

**PRODUCT SPECIFICATION FOR 94512 SERIES TERMINALS  
- HIGH RELIABILITY TERMINAL -**

INDEX

**1.0 GENERAL**

- 1.1 Scope
- 1.2 Description
- 1.3 Reference Documents

**2.0 PRODUCT FEATURES**

- 2.1 Environmental Conditions
- 2.2 Aspect
- 2.3 Dimensions
- 2.4 Material
- 2.5 Surface Finish

**3.0 MECHANICAL REQUIREMENTS**

- 3.1 Insertion force and Withdrawal force
- 3.2 Crimp Tensile Strength

**4.0 PHYSICAL-CHEMICAL REQUIREMENTS**

- 4.1 Heating
- 4.2 Corrosion Resistance

**5.0 ELECTRICAL REQUIREMENTS**

- 5.1 Voltage Drop on the Crimp Barrel
- 5.2 Voltage Drop on the Connection
- 5.3 Voltage Drop on the connection after Corrosion Test

**6.0 PACKING****7.0 QUALIFICATION TEST****8.0 ACCEPTANCE CONTROL**

REVISION: <b>C1</b>	ECR/ECN INFORMATION: EC No: <b>Z2015-0006</b> DATE: <b>2014/07/18</b>	TITLE: <b>PRODUCT SPECIFICATION FOR 94512 SERIES TERMINALS - HIGH RELIABILITY TERMINAL -</b>	SHEET No. <b>1 of 10</b>
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**1.0 GENERAL**

1.1 SCOPE

This specification covers the technical features and quality requirements of the male and female quick-connect terminals.

1.2 DESCRIPTION

This document relates to the male flat 6.3 x 0.8 terminals with hole and the mating female terminals for electric connections as shown by the relevant drawings under P/Nos 94512-XXXX.

These terminals are suitable for cable crimping by means of application tooling (miniapplicator).

The terminals are manufactured in chain and wound on reels.

1.3 REFERENCE DOCUMENTS

- DIN 46249
- UNI 5687-73 (equivalent to: IEC 68-2-11 and MIL-STD 202 E method 101 D)
- ISO 8092-1 , ISO 8092-2
- IEC 760

**2.0 PRODUCT FEATURES**

2.1 ENVIRONMENTAL CONDITIONS

The environment that the parts can tolerate during transport and storage is as follows :

- temperature : from -40 °C to +80 °C
- relative humidity : from 45 % to 90 %

The operating environment of the parts is as follows :

- ambient temperature :
  - unplated and tin-plated brass terminals : -40°C ÷ 80°C max
  - unplated and tin-plated bronze terminals : -40°C ÷ 105°C max
  - unplated and nickel-plated steel terminals : -40°C ÷ 220°C max
- relative humidity : 45 % to 75 %
- corrosive ambient :
  - unplated and nickel-plated terminals : NOT SUITABLE
  - tin post-plated brass terminals : SUITABLE

REVISION: <b>C1</b>	ECR/ECN INFORMATION: EC No: <b>Z2015-0006</b> DATE: <b>2014/07/18</b>	TITLE: <b>PRODUCT SPECIFICATION FOR 94512 SERIES TERMINALS - HIGH RELIABILITY TERMINAL -</b>	SHEET No. <b>2 of 10</b>
DOCUMENT NUMBER: <b>PS 94512-002</b>	CREATED / REVISED BY: <b>L. SANTESSO</b>	CHECKED BY: <b>L. SANTESSO</b>	APPROVED BY: <b>P. ZANGIROLAMI</b>

## 2.2 ASPECT

Under visual examination the terminals shall not show evidence of defects. The surface must be free from cracks, stains, uneven plating or corrosion. Edges, cuts and holes on the terminals shall not have burrs that could affect their use and, in any case, burr dimension shall not exceed the size limits.

## 2.3 DIMENSIONS

All the dimensions of the terminals shall be within the range of tolerance indicated in the relevant drawings.

