NETCONNECT* Enhanced Category 5 System

1. SCOPE

1.1. Content

This specification covers performance, test, and quality requirements for components used in the NETCONNECT* warranted cabling systems. These components are used to conduct systems testing and consist of cable, modular jacks, modular plugs, patch panels and patch cables. The systems will be configured and tested in the long and short channel and link configurations shown in Figures 2 through 10.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan(s) and product drawing(s). All cables, connectors and connecting hardware comprising the system must first be qualified to the applicable 108 Series specification before being entered into this qualification.

1.3. Qualification Test Results

Successful qualification testing on the subject product line was completed on 11Nov98. The Qualification Test Report number for this testing is 501-467. This documentation is on file at and available from Global Engineering and Manufacturing Standards (GEMS).

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. AMP Documents

A.	102-2308:	NETCONNECT Warranted Part Number Approval Procedure
B.	114-44002:	NETCONNECT Warranted Systems List
C.	114-44003:	NETCONNECT Warranted Applications List
D.	501-467:	Qualification Test Report

2.2. Commercial Standards

A.	EN50173, 1996:	Performance Requirements of General Cabling Schemes
B.	ISO/IEC 11801, 1995(E):	Information Technology - Generic Cabling For Customer Premises
C.	TIA/EIA-568-A, Oct 1995:	Commercial Building Telecommunications Cabling Standards
D.	TIA/EIA TSB67, Oct. 1995:	Transmission Performance Specifications For Field Testing Of Unshielded Twisted Pair Cabling Systems
E.	TIA/EIA TSB75, Aug. 1996:	Additional Horizontal Cabling Practices for Open Offices

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3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Materials

Materials used in the construction of this product shall be as specified on the applicable product drawing(s).

3.3. Ratings

Ratings shall be as specified on the applicable products drawing(s).

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environment conditions.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Product verification.	Meets requirements of product drawing.	Certification.
ELECTRICAL		
Attenuation.	See Figure 9.	TIA/EIA-568-A. Test all pairs at each end.
Near-end crosstalk, (NEXT).	See Figure 9.	Standards Proposal No. 4195-A, Proposed Addendum No. 5 to TIA/EIA-568-A. Test all pair combinations at each end.
Power sum near-end crosstalk, (PS NEXT).	See Figure 9.	Standards Proposal No. 4195-A, Proposed Addendum No. 5 to TIA/EIA-568-A. Test all pair combinations at each end.
Equal-level far-end crosstalk, (ELFEXT).	See Figure 9.	Standards Proposal No. 4195-A, Proposed Addendum No. 5 to TIA/EIA-568-A. Test all pair combinations at each end.
Power sum equal-level far-end crosstalk, (PS ELFEXT).	See Figure 9.	Standards Proposal No. 4195-A, Proposed Addendum No. 5 to TIA/EIA-568-A. Test all pair combinations at each end.

Figure 1 (cont)

Test Description	Requirement	Procedure
Return loss.	See Figure 9.	Standards Proposal No. 4195-A, Proposed Addendum No. 5 to TIA/EIA-568-A. Test all pair combinations at each end.
Attenuation-to-crosstalk ratio, (ACR).	See Figure 9.	Calculation: NEXT - Attenuation
Power sum attenuation-to-crosstalk ratio, (PS ACR).	See Figure 9.	Calculation: PS NEXT - Attenuation
Propagation delay.	Channel: < 555ns at 10 MHz. Link: < 518ns at 10 MHz.	Standards Proposal No. 4195-A, Proposed Addendum No. 5 to TIA/EIA-568-A. Test long length channel and link only.
Delay skew.	Channel: < 50ns at 10 MHz. Link: < 45ns at 10 MHz.	Standards Proposal No. 4195-A, Proposed Addendum No. 5 to TIA/EIA-568-A. Test long length channel and link only.

Figure 1 (end)

3.6.   Qualification and Requalification Test Sequence

Since all tests contained in Figure 1 are non-destructive, the sequence of testing may vary.

