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Structural Report

Dropper Bar

25403

for the system by

Global Truss
Furong Industrial Area
Shajing Town

Baoan District Shenzen China

Compiled by:

Aachen, 21th Juli 2025

INGENIEURKAMMER-BAU NORDRHEIN-WESTFALEN
BERATENDER INGENIEUR
716397

This report includes pages: 1 – 8
Annex: Technical Drawing ZC41DA-50

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1 GENERAL REMARKS

1.1 Basics

The currently applicable regulations and standards, in particular:

DIN EN 1991-1	Loadings for buildings (Eurocode 1)
DIN EN 13814	Temporary structures
DIN EN 13782	Temporary structures - Tents
DIN EN 1993-1	Steel structures (Eurocode 3)
DIN EN 1995-1	Wooden structures (Eurocode 5)
DIN EN 1999-1	Aluminium Structures (Eurocode 9)
DIN EN 12385	Steel cable

1.2 Building materials

EN AW 6082 T6	aluminium alloy of the tubes used

1.3 General description / advice on setting up and operation

Subject of this structural report is an attachment component, a so-called dropper bar, for attaching payloads to tubes with a diameter of 50 mm.

The component is attached to tubes with a diameter of 50 mm using 5034 clamps (company Globaltruss). The limiting component is the 5034 clamp with a WLL of 500 kg and an ELL of 250 kg. The component is designed to support a vertical payload of 500 kg or 250 kg for loads above people.

The verifications on the basis of calculations are based on the safety concept of the European aluminium construction standard with increased safety for loads above persons (see chap. 1.4). These verifications are partly based on the yield strength and therefore do not provide a direct statement on the real breaking load.

So additional to this report breaking tests have been carried out, which shows that the real breaking load is at least 2750 kg. So the safety factor towards the breaking load can be attested to 1:11.

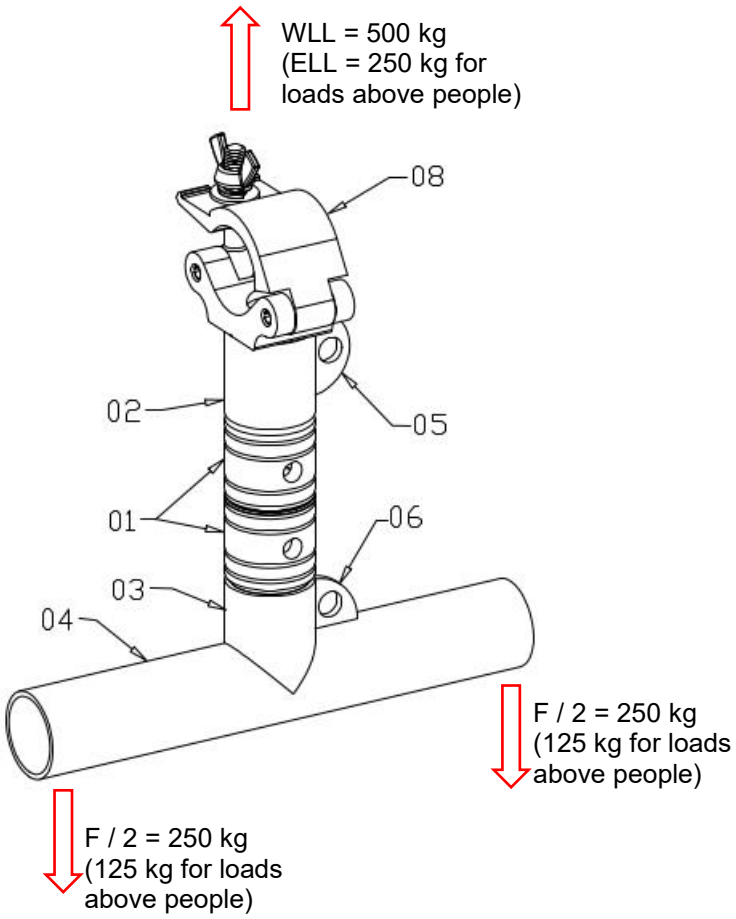
1.4 Loadings

Self-weight — The low self-weight can be neglected

Payload — maximum vertical payload — F = 500 kg = 5 kN

to cover the case: loads above person acc. to DGUV 17
the vertical payload needs to be reduced by half (y = 2,0)
=> Fres = F / 2 = 250 kg = 2,5 kN

