Health and Safety Statement

Alpha Hire (Cotswold) Ltd and Prestige Pavilions
Marina walk offices
Whitminster lane
Frampton on Severn
Glos
GL2 7PR

Marquee Hire
Furniture Hire

ALPHA HIRE

Health and Safety Statement

General Statement

The health and safety of our employees is of paramount importance. We aim to provide and maintain safe and healthy working conditions, equipment and system of work for all our employees and to provide them with the necessary information, instruction and training to achieve this aim.

These documents have been updated to include the necessary precautions relating to the avoidance of Covid 19 transmission.

Appropriate preventive measures are, and will continue to be, implemented following the identification of work related hazards and assessment of the risks associated with them.

We recognise the importance of employer/employee consultation on matters of health and safety and the value of individual consultation prior to allocating specific health and safety functions.

We also accept our responsibility for the Health and Safety of other persons who may be affected by our activities.

The allocation of duties for safety matters, the identity of competent persons appointed with particular responsibilities, and the arrangements made to implement this policy are set out herein and/or in associated health and safety documents and records.

Experts advice will be sought as necessary when determining Health and Safety risks and co-operation of employees and all other persons who use the premises e.g. contractors, visitors, students.

The contents of this statement will be kept up to date to reflect the changes in the nature of the activities and the size or complexity of the organisation/establishment. We will review its effectiveness as appropriate and in any case, at least annually.

R.W.Evans
Managing director

ALPHA HIRE

Health and Safety Statement

Key personnel

Health and safety function (s)/Responsibility	Name	Job title
Resources	R W Evans	Managing Director
Reporting and Recording	R W Evans	Managing Director
Emergency procedures	R W Evans	Managing Director
Health and Safety training	R W Evans	Managing Director
Provision of equipment	R W Evans	Managing Director
Hazard identification and risk assessment	R W Evans W Matthews	Managing Director Operations Director
Introduction and procedure control	R W Evans W Matthews	Managing Director Operations Director
First Aid	R W Evans W Matthews E Rendall	Managing Director Operations Director Resources Manager
House Keeping	R W Evans W Matthews E Rendall	Managing Director Operations Director Resources Manager

ALPHA HIRE

Health and Safety Statement

Checklist for the arrangement section

Health and safety at work topics	Any hazard(s) Identified?	Does hazard(s) pose significant risk(s)?	Are preventative control measures in place?	Brief details of hazards, risks, locations, controls
Contractors/Visitors	No			
Display screen equipment	No			
Electrical Equipment	No			
First-aid	No			All full time staff first aid trained , renewed every three years
Hazardous substances	Yes	No	Yes	Use of cleaning substances containing sodium salts/Warehouse
House keeping	No			
Information, instruction and training				Training continuous with annual review
Machinery	No			Ear defenders to be worn when using peg wacker
Manual handling	Yes	No	Yes	Lifting heavy items , site operative , procedures
Medical Emergency				As detailed below
Monitoring and review				All procedures updated and reviewed on annual bases
Noise at work	No			Ear defenders to be worn when using peg wacker

ALPHA HIRE

P.P.E	Yes			Hard hats to be worn when lifting frame, High viz and boots to be always worn
Violence and bullying	Yes			As detailed in violence and bullying section
Work equipment	Yes			Falling from steps, hitting yourself with hammer
Working at height	Yes	Yes	Yes	Ladder training given in new starter introduction training and renewed each year.

Signed (for on behalf of the employer)

R.W.Evans Managing director

ALPHA HIRE

Health and Safety Statement

Accidents and Dangerous Occurrences

How work-related accidents, dangerous occurrences and diseases are dealt with

All Accidents should be reported immediately to R.W.Evans.

Accident report to be completed by supervisor and counter signed by R.W.Evans.

All Reports and forms to be issued and stored in general office.

Safety committee	R W Evans	Managing Director
	W. Matthews	Operations Director
	E. Rendall	Resources Manager

Review of procedures incidents and accident investigation to be conducted by Safety Committee.

Staff meeting to review general requirements and analyse reports once every 12 months at the beginning of each season.

Notifiable incidents should be reported immediately to R.W.Evans to comply with RIDOR procedures.

ALPHA HIRE

Health and Safety Statement

Contractors/Visitors

How Health and Safety of contractors/visitors on the premises is ensured

Contractors on site will become the responsibility of the site supervisor and should be instructed on Alpha Hire Safety Procedures.

Visitors should be received by appointment only, and should be instructed on relevant safety procedures by their receipt.

Visitors should remain in the office area to avoid any potential risk.

ALPHA HIRE

Health and Safety Statement

Display Screen Equipment

How compliance with statutory regulations is ensured

Computer work in general office should not require long periods of attention to the display screen and therefore no risk considered.

ALPHA HIRE

Health and Safety Statement

Electrical Equipment

Annual inspection of all electrical equipment by warehouse technician

P.A.T testing to be executed on continuous basis

All items to be labelled and dated.

Inspection to be recorded on stock register

Stock register held in general office.

No “live” working to be executed

Site Installation

All equipment must have a current safety label

Power supplies must be checked with tester unit before installation of Alpha Hire equipment

The 32amp single phase cable from the outlet on the wall to the marquee will be covered by a cable cover.

ALPHA HIRE

Health and Safety Statement

First aid

How first-aid cover at work is provided and ensured

Appointed persons for first aid provision

Warehouse /Office

R.W.Evans
E.Rendall

Site / Delivery Supervisors

W Matthews
D.Townsend
J.Holder
P.Matthews

First Aid boxes

1). Warehouse/ Cloakroom
2). All Vehicles

Contents to be checked and re stocked monthly by house keeping

Training to be executed by authorised training consultant

Procedures to be monitored by safety committee

ALPHA HIRE

Health and Safety Statement

Hazardous Substances

How compliance with statutory requirements is ensured

Safety committee to review any new substances before introduction to working procedures

All cleaning substances must remain in manufacturer's containers with identifying labels

Current cleaning substances considered

1). Auto Washing powders

No risk

2).Vanish stain remover

Low risk irritant
Storage in sink unit
Protective gloves
to be warn as provided

3).Traffiklens

Low risk irritant
storage in sink unit
Protective gloves
to be warn as provided
Always
dilute
before use 1 litre
solution 4 litres water

4). Fuel for Vehicles/Generators / Heaters

Low risk
Diesel or Kerosene
storage tanks at
rear of building
Protective gloves to be
worn as provided

ALPHA HIRE

Health and Safety Statement

Health Surveillance

How Health surveillance (where necessary is provided)

All new employees must complete “new employee” form to identify any risk areas and ongoing health problems.

All Health and Safety risks to be reviewed annually at group consultation

The onset of any Covid 19 symptoms must be reported to the supervisor immediately and expulsion from the workplace is mandatory, pending testing procedures.

All existing procedures and new policies to be monitored continuously by Safety Committee

ALPHA HIRE

Health and Safety Statement

Housekeeping Arrangements

How general cleanliness and tidiness of the work place is maintained

Cleaning and maintenance within the warehouse and utility areas to be monitored by warehouse technician

Gangways and exits to be maintained by warehouse technician

Office storage, furniture etc to be maintained and monitored by administrator

Access to racking by step ladders provided

No fork lifts or mechanical handling machinery to be used at any time

Vehicles must be parked in such a way to leave a clear walkway through warehouse

All external doors must be unlocked at the commencement of every working day

All stock must be positioned within racking as specified on plan at end of each rack i.e. heavy items on lower levels

ALPHA HIRE

Health and Safety Statement

Information, Instruction, Training

How health and safety information, instruction and training is ensured:

Continuous assessment by safety committee and information from operatives will be reviewed at regular committee meetings.

Supervisors will be responsible for initiating new procedures and notification of new potential risks or hazards.

Formal first aid training to be implemented and maintained by St Johns Ambulance Brigade

Annual staff meeting to review and discuss all Health and Safety policies

Induction and general conduct to be responsibility of operations supervisors

ALPHA HIRE

Health and Safety Statement

Machinery

How Health and Safety of persons in the workplace is ensured

Ear defenders to be worn when using the peg wacker

No production machinery required in warehouse or on site
Nil risk

ALPHA HIRE

Health and Safety Statement

Manual Handling

How manual handling operations are dealt with:

Lifting/loading

Larger items i.e. Doors, Heaters, Large rolls of carpet must be lifted in pairs

All canvas is bagged in sizes for individual handling; however you should seek assistance if this weight is beyond your individual capability.

