Test-Order chainflex®

Test No.: **4428**

Test Intention:
In test 4428 we want to investigate maximum tensile force of CFSPECIAL.182.045 comparing to CFBUS.045.

Client:		
Name: Rainer Roessel	Team: chainflex®	Date: 19.09.2012

Order-Info:	
Customer/ No.: igus® GmbH, Spicher Str.1a 51147 Köln	
Series / No: CFSPECIAL, CFBUS	Installation type: vertical hanging
Customer test: Yes ☐ No ☒	Development test: Yes ☒ No ☐

Technical data		**Target & Examination**	
e-chain® type:	-/-	Cable length [m]:	5,0
e-chain® radius [mm]:	-/-	Target:	**Maximum tensile force**
Stroke [m]:	-/-	Optical check:	☒
Ambient temperature [°C]:	approx. 25°C	Fluke DTX-ELT:	☒

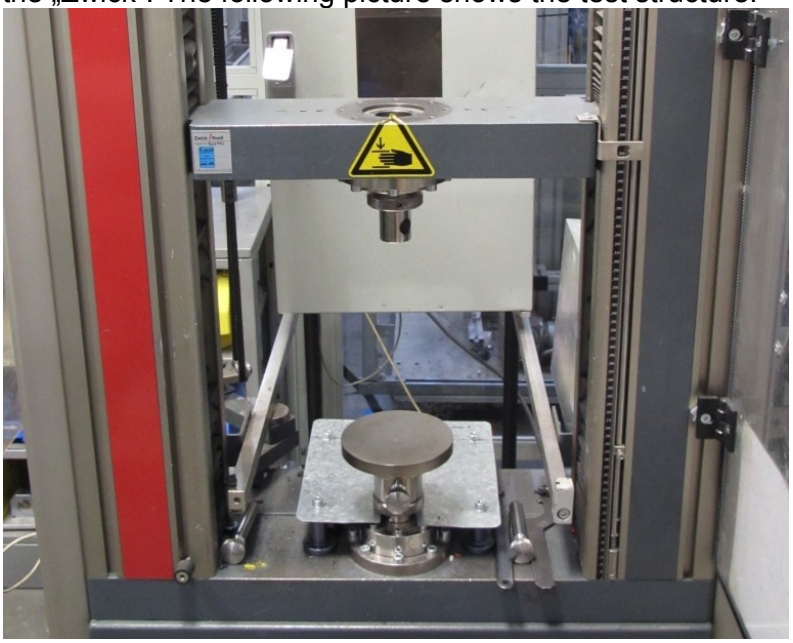
Experimental setup (Sketch, Photo ...)

Checklist for the experimental preparations

- ☐ additional inscription/label at all wires
- ☒ strain reliefs at both ends
- ☒ 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 „Zwick“. The following picture shows the test structure:



2. Cable and hose packages:

No. 1: **1x CFSPECIAL.182.045** with the cable marking
00831m igus chainflex CFSPECIAL.182.045 (4x2x0,15)C E310776 N CSAUus AWM Style 20236 VW-1 AWM I/II A/B 80°C 30V FT-1 CE N O/CJ Ethernet/CAT5 conform RoHS-II conform www.igus.de

No. 2: **1x CFBUS.045** with the cable marking
013380m igus CHAINFLEX CFBUS.045 (4x2x0,15)C E310776 CSAUus AWM Style 21371 VW1 AWM I/II A/B 80°C 30V FT-1 CE N N/DH DESINA Ethernet/CAT5 conform RoHS conform www.igus.de

3. Description of the cable construction:

CFSPECIAL.182.045 ready-made with CAT9040020
CFBUS.045 ready-made with CAT9240020

4. Remarks:

We install each cable sample with one of the strain reliefs and pull them with 100N. After pulling it, we will make a function check with the Fluke DTX-ELT. We will repeat the procedure and raise the tensile force in certain steps until the function of the samples isn't given any more.