Safety factors — Safety factor on loading side y_F = 1,5 according to EN 1990



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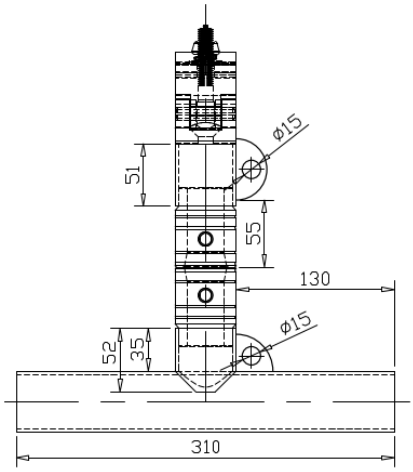
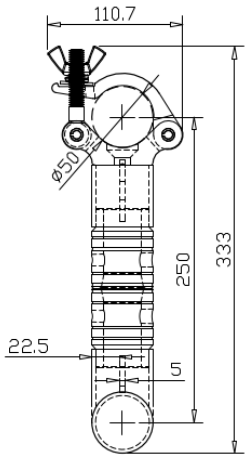
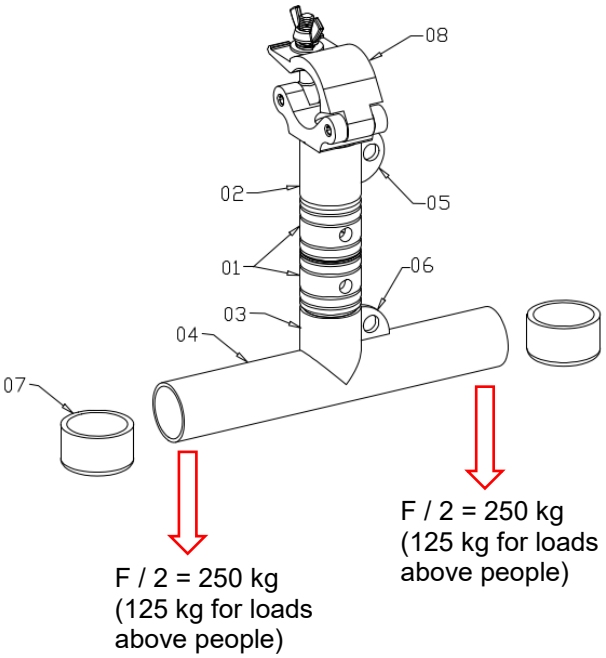
2 SYSTEM

Dimensions in [mm]







Tubes	Ø 50 x 3 mm, EN AW 6082 T6
Clamp	5034 (company Globaltruss) WLL 500 kg ELL 250 kg
maximum Payload	F = 500 kg = 5 kN (250 kg for loads above people)

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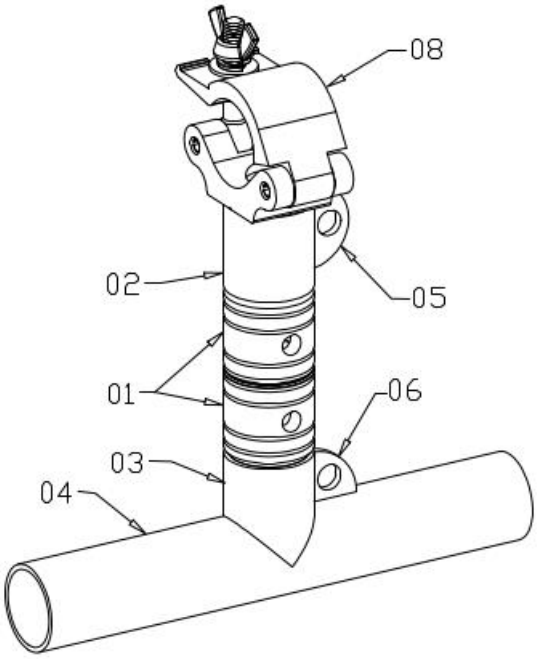
3 VERIFICATION