4.   QUALITY ASSURANCE PROVISIONS

4.1.   Qualification Testing

A.   Sample Selection

Test samples and link components shall be selected randomly from three (3) different production lots and be prepared in accordance with applicable instruction sheets. Documentation verifying that all components meet or exceed applicable product specifications and product drawings shall be submitted before link testing. Test matrix shall be determined by the Initiating Division, Americas Regional Laboratory (ARL) and the Premises Systems Engineering Division.

B.   Test Sequence

Qualification inspection shall be verified by testing samples as specified in Figure 1.

4.2.   Requalification Testing

If changes significantly affect form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequences 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 the product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before submittal. Upon acceptance, product shall be placed in AMP Specification 114-44002.

4.4.   Quality Conformance Inspection

Applicable AMP 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.

5.   EXAMPLE TEST CONFIGURATIONS

5.1.   System Test Cable Lengths

Cable lengths shall meet those specified in Figure 2 when a four (4) connector channel and three (3) connector link test configuration (using a transition point) is required. Likewise, cable lengths shall meet those specified in Figure 3 when a three (3) connector channel and two (2) connector link test configuration (using a work area outlet or multi-user outlet) is required. The cable lengths specified in Figure 4 are used only to measure attenuation in a three (3) connector long channel (multi-user outlet) configuration.

Cable Identification	Four Connector Channel (Figure 5)		Three Connector Link (Figure 6)	
	Long (meters)	Short (meters)	Long (meters)	Short (meters)
Horizontal Cable	75	15	75	15
Transition Cable	15	15	15	15
Equipment Cable	2	2	---	---
Patch Cable	2	2	---	---
Work Area Cable	6	2	---	---

Figure 2

Cable Identification	Three Connector Channel (Figure 7)		Two Connector Link (Figure 8)	
	Long (meters)	Short (meters)	Long (meters)	Short (meters)
Horizontal Cable	75	15	75	15
Equipment Cable	2	2	---	---
Patch Cable	2	2	---	---
Work Area Cable	15	2	---	---

Figure 3

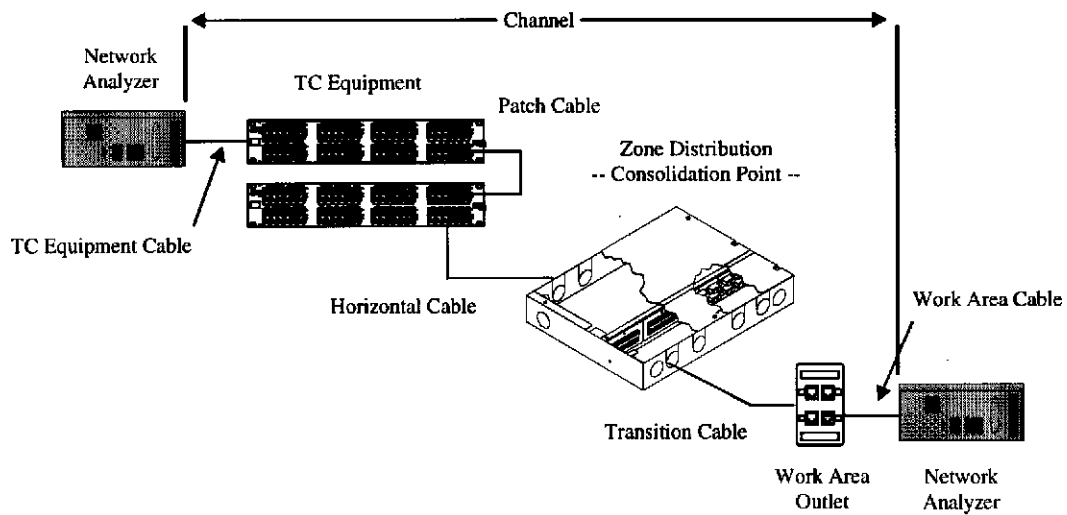| Cable Identification	Three Connector Channel (Figure 7)	
	Long (meters)	Short (meters)
Horizontal Cable	70	---
Equipment Cable	2	---
Patch Cable	2	---
Work Area Cable	20	---