The following chart gives an overview regarding the test parameters:

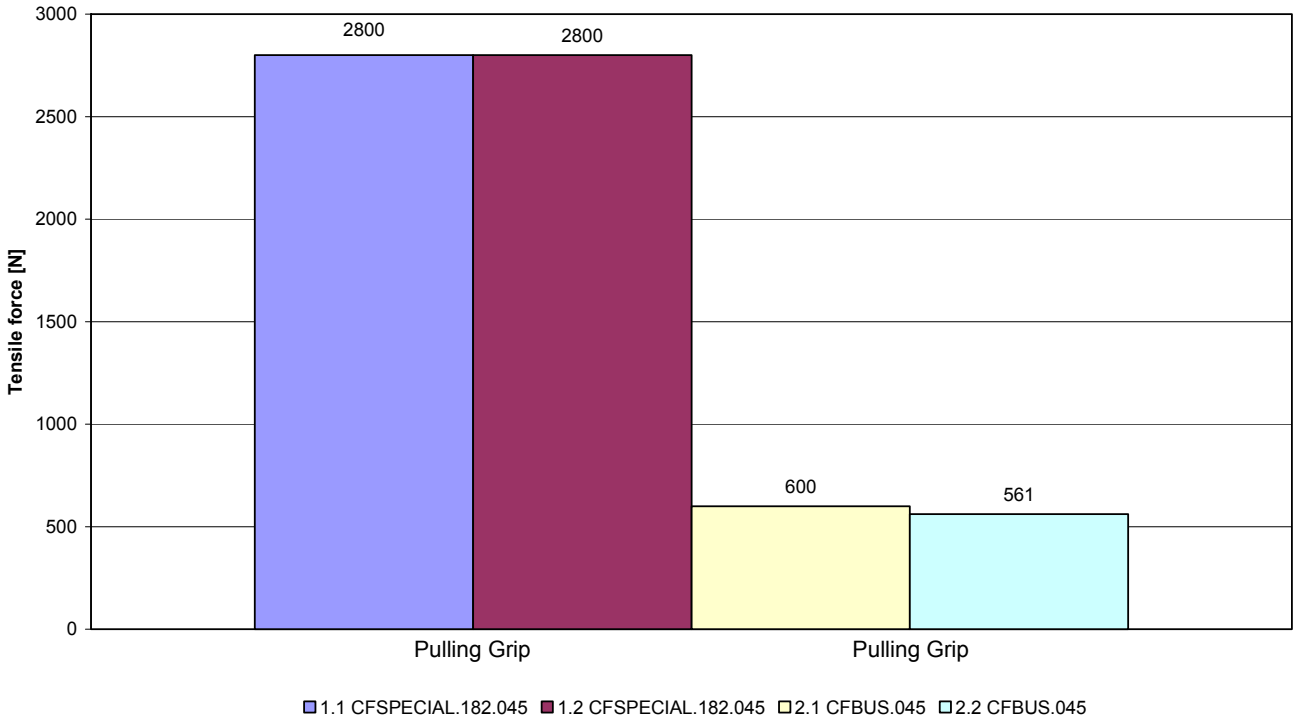
Cable no.	Cable type	Outer diameter [mm]	Strain relief	Tested tensile force [N]
1.1	CFSPECIAL.182.045	9,4	Pulling grip	2800
1.2	CFSPECIAL.182.045	9,4	Pulling grip	2800
2.1	CFBUS.045	7,9	Pulling grip	600
2.2	CFBUS.045	7,9	Pulling grip	561

The following diagram shows the result of the maximum tensile force test:

chainflex cable works

Diagram of the maximum tensile force

igus® qualitäts management



LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: 4428-1.1-2800N

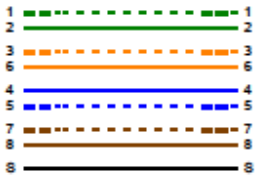
Test Summary: PASS

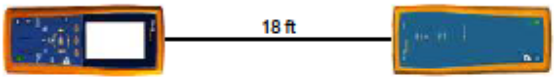
Date / Time: 10/11/2012 09:43:27am
Headroom: 22.3 dB (NEXT 36-45)
Test Limit: ISO11801 Channel Class D
Cable Type: Cat 5e FTP

Operator: CF
Software Version: 2.5200
Limits Version: 1.7000
NVP: 69.0%

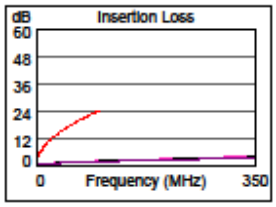
Model: DTX-ELT
Main S/N: 1924028
Remote S/N: 1924029
Main Adapter: DTX-CHA002
Remote Adapter: DTX-CHA002