Always ensure the following routine when lifting

- Good grip
- Straight back
- Bend knees
- Lift using leg muscles

Storage

Step ladders as provided (Ref: work equipment) must be used for placing or removing stock from shelves above eye level.

Environment

Supervisor to assess site and prevailing conditions i.e. high winds, slippery surface and extreme weather conditions and implement working in pairs to avoid risk or injury if necessary.

Site work must cease if sufficient light is not provided after daylight hours

Operative tasks to be rotated to avoid prolonged effort on any particular task

ALPHA HIRE

Health and Safety Statement

Working at height

How risk to staff is prevented

Ladder/step training given in new starter introduction training and renewed each year.

Activities where steps are required

Installing roof canvases - approx. working height 0.5m
Installing wall canvases - approx. working height 0.5m
Tensioning roof canvases and cables -- approx. working height 0.5m
Threading lining ropes through apex - approx. working height 1m – 1.8m

No work over 2m is carried out.

ALPHA HIRE

Health and Safety Statement

Medical emergency

How serious accidents or health conditions are dealt with:

Appointed First Aid person to secure area and avoid any further risk

Attend to injury if necessary

Contact emergency services by mobile phone 999

Inform R.W.Evans

ALPHA HIRE

Health and Safety Statement

Monitoring and review

How Health and Safety performance is monitored and reviewed:

Continuous review by committee discussions to review risks and procedures

Regular committee discussions to review risks and procedures

Annual staffs meeting to review assess and instigate policy changes

ALPHA HIRE

Health and Safety Statement

Noise at work

How compliance with statutory requirements is ensured:

Ear defenders to be used when using the peg wacker

Continuously assessed by committee members

No risk considered currently

ALPHA HIRE

Health and Safety Statement

Personal Protective Equipment (PPE)

How compliance with statutory requirements is ensured:

Hand sanitiser is available and must be utilised at entry point to all buildings and in all company vehicles

Face masks are discretionary when working

Disposable protective gloves

Site helmets to be worn during elevation of structural framework

Protective footwear must be worn at all times

Hi Viz must be worn

To be available in warehouse and in every vehicle (Available from maintenance/ housekeeping)

Vehicles to be checked every week by housekeeping to ensure availability

ALPHA HIRE

Health and Safety Statement

Safe system of work

How activities with an element of risk which cannot be avoided area controlled:

Cross reference to Manual Handling and Work Equipment

Methods and procedures continuously reviewed by safety committee

ALPHA HIRE

Health and Safety Statement

Serious and imminent danger

How emergency situations are dealt with:

In case of fire explosion or collapse of building, Warehouse staff to evacuate building by nearest exit.

Exits are positioned at each end of the building

3 Fire extinguishers are positioned at front entrance, inspected and maintained executed by local contractor

Competent persons

R.W.Evans	Managing Director
W. Matthews	Operations Director
E.Rendall	Resources Manager

ALPHA HIRE

Health and Safety Statement

Violence and bullying

How violence and bullying are controlled:

Committee member's continuous consideration for violence and bullying at work

Contract of employment covers disciplinary procedures to deal with this problem

ALPHA HIRE

Work Equipment

Item	Application	Risk	Procedure
Sledge Hammer	Driving in pegs	Injury to hands and feet	1). Ensure handle is dry 2). Ensure head is secure 3). Grip with two Hands
Peg lifter	Removing pegs	Back injury	1). Ensure stand is upright and on firm ground 2). Insert lever at lowest point and lift one notch at a time
Ratchet/spanners	Tightening and removing bolts	Injury to hands	1). Ensure handles are dry 2).Correct size spanner 3).Ratchet is in working condition
Purlin lifter	Frame assembly	Head injury	1).Check hook is not cracked 2).Ensure handle is dry
Step ladders	Several	Falling	1)Choose appropriate size for application 2).Visually check steps 3).Position on firm flat ground 4).Ensure diagonal stays are fully open 5).If in doubt ask for assistance to secure steps

ALPHA HIRE

Health and Safety Statement

Work place and welfare

How the provision of suitable and sufficient facilities for employees is ensured:

Warehouse

Toilet and hand wash facilities provided and maintained by housekeeping

Kitchen available to provide drinks

Lunch room available to provide seating area for lunch breaks

Chilled mineral water available within operations office

Company policy of non smoking exists in warehouse, office and all vehicles and within a marquee site

ALPHA HIRE

Health and Safety Statement

Fixing to tarmac or similar surfaces

In the instance of fixing to a tarmac surface, the following should apply;

A).

1). Firstly, steel pegs no longer than 18" (460mm) could be utilised when fixing into tarmac with a consolidated base

2).The line of any drainage pipes or underground cables should be observed and avoided

3).Upon removal of the pegs sand should be poured into the hole leaving a 1" (25mm) depth for the top coat of tarmac repair to be inserted.

B).

Where pegs can not be penetrated in to tarmac or similar hard surface

1).Whenever possible pegs should be driven into the ground surrounding the tarmac and guy ropes or ratchet straps can be utilised.

2). Alternatively a concrete weight should be positioned at the base of each upright and fixed by guy rope to the top of the upright.
Each weight should be 250kg in weight to replace a ground stake.

3). I.B.C tanks can be utilised as retaining weights where there Is a water supply available on site.
The tank should be filled with water to give a total of 1000kg, this is sufficient to replace the retention value of 4 ground stakes.
The tank should be attached to the top of a frame upright with a minimum 1500 kg rated ratchet strap.
The strap should pass under the frame of the I.B.C tank to ensure full load bearing.

ALPHA HIRE

Environment policy

Alpha hire are committed to providing a quality service in a manner that ensures a safe and healthy workplace for our employees and minimises our potential impact on the environment. We will operate in compliance with all relevant environmental legislation and we will strive to use pollution prevention and environmental best practices in all we do.

Awareness & Engagement
We will champion environmental, and sustainability matters by regularly reviewing: requirements, risks and opportunities, system performance, benchmarking, communicating and training. We will communicate this policy to everyone working for us.

Fulfilment of Compliance Obligations

We will maintain systems to enable compliance with applicable statutory and non-statutory sustainability and environmental compliance obligations. We will work in cooperation with regulators, customers, suppliers, contractors, the local community, and our shareholders to benchmark and learn from others to achieve continual improvements in our sustainability performance.

Objectives
We will set stretching sustainability and environmental objectives to aid and support continual improvement, based upon our assessment of the risk and impacts associated with our activities. We will regularly monitor performance against these objectives and take action.

Protection of Environment
We understand the significant impact businesses can have on the environment so we will identify environmental risks and impacts arising from our activities, considering a life-cycle perspective. We will take appropriate action to reduce these risks to prevent pollution and harm to the environment.

Sustainable Sourcing
Responsible and sustainable sourcing is a key Alpha hire priority. We will source sustainable products, where practicable and work with suppliers, sector organisations and other appropriate parties to support embedding sustainability and ongoing sustainable solutions throughout our supply chains.

Waste Prevention
We will reduce the generation of waste and, where this is not possible, seek to reuse, recycle or recover energy from waste. We have committed to zero waste to landfills.

Continual Improvement
We will routinely benchmark baseline, measure and improve our management systems to enhance environmental credentials performance. Resources will be provided to address both sustainability and environmental issues and to work for the adoption of best practices. We will partner with our customers, suppliers, and sustainability experts to set cascade and monitor our goals.

Responsibility
Alpha hire recognises that everyone has a responsibility to support our Sustainability and Environmental agenda. We will engage and train employees, so they understand their roles. In addition, Alpha hire has responsible people at different levels of the business to act as champions and lead on sustainability and environmental actions, ensure review and follow up on key priorities.

ALPHA HIRE

Product Quality and Safety statement

1). Alpha Hire pavilions are constructed from high quality extruded and anodised aluminum framework, steel connectors, pins and feet are galvanised to ensure long life and guarantee Safety.
These pavilions are made by Hoecker.
These structures are calculated for up to 60mph wind .

2). Covers are manufactured to UK specifications (Bs 5438 parts 1&2) from pvc coated polyester Fabric which is fire resistant, mould inhibited, UV stabilised and lacquered both sides to provide optimum appearance and ultimate safety.

