AMP CO Plus Insert for Cat. 6_A applications

1. INTRODUCTION

1.1 Purpose

Testing was performed on AMP CO Plus Insert for Cat. 6_A applications, to determine its conformance to the requirements of **CommScope** Product Specification 108-93039, Rev. F.

1.2 Scope

This report covers the electrical, mechanical, environmental and transmission performance of the AMP CO Plus Insert for Cat. 6_A applications manufactured by **CommScope**.
The testing was performed between February 1st and November 5th, 2010.

1.3 Conclusion

Tested AMP CO Plus Inserts for Cat. 6_A applications meet the electrical, mechanical, environmental and transmission performance requirements of **CommScope** Product Specification 108-93039, Rev. F.

1.4 Product Description

The AMP CO Plus Insert for Cat. 6_A applications is an assembly used to provide an universal connection interface between premise wiring of an office and the user's network of communications equipment (for data and voice networking systems).

1.5 Test Samples

Tested samples were randomly selected from pre-production and normal current production lots, and the following part numbers (PN) were used for tests:

39 samples of INSERT CAT6a 1x RJ45 T568A	PN 1711796
24 samples of INSERT CAT6a 10/100BT-ISDN AMP CO	PN 1711804
6 samples of INSERT CAT6a 2x 10/100BT AMP CO	PN 1711801
6 samples of INSERT CAT6a 2x ISDN AMP CO	PN 1711807

1.6 Qualification Test Sequence

	Test Group							
	1 (b)	2	3	4 (b)	5 (b)	6 (c)	7 (b)	8 (c)
	Test Sequence (a)							
Examination of product	1, 11	1, 11	1, 3	1, 12	1, 4	1, 11	1, 18	1, 14
ELECTRICAL								
Contact resistance	2, 10	2, 10		2, 10		2, 10		
Input-output resistance	3, 9	3, 9		3, 9		3, 9		
Insulation resistance	4, 8	4, 8		4, 8		4, 8		
Dielectric withstanding voltage	5, 7	5, 7		5, 7		5, 7		
Current carrying capacity			2					
TRANSMISSION								
Insertion loss (conn. hardware config.)							2	
Return loss (conn. hardware config.)							3	
NEXT loss (conn. hardware config.)							4	
FEXT loss (conn. hardware config.)							5	
Transverse conversion loss							6	
Transverse conversion transfer loss							7	
Transfer impedance (conn. hardware config.)				11				
Coupling attenuation (conn. hardware config.)					3			
Insertion loss (link. config.)							8, 17	2, 13
Return loss (link. config.)							9, 16	3, 12
NEXT loss (link. config.)							10, 15	4, 11
ACR-F (link. config.)							11	5
PS NEXT (link. config.)							12	6
PS ACR-F (link. config.)							13	7
PS ANEXT (link. config.)								8
PS AACR-F (link. config.)								9
MECHANICAL								
Sinusoidal vibration	6							
ENVIRONMENTAL								
Stress relaxation				6	2	6	14	10
Flowing mixed gas corrosion		6						

(a) Numbers indicate sequence in which tests are performed
(b) Test sequence for AMP CO Insert Cat. 6_A 1x RJ45
(c) Test sequence for AMP CO Insert Cat. 6_A 10/100BT & ISDN, Cat. 6_A 2x 10/100BT and Cat. 6_A 2x ISDN

2. SUMMARY OF TESTING

2.1 Examination of product – All Groups.

All samples submitted for testing were selected from normal current production lots. They were inspected and accepted by the product Assurance Department.

2.2 Contact Resistance – Groups 1, 2, 4 and 6.

All contact resistance measured values with low level method were lower than 20 mOhm (maximum specified value).

2.3 Input-Output Resistance – Groups 1, 2, 4 and 6.

All termination resistance measured values with low level method were lower than 200 mOhm (maximum specified value).
All shield termination resistance measured values with low level method were lower than 100 mOhm (maximum specified value).