Wire Map (T568A)
PASS

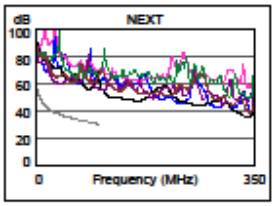


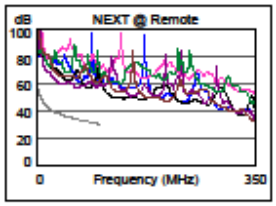


Length (ft)	[Pair 12]	18
Prop. Delay (ns), Limit 555		27
Delay Skew (ns), Limit 50		1
Resistance (ohms), Limit 25.0		1.3
Insertion Loss Margin (dB)	[Pair 36]	22.3
Frequency (MHz)	[Pair 36]	100.0
Limit (dB)	[Pair 36]	24.0

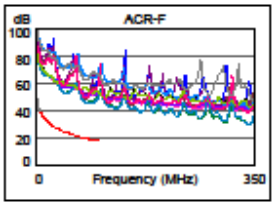


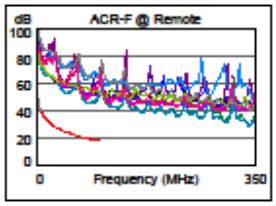
	Worst Case Margin		Worst Case Value	
N/A	MAIN	SR	MAIN	SR
Worst Pair	36-45	36-45	12-78	36-45
NEXT (dB)	22.4	22.3	23.8	23.2
Freq. (MHz)	34.0	34.5	86.0	64.8
Limit (dB)	38.1	38.0	31.2	33.3
Worst Pair	45	45	78	36
PS NEXT (dB)	24.0	24.3	25.7	25.3
Freq. (MHz)	32.8	34.5	85.8	66.5
Limit (dB)	35.4	35.0	28.2	30.1



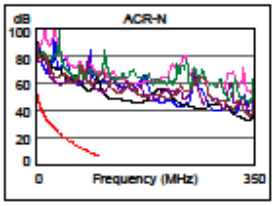


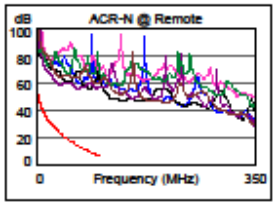
PASS	MAIN	SR	MAIN	SR
Worst Pair	45-36	36-45	45-36	36-45
ACR-F (dB)	26.4	26.5	26.9	27.0
Freq. (MHz)	81.5	81.5	89.3	89.3
Limit (dB)	19.2	19.2	18.4	18.4
Worst Pair	36	36	36	36
PS ACR-F (dB)	27.1	27.1	27.1	27.1
Freq. (MHz)	81.5	80.5	81.5	80.5
Limit (dB)	16.2	16.3	16.2	16.3



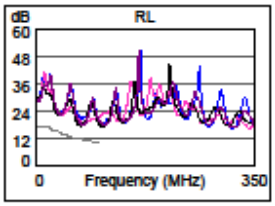


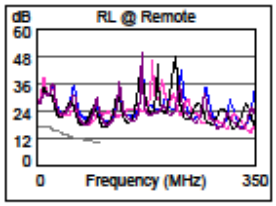
PASS	MAIN	SR	MAIN	SR
Worst Pair	36-45	12-36	12-78	36-45
ACR-N (dB)	27.8	29.7	44.6	40.8
Freq. (MHz)	3.0	1.8	86.0	64.8
Limit (dB)	51.6	55.4	9.1	14.4
Worst Pair	36	36	78	36
PS ACR-N (dB)	28.2	29.5	46.5	43.2
Freq. (MHz)	1.6	1.8	85.8	66.5
Limit (dB)	52.9	52.4	6.1	10.9





N/A	MAIN	SR	MAIN	SR
Worst Pair	45	45	45	45
RL (dB)	5.8	6.1	5.8	6.1
Freq. (MHz)	71.3	72.8	72.3	72.8
Limit (dB)	11.5	11.4	11.4	11.4





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	

LinkWare Version 6.0

Project: 4428
Site: IGUS

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LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: 4428-2.1-600N

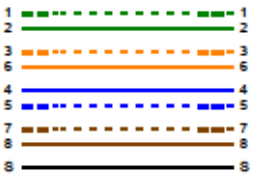
Test Summary: PASS

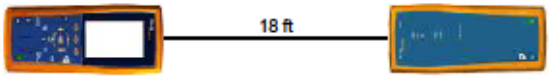
Date / Time: 10/12/2012 02:06:52pm
Headroom: 16.8 dB (NEXT 12-78)
Test Limit: ISO11801 Channel Class D
Cable Type: Cat 5e FTP