3). Wall panels comply with flammability tests
Additionally all coloured swags are produced from the same trevira cs fabric.

4). Flooring: Delta cord carpet is supplied in barley colour.
The carpet complies with Bs 4790:1987(1996) flammability tests
(copy certificate enclosed).
Carpet is nailed to the floor and stretched to provide a flat stable surface.

5). Electrical: all electrical supply sockets are provided with an r.c.d. unit at the mains supply socket complying with Bs 7071 and Bs 1363.
Transmission of power is linked with 16 amp outdoor connections to Bs 43b3 standard.
Lighting circuits are wired "in line" and can incorporate 3 hour non-maintained "fire exit" Signs to comply with Bs 4533 102-22

6). Heating: all heating is provided by utilisation of arcotherm indirect fired oil burning heaters.

- Use only in places free of flammable vapors or high dust content
- Never use heater in immediate proximity of flammable materials. Minimum clearance 2.5m
- Make sure firefighting equipment is readily available
- Make sure sufficient fresh outside air is provided according to the heater requirements
- The internal diffuser should be positioned to avoid any blockage to the free air flow

- The air intake grill should be clear of any items likely to prevent free air flow through the unit
- The clean hot air is conducted into the marquee by a 12 inch flexible ducting , the heater should be positioned to ensure flexi ducting is fully extended to prevent overheating
- Make sure heater is always under surveillance and keep children and animals away from it
- Before starting the heater always check free rotation of ventilator
- Drums of heater fuel should be clearly marked and positioned securely
- Unplug heater when not in use

The heaters are manufactured to E.C regulation and comply with provision of machinery Directives 89/392 and its modifications 91/368, 93/44 and 93/68 and the directives 89/336, 92/31, 73/23.

ALPHA HIRE

Method Statement

Project/Contract	**Strategy and Evolution**
Contractor	**Alpha Hire (Cotswold) Ltd**
Site Address	**Cirencester park**
Project Start Date	**Tuesday 9th June 2026 TBC**
Expected Duration	**3 Days**
Projected Completion Date	**Thursday 10th June 2026 TBC**

	Name	Title	Signature	Date
Document Author	Edward Rendall	Operations admin	E.J.Rendall	26/2/26
Authorised by	Rhys Evans	Managing director	R.W.Evans	26/2/26
Authorised by				
Authorised by (for Client)				

Emergency Contact Details			
Contact **Tel** **Mobile**	**R.W. Evans** **01452 742020** **07850 585635**		

Data Protection Statement

The information and data provided herein shall not be duplicated, disclosed or disseminated by the recipient in whole or in part for any purpose whatsoever without the prior written permission from Alpha Hire.

The following method statement has been developed to provide a safe system of work and must be adhered to at all times, any significant deviation from this system must first be authorised by

your manager or safety representative. **Please read the entire sheet before beginning the procedure, if you have any questions please contact your manager or safety representative.**

The main hazards to your safety and health are;

a) Falling from height
b) Injury from incorrect Manual handling.
c) Injury from slips trips and falls.
d) Injury from the incorrect actions of other contractors on site.
e) Injury to members of the public during operations.
f) Injury from overhead services
g) Injury from underground services

Preventative Measures you must take;

a) You must be "competent" to carry out the task.
b) You must NOT carry out this task alone
c) Barriers erected at entrances and around the work area if deemed necessary by the foreman or safety officer to protect tenants.
d) You must not lift beyond your capabilities, get help if necessary.
e) Visitors and other members of staff are prohibited from entry unless accompanied by competent person.
f) You must read and be familiar with the Safety statement.

Personal Protective Equipment you must wear;

a) Gloves
b) Safety boots
c) Safety helmets

Quality Control;

a) Adhere strictly to the following procedure to ensure quality of service
b) If in doubt contact your manager for clarification before proceeding.

ALPHA HIRE

Task Description

This method statement describes the work process for the erection/dismantling of pavilion style clear span marquees and internal accessories. The installation of electrical equipment and the connection to power supply either client's main power or sub contracted generators supply.

Staff & Training

The projects will be carried out by staff from Alpha hire. All members of staff are experienced. A site Supervisor will be appointed to each contract that will be responsible for quality and safety. Apprentices and young workers will be supervised and are not allowed to carry out tasks for which they have not been trained. All procedures will be executed in accordance with the Alpha Hire safety statement.

Step by step procedure

Start of works

1) Site Supervisor will ensure the site is safe to commence work.
   Tenants have been warned and barriers erected to prevent unauthorised access. The supervisor should thoroughly read the delivery documents and layout diagram. The contents of which should be verified with the client before the commencement of any work.
2) Alpha hire delivery vehicles should be parked as close as possible to the proposed erection site, but not in such a way as to cause congestion to other users of the premises.
   If necessary a safety barrier should be placed around the vehicle if there is risk of the general public gaining access.
3) P.P.E Staff to put on personal protective equipment in accordance with the Alpha Hire safety statement.
4) Work base to be created at rear of vehicles with all tools and equipment placed to avoid trip hazards.
5) Supervisor will inspect the proposed site and check for any underground or overhead services before commencing the marking out procedure.
   A safe working distance of 6m must be maintained from any overhead power cable.
   In the vicinity of any underground services stakes shall not be driven into the ground, alternative methods of securing should be utilised in accordance with the individual site conditions.

6) Manual handling. The lifting and carrying of all items must be executed in accordance with the Alpha Hire safety statement.
7) Electrical installation .All electrical items supplied by Alpha Hire are tested and P.A.T certificated issued at our own warehouse before delivery to site. Only competent staff will be responsible for the installation and connection of the equipment to the mains supply or a generator that is certified by the sub contractor supplier.
8) Upon completion of the erection the site supervisor should complete the safety inspection report and issue the client with a copy.
9) The site supervisor should complete a survey of the site before leaving to ensure that no tools dangerous objects have been left behind.
10) Wherever possible 2m social distancing should be observed, with a minimum 1m if necessary.

TFT (Ilkley) Ltd.

The Sidings Business Park, SKIPTON, North Yorkshire, BD23 1TB
Phone or Fax 01756 792525

Office: 30 Alexandra Crescent, ILKLEY, West Yorkshire, LS29 9ER, Phone or Fax 01943 603459
Reg. No. 3168606, VAT No. 659 9604 77

UKAS No. 1861

TEST CERTIFICATE

No. 02465/32

Assessment to BS 5867 : 1980 Specification for Fabrics for Curtains and Drapes, Part 2 : Flammability Requirements using BS 5438 : 1976

SAMPLE INFORMATION

Client	**Custom Covers (1984) Ltd., Quayside Road, Bitterne Manor, SOUTHAMPTON, Hampshire, SO18 1AD**
Fabric Reference	**CQ Supreme, 4oz Excel Black**
Dimensions	**240cm by full width (164cm)**
Pre-treatment	**None - the material was stated to be inherently flame retardant polyester**
Conditioning	**BS 5438 : 1976, Clause 4.**

TESTING

Following the pre-treatment described above, the material was conditioned and tested according to **Test 2 of BS 5438 : 1976 Method of test for flammability of vertically oriented textile fabrics and fabric assemblies subjected to a small igniting flame,** using a **15 second flame application time** and the results assessed according to the requirements of **BS 5867 : 1980 Specification for Fabrics for Curtains and Drapes, Part 2 : Flammability Requirements.** Testing was carried out on the face side of the fabric.

	WARP			WEFT		
Specimen No.	**1**	**2**	**3**	**1**	**2**	**3**
Flame reached an edge	No	No	No	No	No	No
Hole reached an edge	No	No	No	No	No	No
Flaming debris separated	No	No	No	No	No	No

It should be noted that the results may not apply to situations where there is a restricted air supply or prolonged exposure to intense heat as in a conflagration.

CONCLUSION

The sample received meets BS 5867 : 1980 Specification for Fabrics for Curtains and Drapes, Part 2, Flammability Requirements, Type B and Clause 4.16 for Curtains and Drapes of the Guide to Fire Precautions in Existing Places of Entertainment and Like Premises (Home Office, 1994).

It should be noted that the fabric should be supplied with the manufacturers name, trademark or other identifying mark; the statement 'Flammability complies with the requirements of BS 5867 : Part 2, Type B' and instructions on any special precautions to be taken concerning care (including cleansing) of the product to be manufactured from the fabric, preferably using an appropriate care labelling symbol in accordance with BS 2747 and taking account of the pre-treatment used in this test and the requirements of Clause 4 of BS 5867 : Part 2 : 1980.

