



REPORT INTERTEK TESTING SERVICES, INC.

3933 US ROUTE 11, CORTLAND, NEW YORK 13045

ORDER NO.: J20015851-406

DATE: June 29, 2001

REPORT NO.: J20015851-001

RENDERED TO:

Fluke Corporation
6920 Seaway Blvd.
Everett, WA 98203

TEST: Performance Verification testing to the Level IIe and Level III requirements of EIA/TIA 568-B.2 for Cat. 5e, and EIA/TIA 568-B.2-1 Cat. 6, Draft 9.

STATEMENT OF LIMITATIONS: At the client's request, the purpose of this report is to provide electrical performance data on the test sample. It is not valid to use this report for any other purpose.

STANDARDS USED:

ASTM D4566-98, dated December 10, 1998, Standard Test Methods for Electrical Performance Properties of Insulations and Jackets for Telecommunications Wire and Cable

TIA/EIA-568-B.2-1 Draft 9, dated June 19, 2001, Transmission Performance Specifications for 4 Pair, 100 Ω Category 6 Cabling.

TIA/EIA-568-B.2 dated March 13, 2001, Transmission Performance Specifications for 4-Pair, 100 Ω Category 5e Cabling.

AUTHORIZATION: The tests were authorized by Mr. Chip Weaver, representing the client, the Fluke Corporation, with Purchase Order number 154123.

SPECIMEN DESCRIPTION: The client supplied two sets of DSP-4100 Field Test Instruments, serial numbers: 07882002 and 07883020.

DATE OF TEST: June 19th through June 29th, 2001.

EQUIPMENT LIST:

The following equipment was employed in conducting the tests.

<u>Equipment Used</u>	<u>Model Number</u>	<u>Calibration Date</u>
Hewlett Packard Network/Spectrum Analyzer	HP4396A	02/26/01
Hewlett Packard S-Parameter Test Set	HP87511A	02/26/01
Rhode & Schwartz RF Step Attenuator	NA	NA

PROCEDURE, REQUIREMENTS AND RESULTS:**I. Phase I**

The scope of this phase was to determine compliance to Annex I of TIA/EIA 568-B.2 for Level IIe, and Annex B of TIA/EIA 568-B.2-1, Cat. 6, Draft 9 for Level III accuracy. The testing was witnessed by an ITS representative at the client's facility, located at 6920 Seaway Blvd. Everett, WA 98203. The procedures and results, as provided by the client, for this phase are contained in Appendix A of this report. The requirements referenced for compliance are contained in Annex I of TIA/EIA 568-B.2 for Level IIe and Annex B of TIA/EIA 568-B.2-1, Cat. 6, Draft 9 for Level III accuracy.

II. Phase II

The scope of this phase was to determine the correlation of the product tested compared to a Network Analyzer. Comparison measurements were made for Attenuation, Near End Crosstalk (NEXT), Return Loss (RL) and Equal Level Far End Crosstalk (ELFEXT) from 1 – 250 MHz. The testing was witnessed by an ITS representative at the client's facility. The procedures and results, as provided by the client, for this phase are contained in Appendix B of this report. The requirements for the comparison are derived from the accuracy of the field tester and the network analyzer. The accuracies shown here were calculated using TIA and minimum compliant field tester error models.

Three Cat 6 permanent link models were used as reference standards, including a thirty (30) meter, sixty (60) meter and a ninety (90) meter. The parameters referenced in Phase II were measured as indicated here after. The client supplied various lab test fixtures, including custom test loads, adapters, and BH baluns connected to an HP 4396A Network Analyzer.

Computed Measurement Accuracy for the Level III Compliant Field Tester

Accuracy In dB	Baseline and Permanent Link @ PL Limits				Channel @ Channel Limits			
	1 MHz	10 MHz	100 MHz	250 MHz	1 MHz	10 MHz	100 MHz	250 MHz
Insertion Loss	1.0	1.0	1.2	1.9	1.0	1.0	1.4	2.5
NEXT	1.8	1.5	1.8	2.8	1.9	2.1	2.9	4.2
PS NEXT	2.0	1.7	2.0	2.9	2.1	2.4	3.2	4.5
ELFEXT	2.2	1.5	1.8	3.1	3.0	2.9	3.3	4.6
PS ELFEXT	2.4	1.5	1.9	3.2	3.4	3.2	3.6	4.9
RL	2.8	3.9	2.8	2.5	4.1	4.4	2.8	3.8

Computed Measurement Accuracy for the Network Analyzer Test Configuration

Accuracy In dB	Baseline @ PL Limits				Permanent Link @ PL Limits				Channel @ Channel Limits			
	1	10	100	250	1	10	100	250	1	10	100	250
Insertion Loss	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.4
NEXT	0.2	0.3	0.4	0.8	0.2	0.3	0.4	0.8	0.2	0.3	0.4	0.6
PS NEXT	0.2	0.3	0.4	0.8	0.2	0.3	0.4	0.8	0.2	0.3	0.4	0.8
ELFEXT	0.3	0.3	0.5	0.9	0.3	0.3	0.5	0.9	0.3	0.3	0.5	0.9
PS ELFEXT	0.3	0.3	0.5	0.9	0.3	0.3	0.5	0.9	0.3	0.3	0.5	0.9
RL	0.7	0.9	0.7	0.8	0.7	0.9	0.7	0.8	0.7	0.7	0.6	0.7

PROCEDURES, REQUIREMENTS AND RESULTS (continued):

IV. Measurements

Attenuation

The Attenuation of the four conductor pairs was measured in accordance with ASTM D4566-98, Paragraph 26. Losses due to reflection, radiation, etc. are assumed to be part of the attenuation.

NEXT

NEXT measurements were made between the six combinations of the four conductor pairs, from both ends, in accordance with ASTM D4566-98, Paragraph 24.

FEXT

FEXT was measured on twelve permutations of four conductor pairs, from one end only, in accordance with ASTM D 4566-98, Paragraph 25.

Return Loss

Return Loss was measured from both ends in accordance with ASTM D4566-98, Paragraph 45.3.

TEST RESULTS

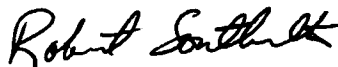
Refer to Appendix A for Phase I test results.
Refer to Appendix B for Phase II test results.
Refer to Appendix C for the Fluke test procedures.

CONCLUSION:

The Field Test Unit, as previously described and supplied by the client, was tested in accordance with the procedures contained herein, and did comply with the indicated applicable requirements for Level IIe and Level III for Baseline, Permanent Link and Channel* configurations.

The Fluke hand held field test unit model numbers covered by this report include the DSP-4000, and DSP-4100.

Reviewed and Approved By:



Robert Southworth
Laboratory Supervisor
Communications Products



Kathy Bishop
Program Administrator
Communications Products

*Using $54-20\log(f/100)$ for Residual FEXT Limit on channel configuration.