3.1 Overview verification points



Pos. 04 horizontal tube Ø 50 x 3 mm, EN AW 6082 T6
=> verification in chapter 3.2

Pos. 01-03 vertical tubes Ø 50 x 3 mm, EN AW 6082 T6 and connection vertical tubes (principle analog to conical connector of F34P)
=> verification in chapter 3.3

Pos. 08 Clamp 5034 with WLL 500 kg
=> without further proof

Additional to this report breaking tests have been carried out, which shows that the real breaking load is at least 2750 kg. So the safety factor towards the breaking load can be attested to 1:11.
=> see chapter 3.4

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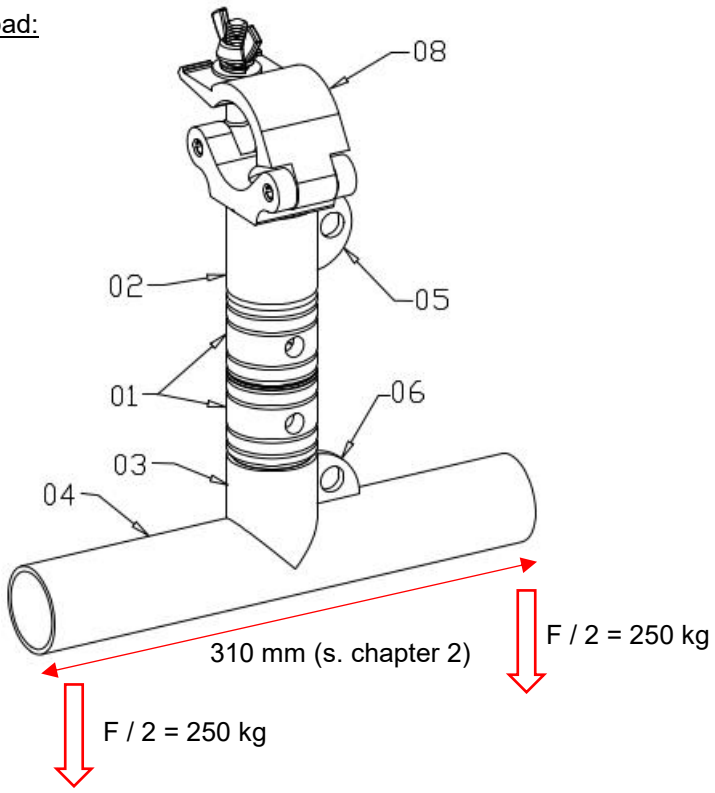
3.2 horizontal tube Ø 50 x 3 mm - EN AW 6082 T6

static system and payload:



payload — 500 kg => per Side 250 kg

reduction by half for the case “load above people” is covered by this proof.

bending moment: lying on the safe side, the bending moment is determined in axis of the vertical profile and the outer edge of the tube

with safety factor γ = 1,5 (see chapter 1.4)

M_{Ed} = 1,5 · 2,50 kN · 31cm / 2 = 58,1 kNcm

resisting moment: Ø 50 x 3 mm, EN AW 6082 T6

lying on the safe side, cross-section completely in the heat affected zone

Lokale Biegung Gurtrohr Knotenpunkt vollst. in WEZ
Local bending of chord

örtliche Schweißnaht nach Kap. 6.2.9.3 (1)
local welding seam acc. Chapter 6.2.9.3 (1)