Dr R J Aron FTI, MIQA
Technical Director
END OF REPORT

TFT
(Ilkley) Ltd.

The Sidings Business Park, SKIPTON, North Yorkshire, BD23 1TB
Phone or Fax 01756 792525

Office: 30 Alexandra Crescent, ILKLEY, West Yorkshire, LS29 9ER. Phone or Fax 01943 603459
Reg. No. 3168606, VAT No. 659 9604 77

UKAS
No. 1801

TEST CERTIFICATE

No. 05320/1

Assessment to BS 5867 : 1980 Specification for Fabrics for Curtains and Drapes, Part 2 : Flammability Requirements using BS 5438 : 1976

SAMPLE INFORMATION

Client	**Custom Covers (1984) Ltd., Quayside Road, Bitterne Manor, SOUTHAMPTON, Hampshire, SO18 1AD**
Fabric Reference	**CQ Advantage. Colour: Ivory.**
Dimensions	**120cm by full width (145cm)**
Pre-treatment	**None - the material was stated to be inherentlly flame retardant.**
Conditioning	**BS 5438 : 1976, Clause 4.**

TESTING

Following the pre-treatment described above, the material was conditioned and tested according to **Test 2 of BS 5438 : 1976 Method of test for flammability of vertically oriented textile fabrics and fabric assemblies subjected to a small igniting flame,** using a **15 second flame application time** and the results assessed according to the requirements of **BS 5867 : 1980 Specification for Fabrics for Curtains and Drapes, Part 2 : Flammability Requirements.** Testing was carried out on the face side of the fabric.

	WARP			WEFT		
Specimen No.	**1**	**2**	**3**	**1**	**2**	**3**
Flame reached an edge	No	No	No	No	No	No
Hole reached an edge	No	No	No	No	No	No
Flaming debris separated	No	No	No	No	No	No

It should be noted that the results may not apply to situations where there is a restricted air supply or prolonged exposure to intense heat as in a conflagration.

CONCLUSION

The sample received meets BS 5867 : 1980 Specification for Fabrics for Curtains and Drapes, Part 2, Flammability Requirements, Type B and Clause 4.16 for Curtains and Drapes of the Guide to Fire Precautions in Existing Places of Entertainment and Like Premises (Home Office, 1994).

.....

Mr J Leadbeater LL.B DTS
Technical Manager
END OF REPORT

ALPHA HIRE

Marlings
www.marlings.co.uk

Delta Cord

Technical Data Sheet

Specification

Fibre Type	80% Polypropylene 20% Nylon
Product Construction	Needle punch/Fibre bonded
Backing Composition Sheet	Latex
Backing Composition Tile	Polymer Modified Bitumen (PMB)
Tile Size	500mm x 500mm
Standard Roll Size	30 linear meters x 2 meter width = 60 m^2
Total Thickness	Sheet – 6.2mm/Tile – 7.6mm
Total mass per unit area	Sheet - 1020 g/m^2 / Tile – 4020 g/m2
Tiles per box	20 tiles = 5 m^2
Colourways	16

Performance

Wear Rating	BS EN 1307	Class 33 Heavy Commercial	
Static Electricity		Suitable for computer rooms	
Flammability	BS EN 13501	Sheet – Cfl-s1 / Tile – Bfl – s1	
Sound Adoption		-19dB	
Colour Fastness	BS EN ISO 105	Light	6
		Water	4-5
		Wet/Dry	4-5
		Shampoo	4-5
Breeam		A+	
Warranty		Full details available on request	

Marlings Ltd Stanley Mills Stonehouse Gloucestershire Gl10 3HQ
Tel: 01453 821800 I Fax: 01453 822002 I Email: sales@marlings.co.uk

*HA 3/02/25

ALPHA HIRE

Wira House, West Park Ring Road, Leeds, LS16 6QL, UK.
Telephone: +44 (0) 113 259 1999
Email: info@bttg.co.uk
Website: www.bttg.co.uk

Date: 24 January 2020

Our Ref: 27/05244/01/20
Your Ref:

Client:	Low & Bonar GmbH Edelzeller Strasse 44 36043 Fulda Germany
Job Title:	Fire Test on One Sample of Material
Client's Order No:	---
Date of Receipt:	07 January 2020
Description of Sample(s):	One sample of material, reference; VALMEX 7216
Work Requested:	We were asked to make the following test(s): BS 7837

Note: This report relates only to the samples submitted and as described in the report.

* subcontracted test, UKAS accredited
** subcontracted test, EN ISO/IEC 17025 accredited
*** not UKAS accredited

1066

Wira House, West Park Ring Road, Leeds, LS16 6QL, UK.
Telephone: +44 (0) 113 259 1999
Email: info@bttg.co.uk
Website: www.bttg.co.uk

Date: 24 January 2020

Our Ref: 27/05244/01/20
Your Ref:

Client: Low & Bonar GmbH

FIRE TESTS ACCORDING TO BS 7837:1996 (2015)
Specification for Flammability Performance for Textiles Used in the Construction of Marquees and Similar Tented Structures

Date of test: 24/01/2020

Conditioning

Prior to testing commencing the sample was water-soaked and then conditioned for at least 24 hours in an atmosphere having a temperature of 20 ± 2°C and a relative humidity of 65 ± 5%.

Procedure

The test was carried out in accordance with the above standard. The sponsor sampled the material and the specimens were cut from the sample received to the dimensions set out in the standard. Three length and three width specimens were tested.

Test 2B (bottom edge ignition) of BS 5438:1989 was used together with a flame application time of 10 seconds, as specified.

In addition, a piece of filter paper with specified characteristics was placed 55mm below the specimen to detect flaming debris.

The following parameters were determined :-

1. Duration of flaming
2. Extent of damage
3. Filter paper ignition, if applicable

1066

Wira House, West Park Ring Road, Leeds, LS16 6QL, UK.
Telephone: +44 (0) 113 259 1999
Email: info@bttg.co.uk
Website: www.bttg.co.uk

Date: 24 January 2020

Our Ref: 27/05244/01/20
Your Ref:

Client: Low & Bonar GmbH

Performance

The sample shall be deemed to perform satisfactorily (pass) if, for at least five of the six test specimens:

(a) the duration of flaming does not exceed 5s after removal of the igniting flame; and

(b) the lowest boundary of any flame does not reach the upper edge or either vertical edge; and

c) the filter paper does not smoulder or flame.

The sample shall be deemed not to conform to BS 7837:1996 (2015) if more than two test specimens show any of the effects listed in (a) to (c) above. If two test specimens show any of the above effects then a further six specimens shall be tested. In this case, the sample shall be deemed to pass if five of the second set of six specimens performs satisfactorily.

Results

After Flame Time (secs.)		Edge reached (Yes or No)		Filter Paper Ignition (Yes or No)	
Width	Length	Width	Length	Width	Length
0	0	No	No	No	No
0	0	No	No	No	No
0	0	No	No	No	No

The test results relate only to the ignitability of the combination of materials under the particular conditions of test; they are not intended as a means of assessing the full potential fire hazard of the materials in use.

1066

Wira House, West Park Ring Road, Leeds, LS16 6QL, UK.
Telephone: +44 (0) 113 259 1999
Email: info@bttg.co.uk
Website: www.bttg.co.uk

Date: 24 January 2020

Our Ref: 27/05244/01/20
Your Ref:

Client: Low & Bonar GmbH

Comments

The results indicate that the sample met the above performance requirements.

Uncertainty of measurement has not been taken into account when presenting the test result. The relevant uncertainty value is included as an annex which forms an integral part of the report.

Reported by:..... B Marsden (Mrs), Senior Fire Technician

Countersigned by:..... P Doherty, Executive Manager

Enquiries concerning this report should be addressed to Customer Services..

1066

Wira House, West Park Ring Road, Leeds, LS16 6QL, UK.
Telephone: +44 (0) 113 259 1999
Email: info@bttg.co.uk
Website: www.bttg.co.uk

Date: 24 January 2020

Our Ref: 27/05244/01/20
Your Ref:

Client: Low & Bonar GmbH

Uncertainty Budget - Annex

The overall uncertainty budget for BS 7837:1996 (2015) is as follows:-

Timings: ±2 seconds.

