

Test Intention:

In test 4888 we want to investigate the lifespan of our new CFROBOT8.PLUS.045 prototype in a torsion application.

Client:

Name: Martin Göllner Team: chainflex® Date: 22.11.2013

Order-Info:

Customer / No.: igus® GmbH, Spicher Str.1a, 51147 Köln

Series / No: CFROBOT8.PLUS

Installation type: Torsion ± 180°

Customer test: Yes No

Development test: Yes No

Technical data

Target & Examination

e-chain® type: TRC.100 // TRC.70

Cable length [m]: 10,0

Torsion angle: ±180°

Optical check:

Stroke [m]: 1,0

Function check:

Ambient temperature [°C]: approx. 25°C

Standard measuring:

Target [Cycles]: **Lifespan**

AutΩMeS:

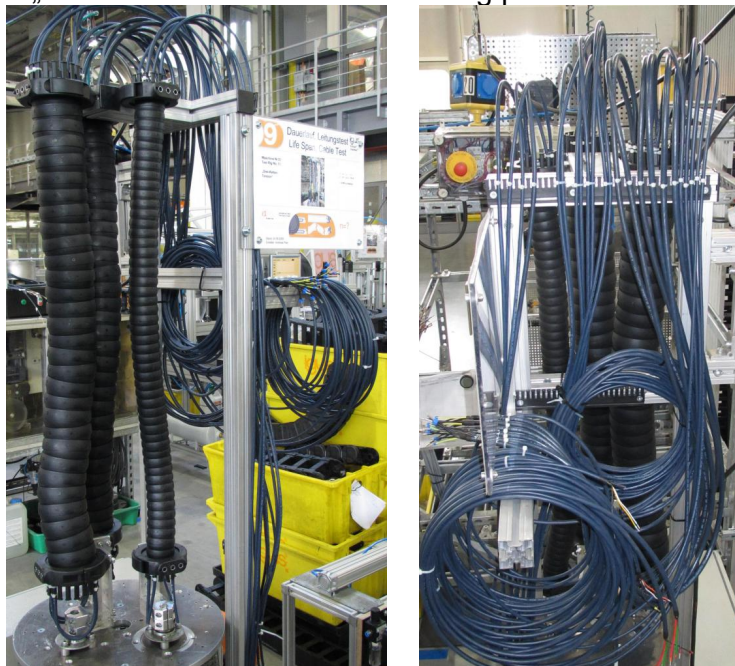
Experimental setup

Checklist for the experimental preparations

- additional inscription/label at all wires
- strain reliefs at both ends of the chain
- correct electrical connection of all wires
- radius was marked at the cables and the energy chain

1. Construction:

This test is built up on the „Drei Ketten Torsion“. The following picture shows the test structure:



2. Cable and hose packages:

No. 2: 3x CFROBOT8.PLUS.045 with the cable marking
 01548m igus chainflex CFROBOT8.PLUS.045 (4x2x0,15)C E310776 A cRUus AWM Style 20236
 VW-1 AWM I/II A/B 80°C 30V FT-1 CE A P/DI DESINA 100OHM Ethernet/CAT5e conform RoHS-II
 conform www.igus.de

3. Description of the cable construction:

Special chainflex prototype

4. Remarks:

The following chart gives an overview regarding the test parameters:

Cable no.	Cable type	External diameter [mm]	Torsion
2.X	CFROBOT8.PLUS.045	7,2	± 180°

Cable no.	Cable type	Counter reading		Effectively tested cycles
		... mounting	... demounting	
2.1	CFROBOT8.PLUS.045	0	Still running	15.941.749
2.2	CFROBOT8.PLUS.045	0	Still running	15.941.749

Test-order was checked by ... [Martin Göllner or Rainer Rössel and further employee]

Date:	29.11.2013	Name:		Name:	Christian Mittelstedt
-------	-------------------	-------	--	-------	------------------------------

Result

Start report 02.12.2013:

At the 02.12.2013 we started the test 4888 at a counter reading of 0 cycles, we will measure the ohmic resistance regularly.

The following Fluke protocols show the condition of the cables after 15.941.749 cycles



Cable ID: 4888-2.1

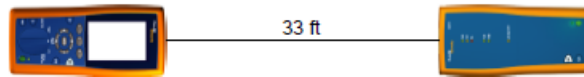
Date / Time: 10/13/2015 09:39:01 AM
Headroom 10.8 dB (NEXT 12-36)
Test Limit: ISO11801 Channel Class D
Cable Type: Cat 5e FTP
Calibration Date: 11/13/2014

Operator: S.MENNER
Software Version: 2.7400
Limits Version: 1.9300
NVP: 69.0%

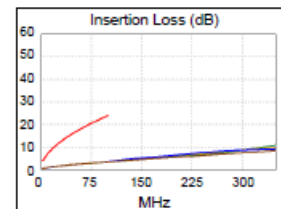
Test Summary: PASS

Model: DTX-ELT
Main S/N: 9751011
Remote S/N: 9751012
Main Adapter: DTX-CHA002
Remote Adapter: DTX-CHA002