## 2.4 MATERIAL

The used raw material shall correspond to that indicated in the product drawing. In detail, the following materials are used:

- BRASS CuZn 30F43 DIN 17670
- STEEL MRSt4 K32 DIN 1624 - Fe P01 UNI 5961-67
- PHOSPHOR BRONZE CuSn4

## 2.5 SURFACE FINISH

The terminals may be supplied unplated or with a surface treatment as specified in the product drawing.

Current plating finishes are:

- copper-alloy based terminals: electrolytic tin-plating, 2  $\mu\text{m}$  min of pure tin on base material (nickel underlayer if requested )
- steel based terminals: electroless nickel-plating, 2  $\mu\text{m}$  min.

REVISION: <b>C1</b>	ECR/ECN INFORMATION: EC No: <b>Z2015-0006</b> DATE: <b>2014/07/18</b>	TITLE: <b>PRODUCT SPECIFICATION FOR 94512 SERIES TERMINALS - HIGH RELIABILITY TERMINAL -</b>	SHEET No. <b>3 of 10</b>
DOCUMENT NUMBER: <b>PS 94512-002</b>	CREATED / REVISED BY: <b>L. SANTESSO</b>	CHECKED BY: <b>L. SANTESSO</b>	APPROVED BY: <b>P. ZANGIROLAMI</b>

**3.0 MECHANICAL REQUIREMENTS**

The tests mentioned in this paragraph must be carried out under the following environmental conditions:

- temperature: 22 °C ± 3 °C
- relative humidity: 45 % to 75 %

**3.1 INSERTION FORCE AND WITHDRAWAL FORCE**

After several mating operations, a mechanically safe connection must be guaranteed between the male and female terminals. This requirement is verified by means of the following tests:

- A) Insert and withdraw a male terminal of same base material axially with respect to the female terminal 10 times, recording the 1st insertion, the 1st and 10th withdrawals.  
 A new male test tab shall be used for each female terminal tested. Use preferably a motorized push-pull tester (test speed 25 mm/min).  
 The recorded value shall not exceed the limits indicated in the following tables (force is in N):

Tab. 1 - both male and female terminals unplated:

1st INSERTION (N max)	1st WITHDRAWAL (N max)	10th WITHDRAWAL (N min)
50	60	20

Tab. 2 - plated female terminals versus male terminals, both unplated and plated:

1st INSERTION (N max)		1st WITHDRAWAL (N max)		10th WITHDRAWAL (N min)	
UNPLATED	PLATED	UNPLATED	PLATED	UNPLATED	PLATED
50	80	60	80	20	25

- B) Insertion and retention at the terminal in the housing. Terminal insertion force and retention force by pulling the terminal by the cable shall be as follows:

- INSERTION FORCE 20 N max.
- RETENTION FORCE 100 N min.

REVISION: <b>C1</b>	ECR/ECN INFORMATION: EC No: <b>Z2015-0006</b> DATE: <b>2014/07/18</b>	TITLE: <b>PRODUCT SPECIFICATION FOR 94512 SERIES TERMINALS - HIGH RELIABILITY TERMINAL -</b>	SHEET No. <b>4 of 10</b>
DOCUMENT NUMBER: <b>PS 94512-002</b>	CREATED / REVISED BY: <b>L. SANTESSO</b>	CHECKED BY: <b>L. SANTESSO</b>	APPROVED BY: <b>P. ZANGIROLAMI</b>

### 3.2 CRIMP TENSILE STRENGTH

The force needed to pull the wire out of the crimp barrel shall be over the minimum load indicated in table 3.

The insulation shall be removed to avoid its contribution in the measurements. Where more than 1 wire are to be connected to one terminal, whether male or female, the force value that has to be considered is according to the following rule:

- that of a single cable, in the case of cables of the some section.
- that of the biggest cable, in the case of cables with different sections.

The sections of the wires that can be terminated are specified in drawings of the terminals. The speed of the pulling machine must be fixed at 25 mm/min. See the relevant CRIMP SPECIFICATIONS for the recommended dimensions of the crimped sections.