ALPHA HIRE

Terms and Conditions

Definitions
Company means Alpha hire, their subcontractors and agents.
Hirer means the persons hiring the equipment form the Company.
Equipment means framed structures, marquees, tables, chairs, flooring, carpeting, lighting and heaters.

Conditions
Unless otherwise stated in writing the Company reserves the right to revise or withdraw any quotation, prior to acceptance, and to vary the quoted hire charges should any substantial increase in labour, materials or transport cost occur before or during the period of hire. Acceptance of all quotations is made strictly subject the Equipment being available, whilst every effort will be made to ensure the Equipment ordered is delivered, the Company reserves the right to substitute with the nearest available item should the need arise. Conformation of orders will only be acknowledged upon receipt of the 20% deposit.

Period of hire
The period of hire is understood to be from the time of arrival of staff to commence erection until the equipment has been dismantled and removed from site. 'Event rate '. Means up to 72 hours. 'Weekly rate' means any completed period of 7 days. Including weekend and public holidays.

Terms
The Company's terms are strictly C.O.D, unless otherwise stated. The Company reserves the right to charge interest at the rate of 2.5% per month on any outstanding monies. The company reserves the right to charge a deposit to cover part, or all of the value of the Equipment used.

Cancelation
Once the contract has been made, should the Hirer wish to cancel. The contractor reserves the right to charge 50% of the total hire price quoted. If cancelled within 14 days prior to the event the full charge will be made unless the equipment is re-let where upon and administration charge will be made.

Erection and dismantling
Hire charges for marquees, framed structures, unless otherwise stated, include provision of labour for erection and dismantling.
The hire charges quoted for tables and chairs does not include erection, placing or dismantling unless otherwise stated in writing.
No attendance of the Equipment by the Company staff, or the provision of a night watchman is included. The safe custody of all Equipment will be the Hirers responsibility until collected. In reasonable time from the Company erects any of its equipment, the Hirer shall inform the company. Or provide a site plan of where precisely on the Equipment is to be erected. Should the Hirer fail to do so, the Company shall site the Equipment as he thinks fit. If thereafter the Hirer wishes the Company to erect the Equipment in a different position on the site, the Company. If possible, will re-erect the Equipment before the period of hire commences and the Company shall reserve the right to charge the Hirer a fee to do so.
The hirer will be responsible for the equipment once on site and must ensure that framed structures and marquees are completely closed when not in use and the pegs and ropes which become loose are secured as necessary. Liability for delay, of contract uncompleted due to adverse weather conditions or any cause beyond our control

Modification of Contract
No verbal representation or arrangements are recognised by the Company and these terms and conditions shall only be modified by a supplementary contract.

Site
Hire charges are based on the assumption that the Hirer provides a firm and level site of turf (or some other material not impervious to stakes and able to absorb rain water) and is served by a firm access road with adequate hard standing for commercial vehicles, is free from flooding, trees and overhead obstructions. The Hirer shall provide the Company with an accurate plan of the site showing all relevant services and any obstacles which may affect the erection of the equipment.
The Hirer shall be sorely responsible for any damage to any concealed services or pipes or any overhead cables or structures, in addition to the quoted price, all ensuring additional costs and liabilities.
The Hirer is responsible for giving notice to, or obtaining permits from, Local Authorities and or site owners prior to erection Any cost incurred in delays or modifications in the work arising from the absence or misrepresentation of any such permit shall be payable to the Company by the Hirer and shall be deemed part of the hire charges. The hire charges do not include making good any repairs to the site. Special rates will be payable for the hire of equipment on sites not conforming to the above requirements.

Loss or damage
The Hirer shall, during the period of hire, be responsible for the maintenance and safe custody of the Company's Equipment on site. Damage or loss (other than fair wear and tear) will be charged for at current replacement rates. The Company cannot accept responsibility for the safety of customers own Equipment stored or housed in their marquees or framed structures. The Hirer is reminded that it is prudent for him to insure against any such loss and damage.

Injury or Damage
In no case shall the company be liable for any damage or injury incurred by any person or property during the period of hire who use or are in the vicinity of the Equipment

Damage Waiver
Unless otherwise stated in writing, we will automatically charge 5% of the total hire fee for 'all risks cover' of marquees, pavilions and furniture only to cover against A Theft, B Vandalism, C Fire and Explosion and D Storm and Tempest

Fire Prevention
Other than the Equipment installed by The Company in its marquees or framed structures, no lighting, heating, cooking or other gas or electrical appliances of any kind shall be used in or next to any Equipment hired from the Company without previous consent in writing from the Company. The Hirer is expected to provide suitable firefighting Equipment.
Where electrical apparatus is hired, the Hirer must provide a suitable 240V power point or supply within 15 metres of the Equipment for the adequacy and reliability of that supply.

Winter hire/Snow conditions
During periods of snow the roof must be regularly cleared to avoid overloading the structure, beyond the recommended safe load limits. 0.2kn m Not including internal hanging loads
Alternatively, the structure must be heated continuously to a temperature of 12c at the ridge point. You must notify Alpha Hire immediately if there are any signs of damage to the structural framework.

Wind conditions
The structure is designed to operate normally in winds of up to 97km/h.
During periods of wind in excess of this speed it is imperative that all canvas covers and entrances are fully closed and secured.
The structure must be vacated and should not be entered before the wind has subsided below the designated safe operational speed.
In a fully enclosed condition, the wind will hold the structure to the ground.
You must notify Alpha Hire immediately if any part of the canvas becomes damaged thus allowing the wind to enter the structure.

Conditions
Heaters or cooking equipment to be placed at least 1 metre from the marquee pavilion walls.
Only electrical or purpose designed gas Equipment to be utilised within the marquee or pavilion.
Barbecue Equipment or open fires must be a minimum of 5 metres from the marquee or pavilion.
During winter months the Hirer is responsible for heating the interior of the structure to not less than 12 C in the event of snow or should snow be forecast. The Hirer is expected to provide suitable fire fighting Equipment and to show due diligence to avoid any loss or damage to the hire of the Equipment. Cover will only apply when the premium has been received by the Company in advance. The Company reserves the right to alter premiums and conditions at any time.
NOTE: Loss or damage arising from fire, theft and vandalism must be reported to the Police immediately upon discovery and to the Company within 24 hours.

Sales items
Title to all purchased goods remains with the Company until invoices are settled in full.
Alpha hire reserves the right to amend any of the changes shown in the price list as well as withdraw any of the items illustrated or described within their literature at their sole discretion and without prior notice. The illustration and specification stated within the Company literature are intended as a guide only and the Company accepts no responsibility for any variation in the actual items supplied for

ALPHA HIRE

HM
Hazelton Mountford
Chartered Insurance Brokers

TO WHOM IT MAY CONCERN

22nd July 2025

Dear Sirs

Re. Alpha Hire (Cotswold) Limited

We are the Insurance Brokers for the above clients and have pleasure in confirming details of their insurance arrangements as follows: -

Public/Products Liability

Insurer	:	Convex Insurance UK Limited via the agency of BGP Ltd
Policy No	:	MGAM328
Expiry Date	:	15th July 2026
Limit of Indemnity, any one occurrence and in the aggregate for Products	:	£5,000,000

Employers Liability

Insurer	:	Convex Insurance UK Limited via the agency of BGP Ltd
Policy No	:	MGAM328
Expiry Date	:	15th July 2026
Limit of Indemnity, any one occurrence	:	£10,000,000

This statement of cover extract has been prepared purely as a confirmation of the insurance in force at the date of this letter, which is subject to the terms and conditions of the insurance policy. We accept no responsibility for any inadvertent or negligent act, error or omission on our part in preparing the statement or for any loss, damage or expense incurred by the recipient arising from the reliance on the information given. We remain solely the agent of our client and owe no legal duty or otherwise to any third party.

Should cover be cancelled assigned or changed in any way during the period of insurance neither we nor the insurers accept any obligation to notify any recipient.

Yours faithfully

Sammara Ahmed
Account Handler

Always the right decision

Hazelton Mountford 4 Bank Street Worcester WR1 2EW
Telephone 01905 611 951 **Facsimile** 01905 734 821
Email enquiries@hazeltonmountford.co.uk www.hazeltonmountford.co.uk

ALPHA HIRE

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 10/01/18 *EngrDCT*	*Sht.* 1
	Description.. Types P3,P4, P5 & P6	*Job. No.* 11691/A	

CALCULATIONS

hoecker® STRUCTURES

CALCULATIONS IN RESPECT OF DEMOUNTABLE STRUCTURES TYPES P3, P4, P5 AND P6 FOR CONSTRUCTION IN MAINLAND UNITED KINGDOM.