Figure 4

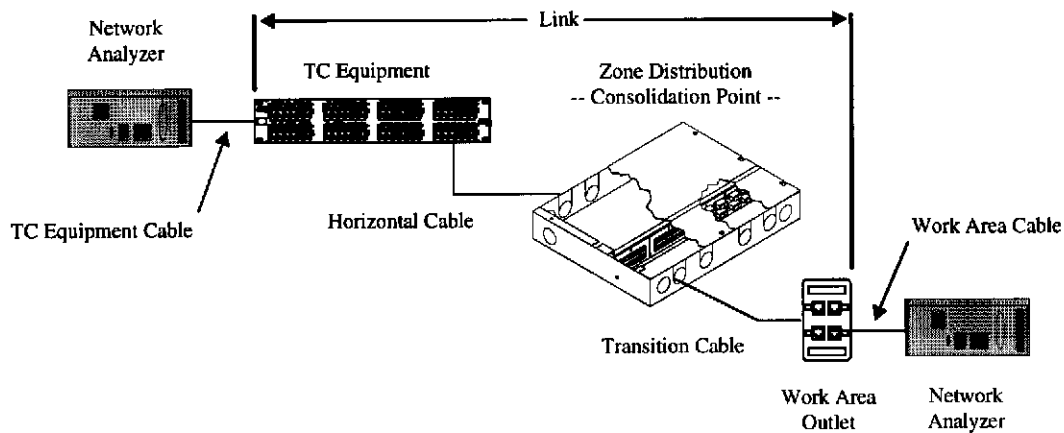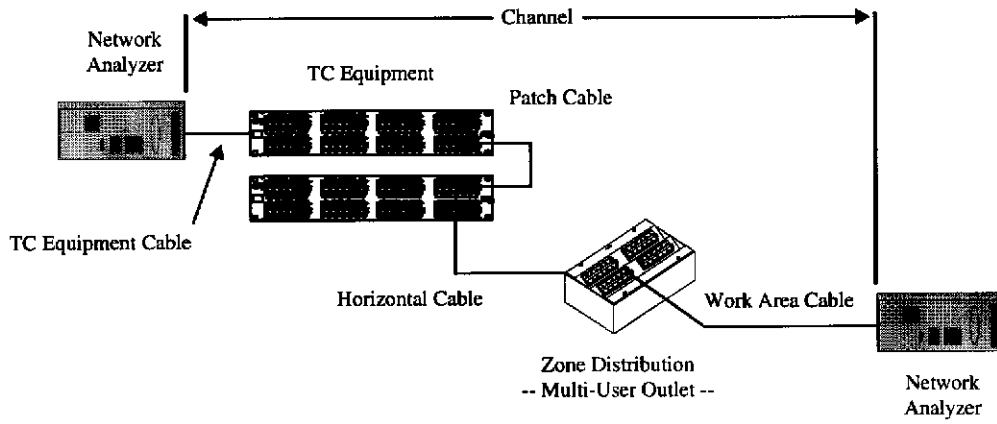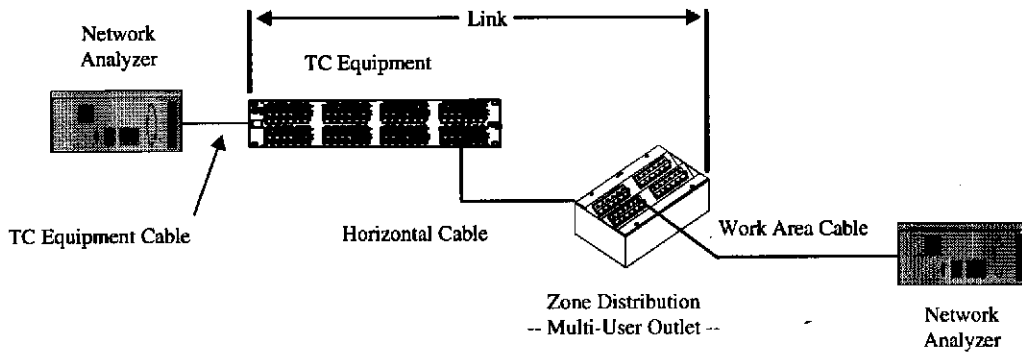## 5.2.   System Test Configurations