Length (ft)	[Pair 12]	33
Prop. Delay (ns), Limit 555	[Pair 78]	51
Delay Skew (ns), Limit 50	[Pair 78]	2
Resistance (ohms), Limit 25.0	[Pair 78]	3.7
Insertion Loss Margin (dB)	[Pair 45]	20.5
Frequency (MHz)	[Pair 45]	100.0
Limit (dB)	[Pair 45]	24.0

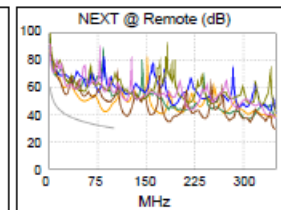
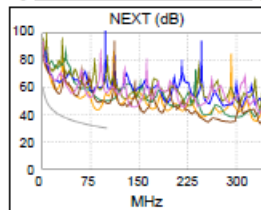


Wire Map (T568A)
PASS

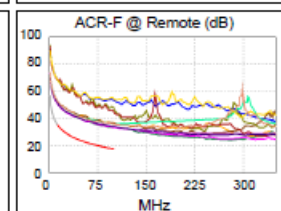
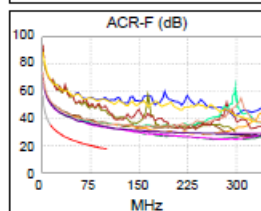


Worst Case Margin Worst Case Value

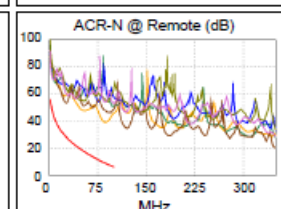
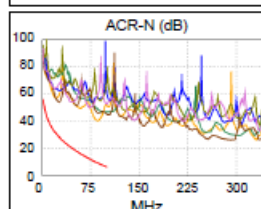
N/A	MAIN	SR	MAIN	SR
Worst Pair	12-36	12-36	12-36	12-36
NEXT (dB)	12.0	10.8	12.0	10.8
Freq. (MHz)	85.5	85.5	85.5	85.5
Limit (dB)	31.3	31.3	31.3	31.3
Worst Pair	36	36	36	36
PS NEXT (dB)	13.9	13.2	13.9	13.2
Freq. (MHz)	85.5	85.5	85.5	86.3
Limit (dB)	28.3	28.3	28.3	28.2



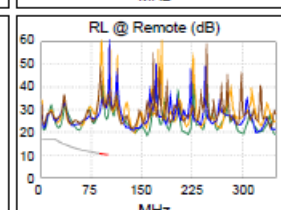
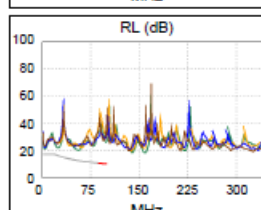
PASS	MAIN	SR	MAIN	SR
Worst Pair	12-45	12-45	12-45	12-45
ACR-F (dB)	15.2	15.2	15.6	15.7
Freq. (MHz)	24.6	2.8	99.3	99.3
Limit (dB)	29.6	48.6	17.5	17.5
Worst Pair	12	45	45	45
PS ACR-F (dB)	16.1	16.1	16.5	16.8
Freq. (MHz)	1.6	1.6	99.3	99.0
Limit (dB)	50.2	50.2	14.5	14.5



PASS	MAIN	SR	MAIN	SR
Worst Pair	36-45	45-78	12-36	12-36
ACR-N (dB)	25.2	24.3	31.1	29.9
Freq. (MHz)	24.5	3.9	85.5	85.5
Limit (dB)	29.2	49.3	9.2	9.2
Worst Pair	36	45	36	36
PS ACR-N (dB)	25.8	25.5	33.0	32.4
Freq. (MHz)	20.5	3.8	85.5	86.3
Limit (dB)	28.5	46.6	6.2	6.0



PASS	MAIN	SR	MAIN	SR
Worst Pair	78	78	78	78
RL (dB)	13.9	14.1	13.9	14.1
Freq. (MHz)	78.8	78.8	78.8	78.8
Limit (dB)	11.0	11.0	11.0	11.0



Compliant Network Standards:
10BASE-T 100BASE-TX 100BASE-T4
1000BASE-T ATM-25 ATM-51
ATM-155 100V/G-AnyLan TR-4
TR-16 Active TR-16 Passive

For internal use only

The managing data show the results of the accomplished examinations. With all data it still acts neither around one or more warranties of certain characteristics around one or more warranties regarding the suitability of a product for a certain targeted application, since the examinations on laboratory conditions took place. The warranty of certain characteristics of the products and/or their suitability for a certain application requires writing in the confirmation of order. Finally we recommend user-specific measurements under genuine operating conditions.