Produced by:

D C TOWNEND & Co Ltd
Chartered Structural Engineers
15 Devon Way, Trowse, Norwich NR14 8GE. England.
Tel 44 1603 766787 Fax 44 1603 763727 Email dctownend@fsmail.net

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 10/01/18 *EngrDCT*	*Sht.* 2
	Description.. Types P3,P4, P5 & P6	*Job. No.* 11691/A	

CALCULATIONS 11691/A.cdt

PREAMBLE.

This document is based on information from the German Designers and checks the building in accordance with BS EN 1991-1-4:200+A1:2010 [wind], BS EN 13782: 2015, Temporary Structures, - Tents Safety... and BS EN 1999 Eurocode 9. Design of aluminium structures.

Analysis has been carried out based on the maximum loads imposed by the worst likely wind conditions in mainland UK. Analysis is by computer 3-dimensional program "Q S E Space for Windows version 6" and the results have been included in this document.

The most onerous factors have been assumed to allow for long term erection, open elevated country and any combinations of length, width and height, when calculating the wind loads.

However, for this series of buildings, less than 10 metres span and 5 metres high, the recommended design pressure in ***Clause 6.4.2.2 of BS EN 13782: 2015*** *of 0.3kN/m2 will be assumed.*

Since the materials used for the four structures are the same [89 x 49 single track rafters and legs], the calculations will refer only to the largest structure, the P6, all others being loaded to a lesser degree.

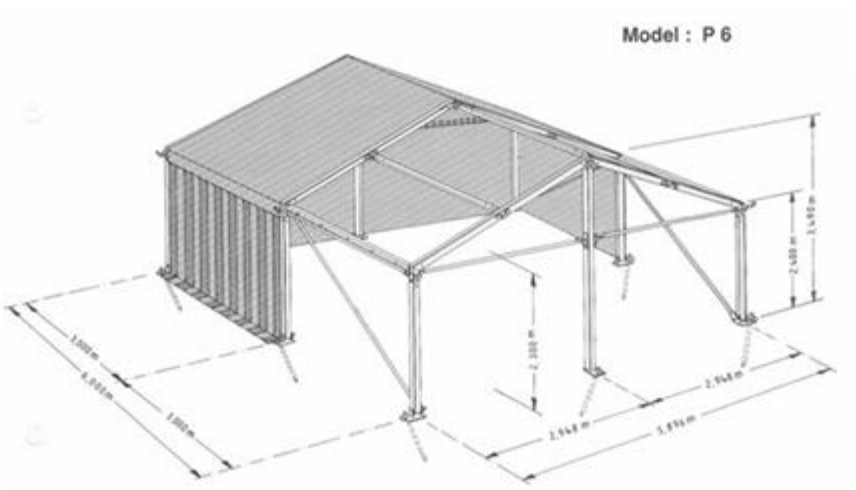
D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 10/01/18 *EngrDCT* *Sht.* 3
	Description.. Types P3,P4, P5 & P6	*Job. No.* 11691/A

CALCULATIONS

DESCRIPTION OF STRUCTURES

The buildings consist of aluminium frames positioned at 3 metre centres along the length.(Type P6 shown below). The greatest height to eaves is 2.4m and to ridge 3.5m. Side to side stability is provided by the stiffness of the frames and longitudinal stiffness by wall bracing. 60 x 60 aluminium tube purlins are provided between the frames and CHS rails at eaves and ground level help carry the side curtains.

The roof membranes are supported continuously along the lengths of the frames using wide piping [keder] which slides into the pre-formed tracks in the aluminium sections. This keder system also supports the vertical edges of the side curtains.



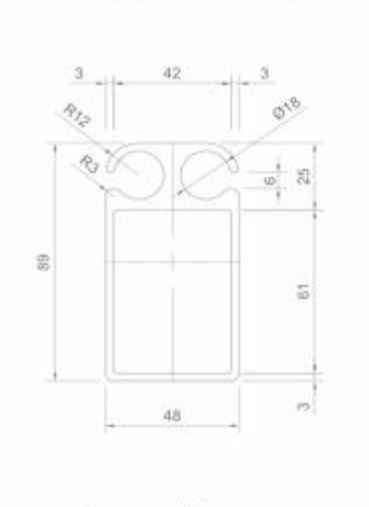
D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 10/01/18 *EngrDCT* *Sht.* 4	
	Description.. Types P3,P4, P5 & P6	*Job. No.* 11691/A	

CALCULATIONS

SECTION PROPERTIES *(from manufacturers information)*

Frame legs and Rafters

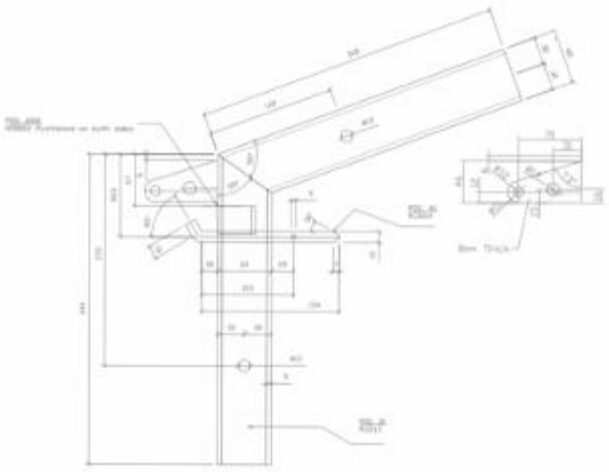
Rafter/Leg extrusions:



Area = *10.46cm2*
Ix = *95.7cm4*
Iy = *129.7cm4*
Zy = *18.8c*

Inserts at Eaves

These are from steel rectangular tube of size 60 x 40 x 5mm thick.



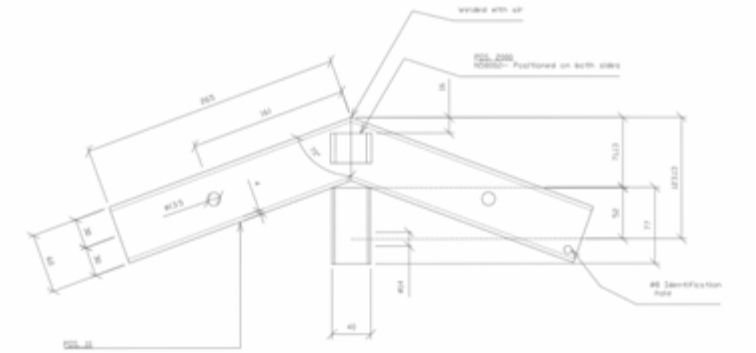
D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 10/01/18 *EngrDCT*	*Sht.* 5
	Description.. Types P3,P4, P5 & P6	*Job. No.* 11691/A	

CALCULATIONS

A = [40 x 60] – [32 x 52] = 7.34cm2
Ix = bd3/12 = [40 x 60³/12] – [32 x 52³/12] = 34.5cm4
Iy = db3/12 = [60 x 40³/12] – [52 x 32³/12] = 17.8cm4
J = 92.9cm4
Zx = 9.6cm3

Ridge insert

A = 7.34cm2
Ix = 34.5cm4
Iy = 17.8cm4
J = 49cm4
Zx = 9.6cm3



Purlins and ridge beams

(60 x 60 x 2mm Rectangular tubes)....

Area = 2.36cm2
Ix = 13.7cm4
Iy = 13.7cm4

Bracing.

Standard CHS section 48.3 x 2mm

Gable Posts

As frame Legs and Rafters.