Table 3:

WIRE SIZE (mm <sup>2</sup> )	MINIMUM TENSILE FORCE (N)
0.25	37
0.35	60
0.50	80
0.75	120
1.00	160
1.50	200
2.50	250
4.00	350
6.00	400

(Ref. also to DIN 46249 )

REVISION: <b>C1</b>	ECR/ECN INFORMATION: EC No: <b>Z2015-0006</b> DATE: <b>2014/07/18</b>	TITLE: <b>PRODUCT SPECIFICATION FOR 94512 SERIES TERMINALS - HIGH RELIABILITY TERMINAL -</b>	SHEET No. <b>5 of 10</b>
DOCUMENT NUMBER: <b>PS 94512-002</b>	CREATED / REVISED BY: <b>L. SANTESSO</b>	CHECKED BY: <b>L. SANTESSO</b>	APPROVED BY: <b>P. ZANGIROLAMI</b>

#### 4.0 PHYSICAL - CHEMICAL REQUIREMENTS

##### 4.1 HEATING

The test shall be carried out at a room temperature of 22 °C to 30 °C.

The temperature rising measured on the terminal shall not exceed the values indicated in table 4.

The test is performed by putting a male/female connection crimped to the specified cables, under an alternating current having the intensity given in table 4.

The over-heating on the contact area and on the crimp barrel is then recorded by means of a thin wire thermocouple or thermal blisters (with  $\pm 1$  °C precision).

In the case of unplated terminals, a temperature rise up to 20 % above the values given below is acceptable.

Table 4:

CURRENT INTENSITY (A)	$\Delta T$ (°C) versus wire size (mm <sup>2</sup> )								
	size 0,25	size 0,35	size 0,5	size 0,75	size 1,0	size 1,5	size 2,5	size 4,0	size 6,0
4	15	10	-	-	-	-	-	-	-
5	25	20	18	12	10	-	-	-	-
10	-	-	-	35	30 (55)	22 (45)	16 (35)	-	-
15	-	-	-	60	55 (85)	40 (70)	32 (55)	-	15
20	-	-	-	-	85	60 (110)	50 (85)	30	25
25	-	-	-	-	-	-	60	40	30

$\Delta T$  = temperature rise of the hottest point over room temperature (the figures within brackets refer to steel terminals).

##### 4.2 CORROSION RESISTANCE

This test shall be performed on tin post-plated terminals only.

Terminals shall be submitted to test in a chamber containing salt fog with a concentration of 5% NaCl for 24 hours.

The chamber must conform to the UNI 5687 standard.

After the test, no sign of oxidation must appear on the samples, except for spots that are easily removed with a dry cloth.

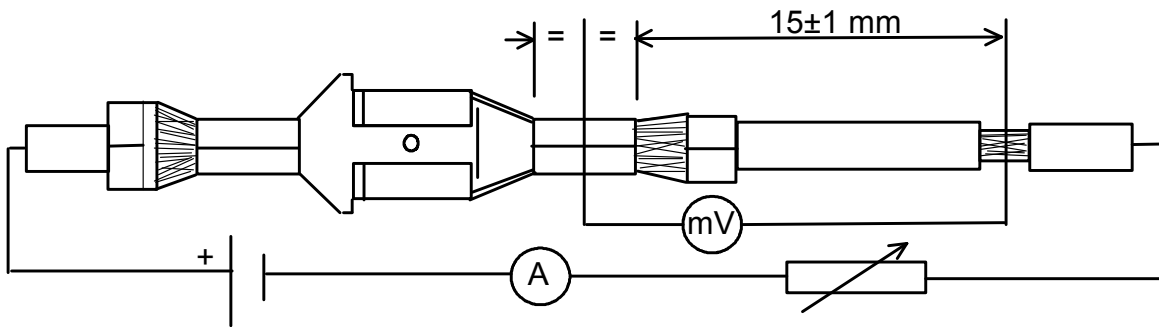
REVISION: <b>C1</b>	ECR/ECN INFORMATION: EC No: <b>Z2015-0006</b> DATE: <b>2014/07/18</b>	TITLE: <b>PRODUCT SPECIFICATION FOR 94512 SERIES TERMINALS - HIGH RELIABILITY TERMINAL -</b>	SHEET No. <b>6 of 10</b>
DOCUMENT NUMBER: <b>PS 94512-002</b>	CREATED / REVISED BY: <b>L. SANTESSO</b>	CHECKED BY: <b>L. SANTESSO</b>	APPROVED BY: <b>P. ZANGIROLAMI</b>