D=	50	[mm]	
red-Faktor=	0,8	[-]	(WIG TIG)
ρo,haz=	0,64	[-]	fu,haz / fu
tu,eff=	1,53	[mm]	red-Faktor · ρu,haz · t
Wnet= π x R² x tu,eff=	2,66	[cm³]	mit R = D / 2 - t / 2
MuRd = Wnet · fu / yM2=	**61,63**	[kNcm]	nach Gl. 6.24 acc. equation 6.24

M_{Rd} = 61,63 kNcm > 58,1 kNcm
=> without further proof

3.3 vertical tubes Ø 50 x 3 mm - EN AW 6082 T6 and connection vertical tubes

principle analog to conical connector of F34P:

acting force: with safety factor γ = 1,5 (see chapter 1.4)

NEd = 1,5 · 5,0 kN = 7,5 kN

resisting force:

Bolzen / Bolt

Material / material min grade 8.8	fy,bk=	64,00	[kN/cm²]
	fu,bk=	80,00	[kN/cm²]
Geometrie / geometry	Db=	1,08	[cm]
	Ab=	0,91	[cm²]

zul Normalkraft aus Abscheren n. EN 1999-1-1
allow able loading due to shearing acc. to EN 1999-1-1

N_{Rd} = 2 x 0,60 x Ab x fub,k / 1,25= **69,71** [kN]

Verbinder / Connector

Material / material	EN AW 2011 (AlCuBiPb F37)		
Geometrie / geometry	Dm=	29	[mm]
Lochleibung in Verbinder	fu / γ_{M2}=	248,00	[N/mm²]
Bearing stress in connector	do=	11	[mm]
	t=	29	[mm]
	e1=	17,1	[mm]
	αb=	0,52	[-]
	e2=	14,5	[mm]
	k1=	1,99	[-]

NRd = k1 x αb x fu x d x t / γ_{M2}= 81,62 [kN]

Nachweis Restquerschnitt auf Zug
Remaining section under tension

NRd = 0,9 x A,net x fu / γ_{M2}= **76,23** [kN]

Hülse / Female Fitting

Geometrie / geometry	DH=	50	[mm]
	Di-1=	29	[mm]
	Di-2=	35	[mm]
	Di-m=	32	[mm]
Lochleibung in Hülse	fu / γ_{M2}=	232	[N/mm²]
Bearing stress in female fitting	do=	13	[mm]
	t = DH - Di-m=	18	[mm]
	e1>	23	[mm]
	αb=	0,59	
	e2>	20	[mm]
	k1=	2,5	

NRd = k1 x αb x fu x d x t / γ_{M2}= **80,04** [kN]

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Gurtrohr im Bereich der WEZ an der Kupplung main chord in heat affected zone at coupler			
$N_{Rd} = A \times 0{,}8^* \times f_{u,haz} / \gamma_{M2} =$	**52,45**	[kN]	*(WIG $_{TIG}$) örtliche Schweißnaht nach Kap. 6.2.9.3 (1) local welding seam acc. chapter 6.2.9.3 (1)

min NRd = 52,45 kN >> NEd = 7,5 kN
=> without further proof

3.4 Test Load

Comparison with Test Load

The preceding verifications are based on the safety concept of the European aluminium construction standard with increased safety for loads above persons (see chap. 1.4). These verifications are partly based on the yield strength and therefore do not provide a direct statement on the real breaking load.

Therefore an additional load test was carried out.

In this test the component was loaded up to a test load of 2750 kg.

In case loads above people the safety factor towards the breaking load is (250 / 2750) = 1:11.