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 10/01/18 *EngrDCT* *Sht.* 6
	Description.. Types P3,P4, P5 & P6	*Job. No.* 11691/A

CALCULATIONS

REQUIREMENTS OF BS EN 13782 – 2015: Temporary Structures

Clause 5.1: *The following calculations will ensure against overturning, sliding and lifting off.*

Clause 5.1.2: *Special loads imposed during erection should be recognized. .....Where calculation seems not sufficient to evaluate the limit states of assemblies the analysis may be substituted by testing at an independent testing body.* *[Two such tests were carried out to completed full size structures and data collected by this office which has been used for analysis of the steel inserts and leg and rafter sections]*

Clause 6.3: *A conventional load of at least 0.1kN/m2 acting downwards shall be assumed unless the dead loads are known to be greater.*

Clause 6.4.2.2: *Determine wind pressures in accordance with BS EN 1991-1-4:200+A1:2010, but assume the following minimum pressures for varying heights of building:*

Up to 5 metres high	*0.5kN/m2*
5 to 10 metres high	*0.6kN/m2*
10 to 15 metres high	*0.66kN/m2*
15 to 20 metres high	*0.71kN/m2*
20 - 25 metres high	*0.76kN/m2*

These buildings are less than 10m width and 5m high. Pressures of 0.3kN/m2 will be assumed.

Clause 6.6.2: *Use partial factors of 1.5 for single variable action and 1.35 for more than one. [These are added within the computer analysis].*

Clause 7.2: *Factors of safety between 1 & 1.3 shall be assumed when checking overturning, sliding and lifting [depending on conditions]*

Clause 7.2: *The weight of dry canvas shall be taken as 5N/m2*

Clause 8: *The recommendations given in clause 8 shall be used in determining the suitability of holding down devices.*

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 10/01/18 *EngrDCT*	*Sht.* 7
	Description.. Types P3,P4, P5 & P6	*Job. No.* 11691/A	

CALCULATIONS 11691/A.odt

CALCULATION OF LOADING

MAX WIND PRESSURES:

Since all the structures being considered here are less than 10m span and 5m high, the condition in ***Clause 6.4.2.2*** *above shall be adopted and all surface pressures will be assumed as* ***0.3kN/m2***

MAX. FRAME LOADS

These include above pressure x 3m spacing

WIND FROM SIDE (case 1)

Windward leg 0.9kN/m
Leeward leg 0.9kN/m
Rafters [windward slope] 0.9kN/m [Leeward slope] 0.9kN/m
Gable posts 0.9kN/m

WIND FROM END (case 2)

Legs 0.9kN/m
Gable posts [windward] 0.9kN/m [leeward] 0.9kN/m
Rafters 0.9kN/m

NOTE:
The side curtains have lightweight top rails independent from the eaves purlin. The curtains are fixed to these and to the posts. The wind load from the side walls will therefore be applied as a UDL up the height of the posts.

DEAD LOADS

The least dead loads of the fabric are 650g. per sq. metre for the walls and roof. However, ***Clause 7.2 states that*** *The weight of dry canvas shall be taken as 5N/m2.*

From manufacturers information ...
Total dead UDL to rafter = 0.16kN/m
Dead wall load applied at eaves = 0.27kN

ALPHA HIRE

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 10/01/18 *EngrDCT*	*Sht.* 8
	Description.. Types P3,P4, P5 & P6	*Job. No.* 11691/A	

CALCULATIONS

SNOW LOADS:

Most of the snow falling on the building will melt due to the lack of insulation. If severe snow is likely in the area, cables should be used between the eaves to strengthen the roof structure. These calculations assume a nominal snow loading of 0.2 kN/m2 which has been included in load combination 3 of the analysis.

If snow in excess of 70mm depth is anticipated, cross cables will be required

SUPERSTRUCTURE ANALYSIS.

Type P6 tent framework is the most onerous for the structures with member sizes used in this group and has been computer analysed for the worst combination of loadings and the results are enclosed. For analysis purposes it has been assumed that the building length is 12m. Variations to this will not adversely affect the analysis results.

To check the adequacy of the eaves insert, the worst loads to this joint have been abstracted from the program and the stresses in the section determined. These have been compared with the results of the destructive test carried out to the structure [enclosed as Appendix B]

The worst theoretical deflection is 191mm - OK for this type of building.

The highest stress in the aluminium frame is 11.3N/mm2 *- (Allowable 162N/mm2 x 1.25 wind factor = 202N/mm2)*

The maximum uplift load is 11kN.

In accordance with BS EN 13782 – 2005 Clause 8...

Where wind speeds of 27 metres per second or above are forecast, provide heavy duty holding down ratchet strops to vehicles or concrete blocks weighing 100kg or more.

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 10/01/18 *EngrDCT* *Sht.* 9	
	Description.. Types P3,P4, P5 & P6	*Job. No.* 11691/A	

CALCULATIONS 11691/A.pdf

CHECK THE EAVES INSERTS:

The results of a destructive test to the structure showed a maximum ultimate load to the ridge and eaves insert of 6.22kNm.. The worst likely moment induced due to wind [element 12] is 4.2kNm This provides a safety factor of 6.22/4.2 = 1.51 against failure under worst wind loading. Since loads will be very short and failure [as witnessed during the test] would be unlikely to cause harm to occupants, this is considered satisfactory.

EAVES AND RIDGE INSERTS ADEQUATE UNDER WORST LIKELY WIND CONDITIONS IN MAINLAND UK.

CHECK THE WALL BARS:

These are from 26.9 x 2 steel CHS.
They carry only part of the side wind since the membranes are fixed to the posts and the top rails. 0.3m2/m carried.

Because these are between fixed points with the eaves beam above, if bending failure takes place they will act in tension to resist the loading.

Estimate of worst UDL from side walls under wind loading:

Resultant load to rails
= $\sqrt{1.29^2 + 0.4^2}$
= 1.34kN/m

Moment to rails
= 1.34kN/m x $3^2/8$ =1.5kNm

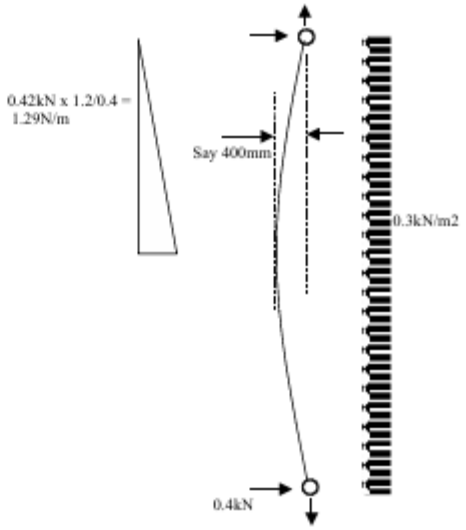
Z of section = 0.96cm3

Induced stress = M/Z

= 1562N/mm2

Therefore the rail will act as tension members.

Assume deflection has reached 150mm when tension begins to carry the load.



D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 10/01/18 *EngrDCT* *Sht.* 10
	Description.. Types P3,P4, P5 & P6	*Job. No.* 11691/A

CALCULATIONS

UDL to rail = 1.34kN/m

Approx tension in rail = 12.5kN

Stress in steel = 12.5E3/ 145mm2 = 86N/mm2

IN SEVERE WIND, THE WALL BARS MAY DEFLECT BUT FAILURE IS UNLIKELY.

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 12/11/21 *EngrDCT*	*Sht.* 11
	Description.. Types P3,P4, P5 & P6	*Job. No.* 11691/A	

CALCULATIONS 11691/A.odt

RECALCULATION OF WORST LEG UPLIFT

The computer analysis carried out previously made the assumption that the worst calculated wind loads could act simultaneously in two directions at te same time. This is an unlikely event and a recheck is considered appropriate. The calculated wind pressures will be used as before.

Since *the buildings are generally longer than they are wide, the most likely uplift failure will occur due to winds form the side.*

DEAD LOADS

The least dead loads of the fabric are 650g. per sq. metre for the walls and roof. However, ***Clause 7.2 states that*** *The weight of dry canvas shall be taken as 5N/m2.*

From manufacturers information ...
Total dead UDL to rafter = 0.16kN/m
Dead wall load applied at eaves = 0.27kN

SNOW LOADS:

Most of the snow falling on the building will melt due to the lack of insulation. If severe snow is likely in the area, cables should be used between the eaves to strengthen the roof structure. These calculations assume a nominal snow loading of 0.2 kN/m2 which has been included in load combination 3 of the analysis.

If snow in excess of 70mm depth is anticipated, cross cables will be required

MAX WIND PRESSURES:

These have been calculated in accordance with BS EN 1991-1-4:2005+A1:2010 EN 1991-1-4:2005+A1:2010 (E).

It would be appropriate, due to the lightweight structure to consider peak velocity pressure as critical, determined from clause 4.5.