2.4 Insulation Resistance – Groups 1, 2, 4 and 6.

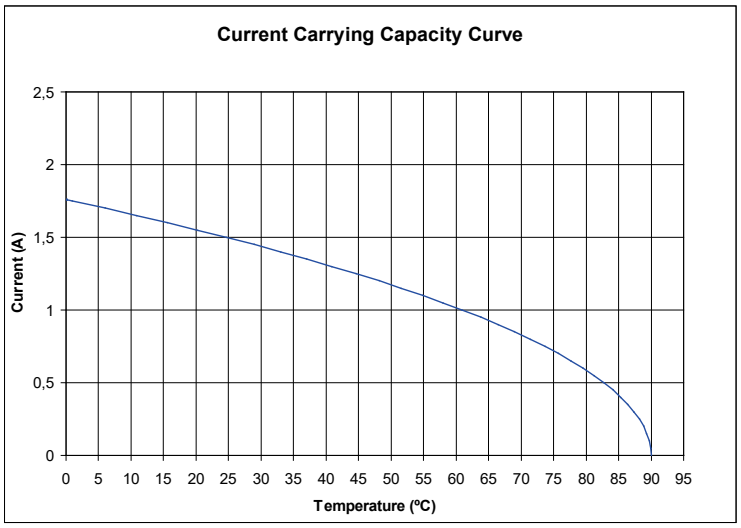
All insulation resistance measured values were higher than $5 \cdot 10^8$ Ω (minimum specified value):

2.5 Dielectric withstanding voltage – Groups 1, 2, 4 and 6.

No dielectric breakdown or flashover occurred during the test, having applied 1500 V_{AC} Peak between contacts and shield and 1000 V_{AC} Peak between adjacent contacts, 1 minute hold and 2mA max. leakage current.

2.6 Current Carrying Capacity – Group 3.

The maximum permissible current for a given ambient temperature (t) that samples can drive is $I(t) = 1.76\ (1-(t/90))^{0.5}$.



2.7 Transmission Tests – Insertion Loss (conn. hardware config.) – Group 7.

Samples tested meet the requirements of Transmission tests for Cat 6_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.8 Transmission Tests – Return Loss (conn. hardware config.) – Group 7.

Samples tested meet the requirements of Transmission tests for Cat 6_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.9 Transmission Tests – NEXT Loss (conn. hardware config.) – Group 7.

Samples tested meet the requirements of Transmission tests for Cat 6_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.10 Transmission Tests – FEXT Loss (conn. hardware config.) – Group 7.

Samples tested meet the requirements of Transmission tests for Cat 6_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.11 Transmission Tests – Transverse conversion loss– Group 7.

Samples tested meet the requirements of Transmission tests for Cat 6_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.12 Transmission Tests – Transverse conversion transfer loss– Group 7.

Samples tested meet the requirements of Transmission tests for Cat 6_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.13 Transmission Tests – Transfer impedance (conn. hardware config.) – Group 4.

Samples tested meet the requirements of Transmission tests for Cat 6_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.14 Transmission Tests – Coupling attenuation (conn. hardware config.) – Group 5.

Samples tested meet the requirements of Transmission tests for Cat 6_A according to ISO 11801 Ed. 2.1 Amd2 and related standards.

2.15 Transmission Tests – Insertion Loss (link config.) – Groups 7 and 8.

Samples tested meet the requirements of Transmission tests for Class E_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.16 Transmission Tests – Return Loss (link config.) – Groups 7 and 8.

Samples tested meet the requirements of Transmission tests for Class E_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.17 Transmission Tests – NEXT Loss (link config.) – Groups 7 and 8.

Samples tested meet the requirements of Transmission tests for Class E_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.18 Transmission Tests – ACR-F Loss (link config.) – Groups 7 and 8.

Samples tested meet the requirements of Transmission tests for Class E_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.19 Transmission Tests – PS NEXT (link config.) – Groups 7 and 8.

Samples tested meet the requirements of Transmission tests for Class E_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.20 Transmission Tests –PS ACR-F (link config.) – Groups 7 and 8.

Samples tested meet the requirements of Transmission tests for Class E_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.21 Transmission Tests – PS ANEXT (link config.) – Group 8.

Samples tested meet the requirements of Transmission tests for Class E_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.22 Transmission Tests – PS AACR-F (link config.) – Group 8.

Samples tested meet the requirements of Transmission tests for Class E_A according to ISO 11801 Ed. 2.1 Amd2, TIA-568-B.2-10 and related standards.

2.23 Sinusoidal vibration – Group 1.

No discontinuities equal or greater than 10 microseconds were detected.
All tested samples meet visual requirements, show no physical damages and meet the requirements of additional tests specified in test sequence.