Pictures for show the statement of the **conditions of testing**:

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Picture for show the statement of the conditions **after loaded test**:

鑫源富金屬制品（深圳）有限公司
ALUFORCE INDUSTRIAL CO.,LTD

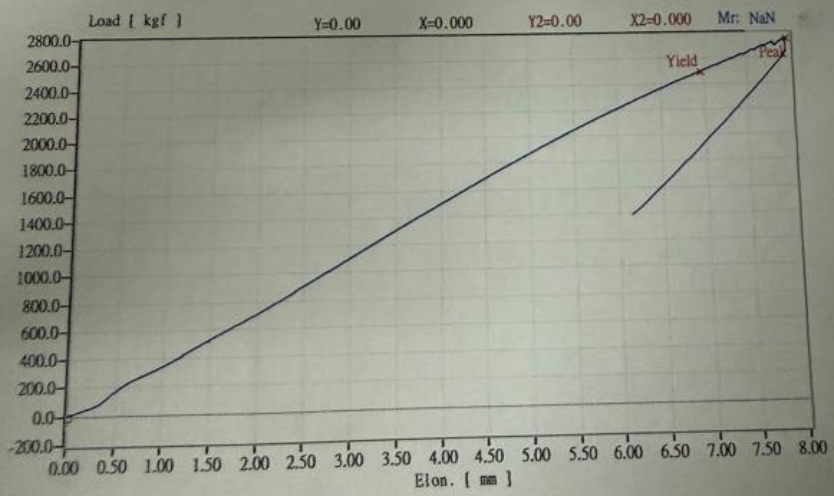
廣東省深圳市寶安區沙井鎖芙蓉工業區
TEL:86-755-27255905 FAX:86-755-27255907

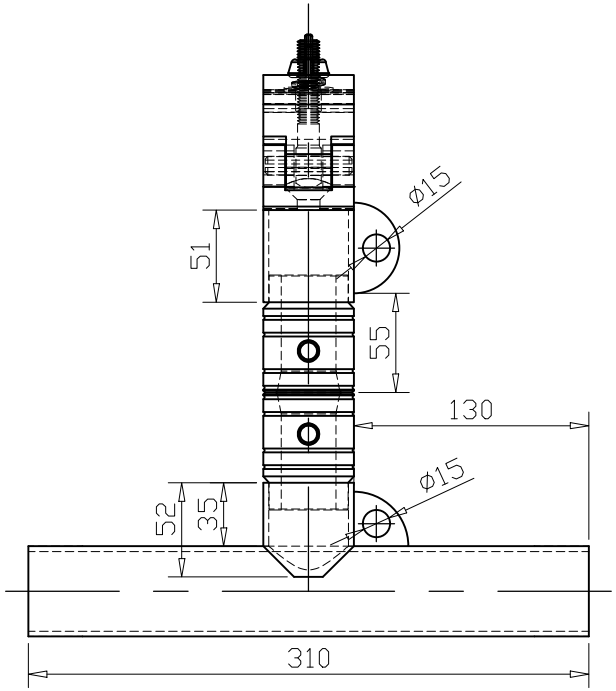
材料測試 試驗報告

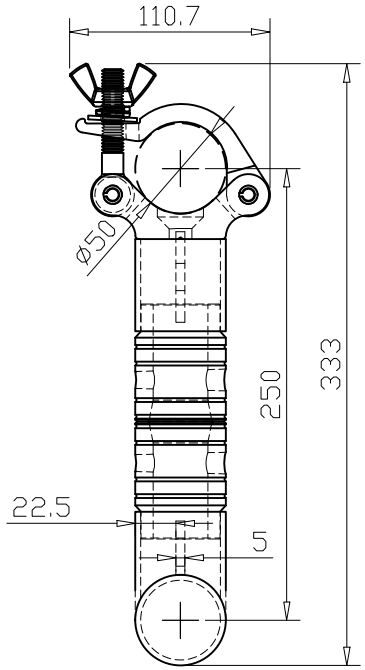
1.Customer :
鑫源富金屬製品（深圳）有限公司
2.Operator :
3.Lot No. : 2025043001
4.Date : 2025年4月30日
5.Time : 下午 02:56:38
6.Temperature: 25C
7.Speed :20.00mm/min
8.Test Style : Tension Test
9.Standard :