**5.0 ELECTRICAL REQUIREMENTS**

**5.1 VOLTAGE DROP ON THE CRIMP BARREL**

The test is performed at a current density of 10 A/mm<sup>2</sup> wire section.

The voltage drop is measured after 30 sec. with the voltmeter probes placed as shown in the following diagram:



The maximum acceptable values are indicated in the following table (current intensity: A , voltage drop: mV ):

Tab 5:

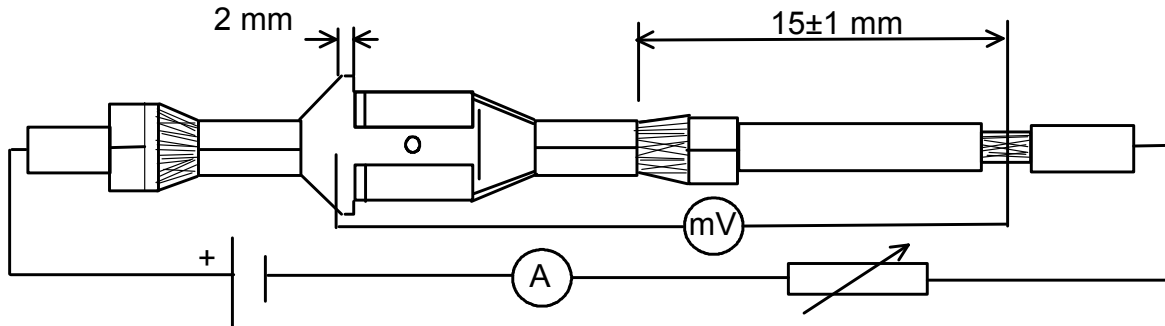
WIRE SIZE (mm <sup>2</sup> )	CURRENT INTENSITY (A)	VOLTAGE DROP (mV max)
0,25	3	3
0,35	4	3
0,5	5	4
0,75	8	5
1,0	10	6 (10)
1,5	15	7 (15)
2,5	20	9 (20)
4,0	25	12
6,0	32	15

(the figures within brackets refer to steel terminals)

REVISION: <b>C1</b>	ECR/ECN INFORMATION: <b>EC No: Z2015-0006</b> <b>DATE: 2014/07/18</b>	TITLE: <b>PRODUCT SPECIFICATION FOR 94512 SERIES TERMINALS - HIGH RELIABILITY TERMINAL -</b>	SHEET No. <b>7 of 10</b>
DOCUMENT NUMBER: <b>PS 94512-002</b>	CREATED / REVISED BY: <b>L. SANTESSO</b>	CHECKED BY: <b>L. SANTESSO</b>	APPROVED BY: <b>P. ZANGIROLAMI</b>

5.2 VOLTAGE DROP ON THE CONNECTION

This test is performed in the same way as above (see the diagram below).



The maximum acceptable values are as per the following table:

Tab. 6:

WIRE SIZE (mm <sup>2</sup> )	CURRENT INTENSITY (A)	VOLTAGE DROP (mV max)
0,25	3	7
0,35	4	7
0,5	5	9
0,75	8	12
1,0	10	15 (60)
1,5	15	20 (100)
2,5	20	25 (20)
4,0	25	35
6,0	32	40

(the figures within brackets refer to steel terminals)

5.3 VOLTAGE DROP ON THE CONNECTION AFTER CORROSION TEST

This test shall be performed on tin post-plated terminals only.

