delta R$ : < 10 m $\Omega$ No electrical discontinuity > 1 $\mu$ sec	IEC 352-4 Section 12.2.1	Pass
	Microsection	Strands shall be located in IDC-slot The deformation of the strands shall be identifiable No damaged of the beams of the IDC-slot	IEC 352-4 Section 12.2.4	Pass
	Vibration	No Physical abnormalities after test Max. $\Delta R$ : < 10 m $\Omega$ No electrical discontinuity > 1 $\mu$ sec	IEC 512-4 Test 6d	Pass
<b>Electrical</b>	Low Level Contact Resistance	Max. $\Delta R$ : < 10 m $\Omega$	IEC 512-2 Test 2a	Pass
	Electrical load and temperature	No Physical abnormalities after test Max. $\Delta R$ : < 10 m $\Omega$ "X" °C for 1000 Hours X, depended on cable temp. rating with minimum of 70 °C	IEC 512-5 Test 9b	Pass

### 3M Electronic Solutions Division

6801 River Place Blvd.  
 Austin, TX 78726-9000

## 5.0 Testing

Test methods are based upon EIA Standard 364.

### 5.1 General

#### **Visual (Appearance) — IEC 512-2 test 1a**

##### *Purpose*

The purpose of this test is to visually examine and dimensionally inspect the connector in order to determine whether the connector conforms to the applicable specification and detail documents not covered by performance requirements.

##### *Test Method*

The examination shall be made in accordance with IEC 512-2 test 1a. The visual examination shall include inspection of the following features as a minimum: workmanship, marking, materials, finish, standards, design and construction. The dimensional inspection shall be a check for compliance with the outline drawings of the detail specification.

### 5.2 Environmental

#### **Thermal Shock — IEC 512-6 test 11d**

##### *Purpose*

The purpose of this test is to determine the resistance of a given electrical connector to exposure at extremes of high and low temperatures and to the shock of alternate exposures to these extremes, simulating the worst probable conditions of storage, transportation and application.

##### *Test Method*

Mated connectors shall be tested in accordance with IEC 512-6, Test 11d.

Temperature:	-55 °C & + 85 °C
Cycle Time:	30 minutes each Temperature
Cycles:	100

#### **Rapid change of temperature — IEC 512-6 test 11d**

##### *Purpose*

The purpose of this test is to determine the resistance of a given electrical connector to exposure at extremes of high and low temperatures and to the shock of alternate exposures to these extremes, simulating the worst probable conditions of storage, transportation and application.

##### *Test Method*

Mated connectors shall be tested in accordance with IEC 512-6, Test 11d.

Temperature:	-55 °C & + 85 °C
Cycle Time:	30 minutes each Temperature
Cycles:	5

#### **Dry heat — IEC 512-6 test 11i**

##### *Purpose*

---

## **3M Electronic Solutions Division**

6801 River Place Blvd.  
Austin, TX 78726-9000

The purpose of this test is to determine the resistance of a given electrical connector to assess the ability to be stored and/or to function in a specified manner and specified conditions of dry heat.

*Test Method*

Mated connectors shall be tested in accordance with IEC 512-6, Test 11i.

Temperature:	100 °C
Duration:	16 hours

**Damp heat, cyclic — IEC 512-6 test 11m**

*Purpose*

The purpose of this test is to determine the ability of the connectors to be stored and/or to function under conditions of high humidity when combined with important temperature changes.

*Test Method*

Mated connectors shall be tested in accordance with IEC 512-6, Test 11m.

Upper temperature:	+55 °C
Lower temperature:	+25 °C
Relative Humidity:	95%
Duration:	12 hours per temperature
Transition time:	3 hours
Number of cycles:	6

**Cold — IEC 512-6 test 11j**

*Purpose*

The purpose of this test is to determine the ability of the connectors to be stored and/or to function under specified conditions of cold.

*Test Method*

Mated connectors shall be tested in accordance with IEC 512, Test 11j.

Temperature Range:	-55 °C
Duration:	2 hours

**Corrosion, industrial atmosphere — IEC 68-2-60 TTD, Test Ke, Method C**

*Purpose*

The purpose of this test is to determine the effects of a controlled environmentally related corrosive atmosphere on the electrical connector.

*Test Method*

Mated connectors shall be tested in accordance with IEC 68-2-60 TTD, Test Ke, Method C