Figure 5

Figure 6

Figure 7

Figure 8

5.3.   System Test Specification Limits

Channel Specification Limits

Frequency (MHz) (a)	Attenuation (dB) (b)	NEXT (dB) (c)	PS NEXT (dB) (d)	ELFEXT (dB) (e)	PS ELFEXT (dB) (f)	Return Loss (dB) (g)	ACR (dB) (h)	PS ACR (dB) (I)	Prop Delay (ns) (j)	Skew (ns) (k)
1.0	2.5	63.3	60.0	57.4	54.4	17	60.8	57.5	-	-
4.0	4.5	53.6	50.9	45.3	42.4	17	49.1	46.4	-	-
8.0	6.3	48.6	45.7	39.3	36.3	17	42.3	39.4	-	-
10.0	7.0	47.0	44.1	37.4	34.4	17	40.0	37.1	<555	<50
16.0	9.2	43.6	40.6	33.3	30.3	17	34.4	31.4	-	-
20.0	10.3	42.0	39.0	31.4	28.4	17	31.7	28.7	-	-
25.0	11.4	40.4	37.3	29.4	26.4	16	29.0	25.9	-	-
31.25	12.8	38.7	35.7	27.5	24.5	15	25.9	22.9	-	-
62.5	18.5	33.6	30.6	21.5	18.5	12	15.1	12.1	-	-
100.0	24.0	30.1	27.1	17.4	14.4	10	6.1	3.1	-	-

Link Specification Limits

Frequency (MHz) (a)	Attenuation (dB) (b)	NEXT (dB) (c)	PS NEXT (dB) (d)	ELFEXT (dB) (e)	PS ELFEXT (dB) (f)	Return Loss (dB) (g)	Prop Delay (ns) (j)	Skew (ns) (k)
1.0	2.1	64.2	60.0	60.0	57.0	17	-	-
4.0	4.0	54.8	52.0	48.0	45.0	17	-	-
8.0	5.7	50.0	47.1	41.9	38.9	17	-	-
10.0	6.3	48.5	45.6	40.0	37.0	17	<518	<45
16.0	8.2	45.2	42.2	35.9	32.9	17	-	-
20.0	9.2	43.7	40.7	34.0	31.0	17	-	-
25.0	10.3	42.1	39.1	32.0	29.0	16	-	-
31.25	11.5	40.6	37.5	30.1	27.1	16	-	-
62.5	16.7	35.7	32.6	24.1	21.1	14	-	-
100.0	21.6	32.3	29.3	20.0	17.0	12	-	-

NOTE

(a)   TIA/EIA TSB67, October 1995.

(b)   Table 1/2 of TIA/EIA TSB67, October 1995.

(c)   Table 3/4 of Standards Proposal No. 4195-A, Proposed Addendum No. 5 to TIA/EIA-568-A, August 25, 1998.

(d)   Table 6/7 of Standards Proposal No. 4195-A, Proposed Addendum No. 5 to TIA/EIA-568-A, August 25, 1998.

(e)   Table 10/11 of Standards Proposal No. 4195-A, Proposed Addendum No. 5 to TIA/EIA-568-A, August 25, 1998.

(f)   Table 13/14 of Standards Proposal No. 4195-A, Proposed Addendum No. 5 to TIA/EIA-568-A, August 25, 1998.

(g)   Table 17/18 of Standards Proposal No. 4195-A, Proposed Addendum No. 5 to TIA/EIA-568-A, August 25, 1998.

(h)   Calculation: ACR = NEXT - Attenuation.

(I)   Calculation: PS ACR = PS NEXT - Attenuation.

(j)   Section 5.4 of Standards Proposal No. 4195-A, Proposed Addendum No. 5 to TIA/EIA-568-A, August 25 ,1998.

(k)   Section 5.5 of Standards Proposal No. 4195-A, Proposed Addendum No. 5 to TIA/EIA-568-A, August 25 ,1998.

Figure 9