2.24 Stress Relaxation – Groups 4, 5, 6, 7 and 8.

All tested samples meet visual requirements, show no physical damages and meet the requirements of additional tests specified in test sequence.

2.25 Flowing mixed gas corrosion – Group 2.

All tested samples meet visual requirements, show no physical damages and meet the requirements of additional tests specified in test sequence.

3. TESTS METHODS

3.1 Examination of product (Reference Standard: IEC 60512-1-1, Ed. 1 Feb 02).

Product drawings and inspections plans were used to examine the samples. They were examined visually and functionally.

3.2 Contact Resistance (Reference Standard: IEC 60512-2-1, Ed. 1 Feb 02).

Contact Resistance measurements were done between indicated points, at low level current using four terminal technique (Figure 1).

$$R = R_{AD} - (R_{AB} + R_{CD})$$

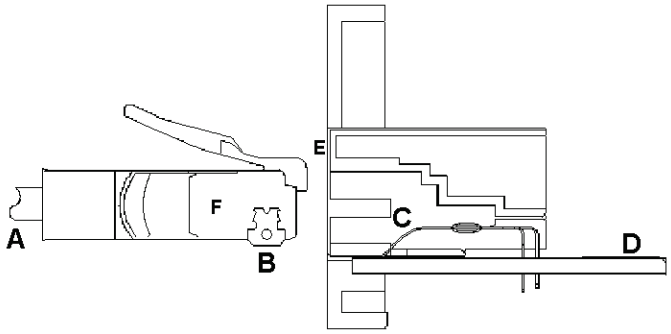


Figure 1.

3.3 Input-Output Resistance (Reference Standard: IEC 60512-2-1, Ed. 1 Feb 02).

Input Output Resistance measurements at low level current were made using four terminal technique (Figure 2).

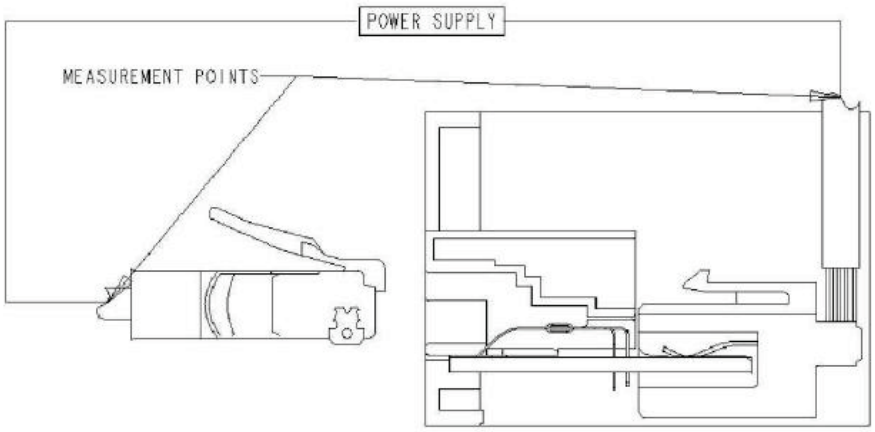


Figure 2.

3.4 Insulation Resistance (Reference Standard: IEC 60512-3-1, Ed. 1 Feb 02)

Insulation Resistance was measured between adjacent contacts and between contacts and shield using a megaohmmeter applying 100 V DC.

3.5 Dielectric Withstanding Voltage (Reference Standard: IEC 60512-4-1, Ed. 1 May 03).

A 1000 V DC or AC peak voltage was applied between adjacent contacts during 60 s.
A 1500 V DC or AC peak voltage was applied between contacts and shield during 60 s.
Maximum leakage current was set to 2 mA.

3.6 Current Carrying Capacity (Reference Standard: IEC 60512-5-2, Ed. 1 Feb 02).

The contact temperature at several current steps was measured. The maximum allowed temperature minus the measured temperature increase was plotted vs. current.

3.7 Insertion Loss, IL (conn. hardware config.) (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Insertion Loss (IL) was measured according to the standard ISO 11801 Ed 2.0 Sep/2002 and TIA-568-B.2-10 at GHMT AG Laboratory (GHMT AG Laboratory Test Report p2374a-10E).

3.8 Return Loss, RL (conn. hardware config.) (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Return Loss (RL) was measured according to the standard ISO 11801 Ed 2.0 Sep/2002 and TIA-568-B.2-10 at GHMT AG Laboratory (GHMT AG Laboratory Test Report p2374a-10E).