The voltage drop measurement is taken as in paragraph 5.2, after keeping the mated male-female terminals in the salt fog chamber for 96 hours.

Once removed from the chamber, the terminals must be cleaned in distilled water and left to rest for 24 hours at room temperature.

The values recorded shall not result over 50% of the initial values.

Note: the electrical tests described above may be replaced by other methods described in the DIN standard No. 46249, following the requirements indicated, for an equivalent classification at the components.

REVISION: <b>C1</b>	ECR/ECN INFORMATION: EC No: <b>Z2015-0006</b> DATE: <b>2014/07/18</b>	TITLE: <b>PRODUCT SPECIFICATION FOR 94512 SERIES TERMINALS - HIGH RELIABILITY TERMINAL -</b>	SHEET No. <b>8 of 10</b>
DOCUMENT NUMBER: <b>PS 94512-002</b>	CREATED / REVISED BY: <b>L. SANTESSO</b>	CHECKED BY: <b>L. SANTESSO</b>	APPROVED BY: <b>P. ZANGIROLAMI</b>



## 6.0 PACKAGING

The terminals, which are produced in chain, are delivered wound on reels with sizes and winding direction suitable for the applicator to be used.

It is allowed max one free break on each reel, to be marked outside with a red label.

The percentage of reels with interruption shall be not over the 5% of reels in the same production lot.

The strips must also have the end fixed in order to avoid problems during the various operations (transport, stocking ...).

The following indication must be given on the label on the reel flange:

- Name and/or trademark of the supplier (for each reel).
- MOLEX-ZETRONIC P/N .
- Quantity.
- Date of manufacture (day, month, year). It can follow a code as per according with the customer.
- Other possible information required by the customer.

## 7.0 QUALIFICATION TESTS

In order to achieve a product qualification, all the above mentioned tests must be carried out with positive results on at least 30 pieces per trial.

If any feature should result negative, the faulty component must be replaced with another 5 ones which must undergo all the tests from the start.

No more than two replacements are permitted during the whole testing program. Other qualification methods may be agreed upon with the customer.

REVISION: <b>C1</b>	ECR/ECN INFORMATION: EC No: <b>Z2015-0006</b> DATE: <b>2014/07/18</b>	TITLE: <b>PRODUCT SPECIFICATION FOR 94512 SERIES TERMINALS - HIGH RELIABILITY TERMINAL -</b>	SHEET No. <b>9 of 10</b>
DOCUMENT NUMBER: <b>PS 94512-002</b>	CREATED / REVISED BY: <b>L. SANTESSO</b>	CHECKED BY: <b>L. SANTESSO</b>	APPROVED BY: <b>P. ZANGIROLAMI</b>

## 8.0 ACCEPTANCE CONTROL

Each manufactured lot will undergo to the statistical check according to MIL - STD 105 D, with the SIMPLE sampling method and 2nd control level.  
The parameters and criteria are indicated below:

Tab. 7:

CHARACTERISTICS	AQL
<b>MANUFACTURING CHARACTERISTICS</b> - dimensional control (only functional dimensions) - Visual control	0,4 1,5
<b>MECHANICAL CHARACTERISTICS</b> - Insertion force - Withdrawal force	1 1
<b>ELECTRICAL CHARACTERISTICS</b> - Voltage drop	1
<b>SURFACE CHARACTERISTICS</b> - Corrosion resistance	0,65

REVISION: <b>C1</b>	ECR/ECN INFORMATION: EC No: <b>Z2015-0006</b> DATE: <b>2014/07/18</b>	TITLE: <b>PRODUCT SPECIFICATION FOR 94512 SERIES TERMINALS - HIGH RELIABILITY TERMINAL -</b>	SHEET No. <b>10 of 10</b>
DOCUMENT NUMBER: <b>PS 94512-002</b>	CREATED / REVISED BY: <b>L. SANTESSO</b>	CHECKED BY: <b>L. SANTESSO</b>	APPROVED BY: <b>P. ZANGIROLAMI</b>