Relative Humidity:	75 ± 3 %
Temperature:	25 ± 2 °C
Duration:	10 days

---

**3M Electronic Solutions Division**

6801 River Place Blvd.  
Austin, TX 78726-9000



H <sub>2</sub> S:	0,1 ± 0,02 ppb
So <sub>2</sub> :	0,5 ± 0,1 ppb

### 5.3 Mechanical

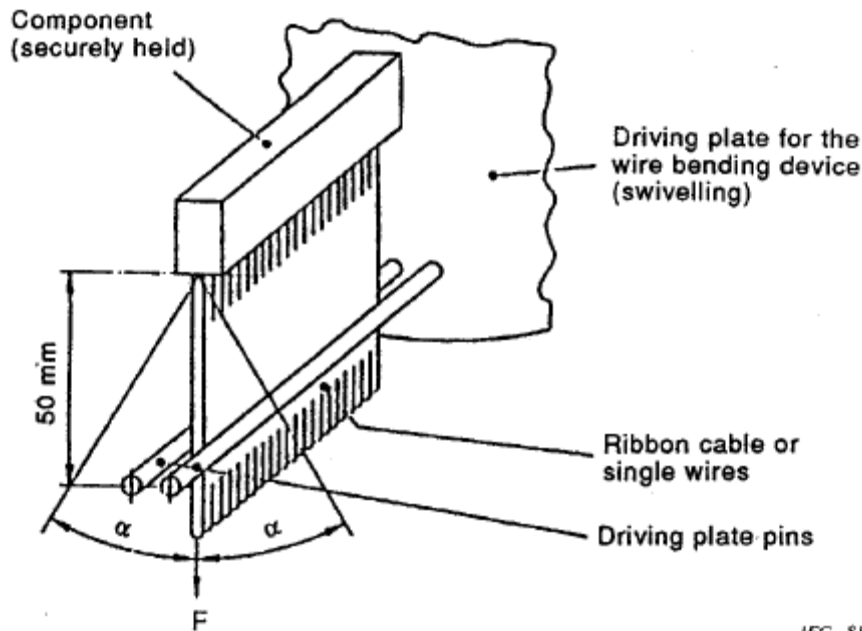
#### Bending of the cable / wire — IEC 352-4, Section 12.2.4

##### Purpose

The purpose of this test is to determine the ability of the connector to withstand the mechanical stress caused by bending the connector wire in a specified manner.

##### Test Method

The connector (see picture) shall be securely held in such a position that the wires hang along its longitudinal axis in the connection slots. An axial load  $F$  shall be applied to the free ends of the wires to keep them straight.



IEC 81094

Connectors shall be tested in accordance with IEC 68-2-60 TTD, Test Ke, Method C

Load $F$ :	5 – 10 % of breaking strength of wire
Angle $\alpha$ :	30 Degrees.
Cycles:	10

#### Microsection — IEC 352-4 Section 12.2.4

##### Purpose

The purpose of this test is to visually examine the IDC connection.

##### Test Method

Connector durability shall be tested in accordance with IEC 352-4 Section 12.2.4

### 3M Electronic Solutions Division

6801 River Place Blvd.  
 Austin, TX 78726-9000

Conductor:	Shall be located in the IDC-slot
Strands:	The deformation shall be identifiable
IDC-slot:	No damage to the beams

### Vibration — IEC 512-4 test 6d

#### *Purpose*

The purpose of this test is to determine the effects of vibration within the predominant or random vibration frequency ranges and magnitudes that may be encountered during the life of the connector.

#### *Test Method*

Mated connectors shall be tested in accordance with IEC 512-4, Test 6d

Frequency:	10 – 500 – 10 Hz
Amplitude:	0,35 mm
Acceleration:	5 G
Sweep cycles:	5
Directions:	X, Y, Z - axis

## 5.4 Electrical

### Low Level Contact Resistance — IEC 512-2 test 2a

#### *Purpose*

The purpose of this test is to evaluate contact resistance characteristics of electrical contacts under conditions where applied voltages and currents do not alter the physical contact interface or modify the conductive oxide films which may be present.

#### *Test Method*

The low-signal level contact resistance shall be tested in accordance with IEC 512-2 with circuit current of 100mA maximum and open circuit voltage of 20 mV maximum. The termination resistance includes contact to wire interface resistance, bulk resistance of contact, and resistance of solder joints of connectors to circuit boards. All readings are in milli-ohms.

### Electrical load and temperature — IEC 512-5 test 9b

#### *Purpose*

The purpose of this test is to determine the effects on the electrical and mechanical characteristics of the connector resulting from exposure of the connector to an elevated ambient temperature for a specified length of time.

#### *Test Method*

Mated connectors shall be tested in accordance with IEC 512-2, Test 9b.

Temperature:	“X” °C
Duration:	1000 hours

The temperature used during testing depends on the temperature rating from the cable / wire, as minimum value 70 °C is used.

---

## 3M Electronic Solutions Division

6801 River Place Blvd.  
Austin, TX 78726-9000

### **Important Notice**

The information we are furnishing you is being provided free of charge and is based on tests performed at 3M laboratory facilities or by our suppliers. While we believe that these test results are reliable, their accuracy or completeness is not guaranteed. Your results may vary due to differences in test types and conditions. This information is intended for use by persons with the knowledge and technical skills to analyze, handle and use such information. You must evaluate and determine whether the product is suitable for your intended application. The foregoing information is provided "AS-IS". In providing this information 3M makes no warranties regarding product use or performance, including any implied warranty of merchantability or fitness for a particular use.

### **Warranty; Limited Remedy; Limited Liability.**

3M's product warranty is stated in its Product Literature available upon request. **3M MAKES NO OTHER WARRANTIES INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** If this product is defective within the warranty period stated above, your exclusive remedy shall be, at 3M's option, to replace or repair the 3M product or refund stated above, your exclusive remedy shall be, at 3M's the purchase price of the 3M product. **Except where prohibited by law, 3M will not be liable for any indirect, special, incidental or consequential loss or damage arising from this 3M product, regardless of the legal theory asserted.**

© 3M Copyright 2010  
This document is the copyrighted property of the 3M Company and may not be reproduced without 3M written permission or used for other than 3M authorized purposes.  
3M is a trademark of the 3M Company

---

### **3M Electronic Solutions Division**

6801 River Place Blvd.  
Austin, TX 78726-9000