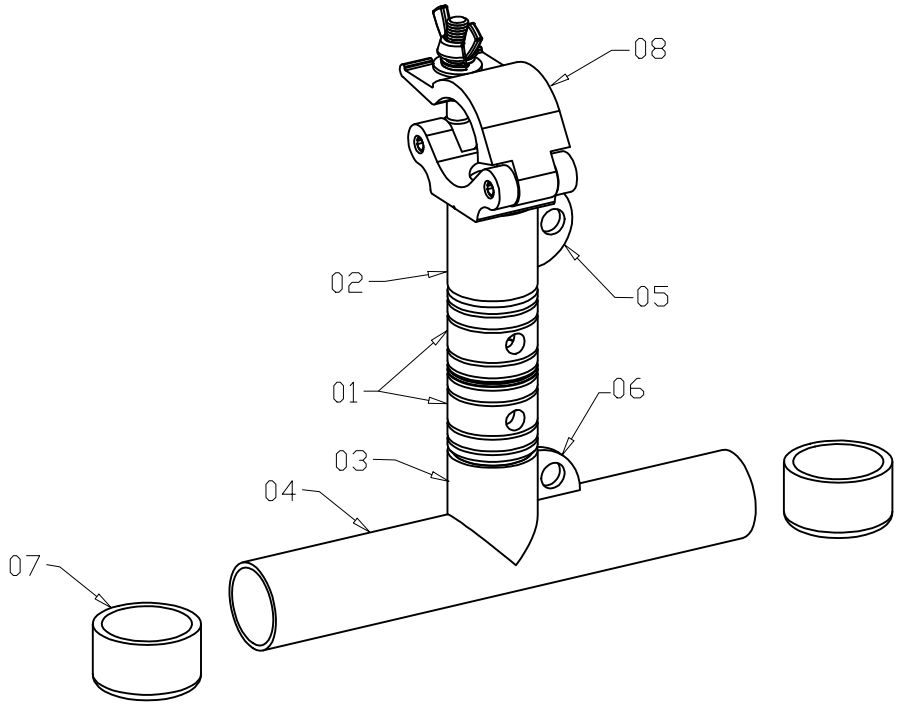
10.Specimen : ZC41DA-25
11.Spec.Length : 250.000mm
12.Spec.Style : Random
13.Spec.Area : 301.5929mm^2
14.Total Energy: 7946kgf · mm
15.Young's Modu. : 333.919kgf/mm^2
16.Notice :
17.Filename: E:\測試報告\2025043001

	Load(kgf)	Elon.(mm)	Stress(kgf/mm^2)	Strain(%)
Peak	2750.5	7.95	9.120	3.18
Break	1387.8	6.14	4.602	2.46
Yield	2493.6	6.96	8.268	2.78

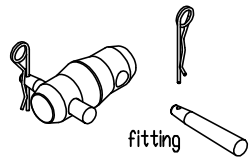








fitting	PTHK02001	DMS-01-1	Steel	ZP	4
	PCX03001	DMS-01-4	S45C	ZP	4
	PJT03001	DMS-01-3	#2011	T6	2
08	PSK08015	ø50*50mm	#6061	T6	1
07	PSJG002	PJ-SJG002		Black	2
06	PLB05003G	30mm*30mm*5.0t	#6061	T6	1
05	PLB05003B	PJ-BQP117	#6061	T6	1
04	YA14310	ø50*3.0t*310mm	#6082	T6	1
03	YA1452	ø50*3.0t*52mm	#6082	T6	1
02	YA1451	ø50*3.0t*51mm	#6082	T6	1
01	PTT03047A	ø50*ø43.8*65mm	#6082	T6	2
NO.	SPEC.	SPEC.	MATERIAL	FIN.	QTY.



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Specification		DESIGN	DJD	DATE 25.03.19	CHECKED	APPROVED	
Weight	**kgs/pcs	UNITS	mm	Proofread			
SURFACE	Black	SCALE	1:4				

MARK	NAME	RETRIEVE CONTENTS	DATE
1			