3.9 Near End crosstalk Loss, NEXT, loss (conn. hardware config.) (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Near End crosstalk Loss, NEXT, loss was measured according to the standard ISO 11801 Ed 2.0 Sep/2002 and TIA-568-B.2-10 at GHMT AG Laboratory (GHMT AG Laboratory Test Report p2374a-10E).

3.10 Far End crosstalk Loss, FEXT, loss (conn. hardware config.) (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Far End crosstalk Loss, FEXT, loss was measured according to the standard ISO 11801 Ed 2.0 Sep/2002 and TIA-568-B.2-10 at GHMT AG Laboratory (GHMT AG Laboratory Test Report p2374a-10E).

3.11 Transverse conversion loss, TCL (conn. hardware config.) (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Transverse conversion loss, TCL was measured according to the standard ISO 11801 Ed 2.0 Sep/2002 and TIA-568-B.2-10.

3.12 Transverse conversion transfer loss, TCTL (conn. hardware config.) (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Transverse conversion transfer loss, TCTL was measured according to the standard ISO 11801 Ed 2.0 Sep/2002 and TIA-568-B.2-10.

3.13 Transfer Impedance (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Transfer Impedance was measured according to the standard ISO 11801 Ed. 2.1 Amd2 and related standards.

3.14 Coupling attenuation (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Coupling Attenuation was measured according to the standard ISO 11801 Ed. 2.1 Amd2.

3.15 Insertion Loss, IL (link config.) (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Insertion Loss (IL) was measured according to the standard ISO 11801 Ed 2.0 Sep/2002.

3.16 Return Loss, RL (link config.) (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Return Loss (RL) was measured according to the standard ISO 11801 Ed 2.0 Sep/2002.

3.17 Near End crosstalk Loss, NEXT, loss (link config.) (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Near End crosstalk Loss, NEXT, loss was measured according to the standard ISO 11801 Ed 2.0 Sep/2002.

3.18 Attenuation crosstalk ratio at far end, ACR-F (link config.) (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Attenuation crosstalk ratio at far end, ACR-F, loss was measured according to the standard ISO 11801 Ed 2.0 Sep/2002.

3.19 Power Sum near end crosstalk, PS NEXT, loss (link config.) (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Power Sum near end crosstalk, PS NEXT, loss was measured according to the standard ISO 11801 Ed 2.0 Sep/2002.

3.20 Power Sum attenuation crosstalk ratio at far end, PS ACR-F, loss (link config.) (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Power Sum attenuation crosstalk ratio at far end, PS ACR-F, loss was measured according to the standard ISO 11801 Ed 2.0 Sep/2002.

3.21 Power Sum alien near end crosstalk, PS ANEXT, loss (link config.) (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Power Sum alien near end crosstalk, PS ANEXT, loss was measured according to the standard ISO 11801 Ed 2.0 Sep/2002.

3.22 Power sum attenuation to alien crosstalk ratio at far end, PS AACR-F (link config.) (Reference Standard: ISO 11801 Ed. 2.1 Amd2).

Power sum attenuation to alien crosstalk ratio at far end, PS AACR-F was measured according to the standard ISO 11801 Ed 2.0 Sep/2002.

3.23 Sinusoidal Vibration (Reference Standard: IEC 60512-6-4, Ed. 1 Feb 02).

Samples mated were subjected to sinusoidal motion with frequency range of 10 to 500 Hz with displacement amplitude of 0.7 mm peak to peak. Were performed 10 sweep cycles per each direction on the 3 perpendicular axes. Total duration: 2 hours per axis. It is not allowed any discontinuity equal or greater than 10 microseconds.

3.24 Stress Relaxation (Reference Standard: IEC 60512-5, Test 9b).

Mated samples were placed into an oven at 70º C for 500 h.
Half of samples connected to 0.5 A and the other half not connected.

3.25 Flowing mixed gas corrosion (Reference Standard: IEC 60512-11-7, Ed. 2 May 03).

Samples were placed during 4 days in a chamber with:
SO_2 = 0.5 ppm (Volume).
H_2S = 0.1ppm (Volume).
T = 25º C +/-2º C, HR = 75 % +/-3 %.
Half of samples mated. Half of the samples unmated.