Operator: CF
Software Version: 2.5200
Limits Version: 1.7000
NVP: 69.0%

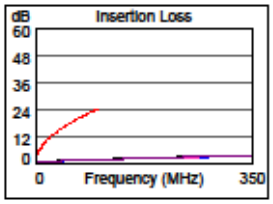
Model: DTX-ELT
Main S/N: 9751011
Remote S/N: 9751012
Main Adapter: DTX-CHA002
Remote Adapter: DTX-CHA002

Wire Map (T568A)
PASS

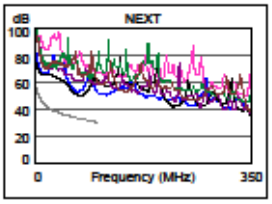


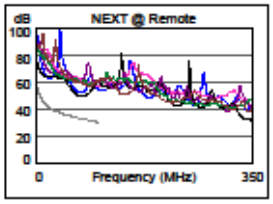


Length (ft)	[Pair 12]	18
Prop. Delay (ns), Limit 555		27
Delay Skew (ns), Limit 50		1
Resistance (ohms), Limit 25.0		1.2
Insertion Loss Margin (dB)	[Pair 45]	22.5
Frequency (MHz)	[Pair 45]	100.0
Limit (dB)	[Pair 45]	24.0

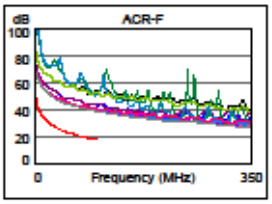


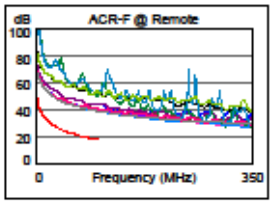
	Worst Case Margin		Worst Case Value	
N/A	MAIN	SR	MAIN	SR
Worst Pair	12-78	12-78	12-78	12-78
NEXT (dB)	17.2	16.8	17.2	16.8
Freq. (MHz)	70.8	71.8	74.3	71.8
Limit (dB)	32.7	32.6	32.3	32.6
Worst Pair	12	12	12	12
PS NEXT (dB)	18.5	17.9	18.6	17.9
Freq. (MHz)	69.0	71.3	73.0	71.3
Limit (dB)	29.9	29.6	29.4	29.6



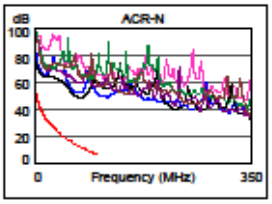


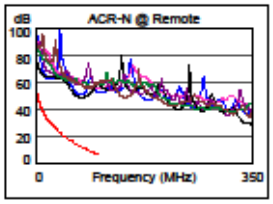
PASS	MAIN	SR	MAIN	SR
Worst Pair	45-78	78-45	78-45	78-45
ACR-F (dB)	20.8	20.7	21.2	21.1
Freq. (MHz)	80.8	81.3	99.3	98.0
Limit (dB)	19.3	19.2	17.5	17.6
Worst Pair	45	78	45	45
PS ACR-F (dB)	21.3	21.3	21.7	21.6
Freq. (MHz)	89.3	71.5	99.3	98.5
Limit (dB)	15.4	17.3	14.5	14.5



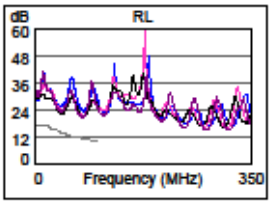


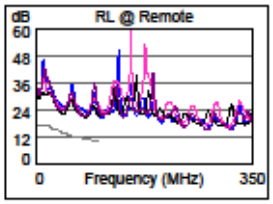
PASS	MAIN	SR	MAIN	SR
Worst Pair	12-78	12-78	12-78	12-78
ACR-N (dB)	23.8	24.3	36.4	35.7
Freq. (MHz)	3.0	3.4	74.3	71.8
Limit (dB)	51.6	50.6	11.9	12.5
Worst Pair	12	78	12	12
PS ACR-N (dB)	25.7	26.7	37.7	36.8
Freq. (MHz)	3.0	3.4	73.0	71.3
Limit (dB)	48.6	47.6	9.2	9.6





N/A	MAIN	SR	MAIN	SR
Worst Pair	45	45	45	45
RL (dB)	8.5	8.6	9.5	9.6
Freq. (MHz)	43.0	42.0	78.3	79.5
Limit (dB)	13.7	13.8	11.1	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	

LinkWare Version 6.0

Project: 4428
Site: IGUS

FLUKE networks

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

Date:	27.09.2012	Name:		Name:	Christian Mittelstedt