Cable ID: 4888-2.2

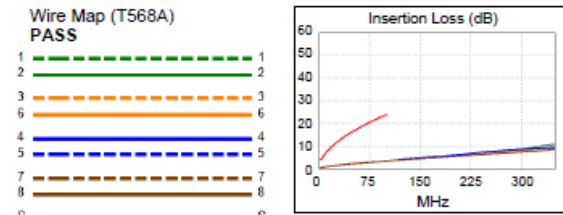
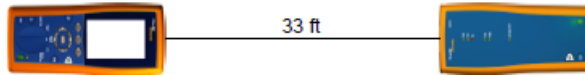
Date / Time: 10/13/2015 09:40:25 AM
 Headroom 11.8 dB (NEXT 36-45)
 Test Limit: ISO11801 Channel Class D
 Cable Type: Cat 5e FTP
 Calibration Date: 11/13/2014

Operator: S.MENNER
 Software Version: 2.7400
 Limits Version: 1.9300
 NVP: 69.0%

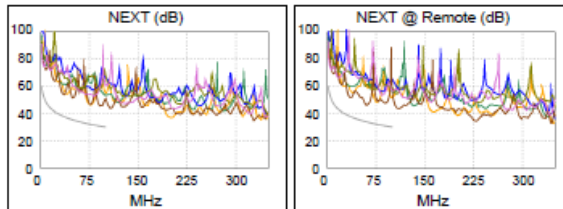
Test Summary: PASS

Model: DTX-ELT
 Main S/N: 9751011
 Remote S/N: 9751012
 Main Adapter: DTX-CHA002
 Remote Adapter: DTX-CHA002

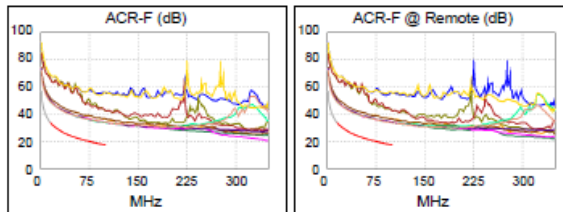
Length (ft)	[Pair 12]	33
Prop. Delay (ns), Limit 555	[Pair 78]	51
Delay Skew (ns), Limit 50	[Pair 78]	2
Resistance (ohms), Limit 25.0	[Pair 78]	2.8
Insertion Loss Margin (dB)	[Pair 45]	20.6
Frequency (MHz)	[Pair 45]	100.0
Limit (dB)	[Pair 45]	24.0



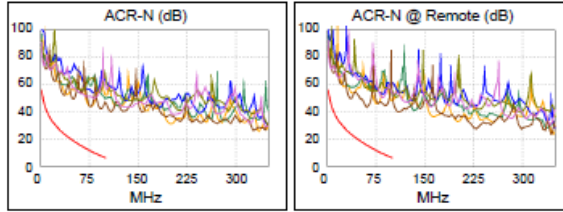
	Worst Case Margin		Worst Case Value	
N/A	MAIN	SR	MAIN	SR
Worst Pair	12-36	36-45	36-45	36-45
NEXT (dB)	14.3	11.8	14.5	11.8
Freq. (MHz)	75.5	60.8	91.8	60.8
Limit (dB)	32.2	33.8	30.7	33.8
Worst Pair	36	36	36	36
PS NEXT (dB)	14.4	14.5	14.4	14.5
Freq. (MHz)	75.8	60.8	76.3	60.8
Limit (dB)	29.2	30.8	29.1	30.8



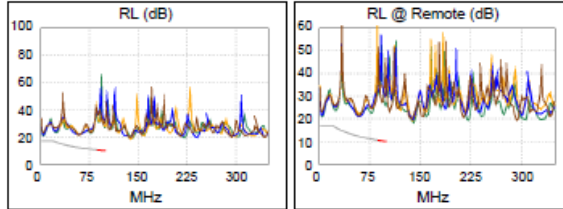
PASS	MAIN	SR	MAIN	SR
Worst Pair	45-78	45-78	45-78	78-45
ACR-F (dB)	15.1	15.1	16.3	16.3
Freq. (MHz)	1.5	1.5	98.5	98.8
Limit (dB)	53.9	53.9	17.5	17.5
Worst Pair	45	45	45	45
PS ACR-F (dB)	15.2	15.2	16.2	16.1
Freq. (MHz)	1.5	1.5	99.5	98.5
Limit (dB)	50.9	50.9	14.4	14.5



PASS	MAIN	SR	MAIN	SR
Worst Pair	45-78	12-36	36-45	36-45
ACR-N (dB)	25.8	24.8	34.3	27.6
Freq. (MHz)	3.1	1.6	91.8	60.8
Limit (dB)	51.3	55.9	7.8	15.5
Worst Pair	45	36	36	36
PS ACR-N (dB)	26.7	26.2	32.5	34.6
Freq. (MHz)	3.1	1.6	77.0	77.3
Limit (dB)	48.3	52.9	8.2	8.1



PASS	MAIN	SR	MAIN	SR
Worst Pair	78	78	78	78
RL (dB)	13.1	13.6	13.1	13.6
Freq. (MHz)	79.5	79.5	79.5	79.5
Limit (dB)	11.0	11.0	11.0	11.0



Compliant Network Standards:
 10BASE-T 100BASE-TX 100BASE-T4
 1000BASE-T ATM-25 ATM-51
 ATM-155 100VG-AnyLan TR-4
 TR-16 Active TR-16 Passive