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 12/11/21 *EngrDCT* *Shr.* 12	
	Description.. Types P3,P4, P5 & P6	*Job. No.* 11691/A	

CALCULATIONS

11691/A.odt

Peak velocity pressure $q_p(z) = [1+7 \cdot I(z)] \cdot \frac{1}{2} \rho v^2(z) = c_0(z) \cdot q_b$

Where

ρ is the air density, taken as 1.25kg/m3

$c_0(z)$ *is the exposure factor .....*

$c_0(z) = q_p(z) / q_b$ ..... *Taken as 1 for flat terrain*

q_b *is the basic velocity pressure given as*

$$q = 0.5 \rho v_b^2$$

The basic wind velocity $v_b = c_{dir} \cdot c_{season} \cdot v_{b,0}$

Where:

v_b *is the basic wind velocity,* *defined as a function of wind direction and time of year at 10 m above ground of terrain category II*

$v_{b,0}$ *is the fundamental value of the basic wind velocity, ... Taken as 19m/s*

P c_{dir} *is the directional factor, ... Taken as 1*

C_{season} *is the season factor ..... Taken as 1*

$$v_b = 1 \times 1 \times 19 m/s = \mathbf{19 m/s}$$

Therefore $q = 0.5 \times 1.25 \times 19^2 = \mathbf{225\ N/m2}$

Drag will not be a major contributory factor here.

Worst wind pressure on external surfaces will be

$w_e = q_p(z_e) \cdot c_{pe}$

Where $q_p(z_e) \cdot$ ***= 225N/mm2***

Use the value of 0.3kN/m2 as given in BS EN 13782 – 2015:

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 12/11/21 *EngrDCT* *Sht.* 13	
	Description.. Types P3,P4, P5 & P6	*Job. No.* 11691/A	

CALCULATIONS 11691/A.odt

WIND FROM SIDE (case 1)

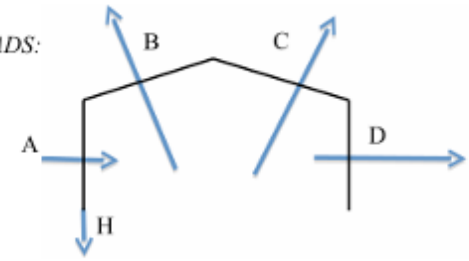
Windward leg 0.9kN/m
Leeward leg 0.9kN/m
Rafters [windward slope] 0.9kN/m [Leeward slope] 0.9kN/m
Gable posts 0.9kN/m

LOADS TO EACH FRAME:

Load A = 2.7kN
Load B = 3.2kN
Load C = 3.2kN
Load D = 2.7kN

DETERMINATION OF HOLDING DOWN LOADS:

Taking moments about one foot



$[1.2m \times [A + D]] + [B \times 3m] + [C \times 3m] = H \times 6m$

$H = \frac{[1.2m \times [A + D]] + [B \times 3m] + [C \times 3m]}{6m}$

$\text{Max value of } H = \frac{[1.2m \times 5.4kN] + [3.2kN \times 3m] = [3.2kN \times 3m]}{6m}$

H max = ***4.3kN***

WORST UPLIFT CAUSED BY WIND TO END ONLY :

The total area of a gable = [2.4 x 6] + [6 x 1/2] = 18m2

Assume the centre of area to be 1.5m above ground level.

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 12/11/21 *EngrDCT* *Sht.* 14
	Description.. Types P3,P4, P5 & P6	*Job. No.* 11691/A

CALCULATIONS

The minimum spacing between frames is 3m

The uplift value H = 18m2 x 0.9kN/m2 x 2.7m *to each side*

2 x 3m

H = 7.29kN

THE WORST LEG UPLIFT = 4.3kN [0.43 TONNES]

ADN 7.3kN [0.73 TONNES] TO LEGS OF BRACED BAYS

D C Townend Chtd Engr.	Job No 11691	Sheet No 1	Rev
Software licensed to D C Townend & Co Ltd	Part Frame		
Job Title Frames P3,P4, 65 & P6	Ref		
	By DCT	Date 09/1/18	Chd
Client Hoecker Structures	File 11691a.asa	Date/Time 9/1/18	

Node Displacement Summary

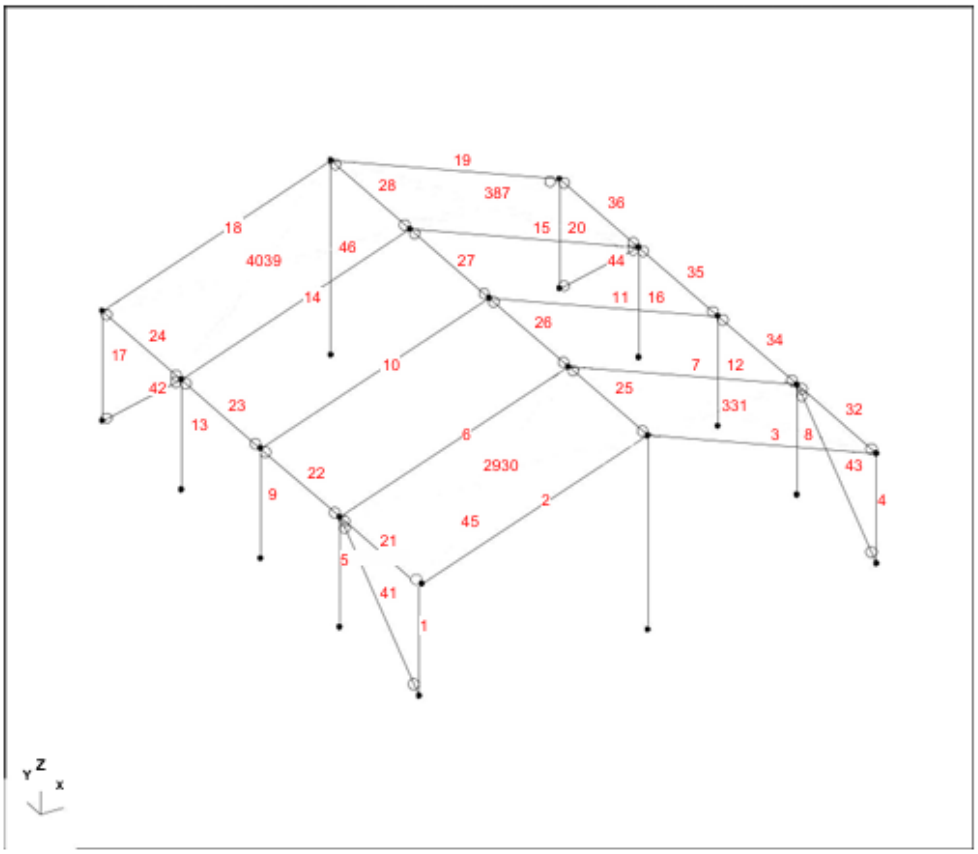
	Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)	rX (rad)	rY (rad)	rZ (rad)
Max X	12	C2	**180.854**	0.000	0.132	210.854	0.00000	0.01319	-0.00000
Min X	12	C1	**-83.313**	0.000	-0.128	91.313	-0.00000	0.01635	-0.00000
Max Y	3	C1	-0.000	**0.358**	-0.455	0.579	-0.00012	0.00000	-0.00000
Min Y	23	C1	0.000	**-0.358**	-0.455	0.579	0.00012	-0.00000	-0.00000
Max Z	13	C2	124.288	-0.000	**181.939**	180.674	0.00000	-0.01656	-0.00000
Min Z	13	C1	-0.000	-0.000	**-190.777**	190.777	0.00000	0.00000	-0.00000
Max rX	18	C1	0.000	-0.242	-3.709	3.717	**0.00015**	-0.00000	-0.00000
Min rX	8	C1	-0.000	0.242	-3.709	3.717	**-0.00015**	0.00000	-0.00000
Max rY	11	C2	0.000	0.000	0.000	0.000	-0.00000	**0.12892**	-0.00000
Min rY	11	C1	0.000	0.000	0.000	0.000	-0.00000	**-0.06525**	-0.00000
Max rZ	1	C1	0.000	0.000	0.000	0.000	0.00007	-0.00626	**0.00016**
Min rZ	4	C1	0.344	-0.158	-0.063	0.384	0.00006	-0.01210	**-0.00016**
Max Rst	13	C2	124.288	-0.000	235.939	**190.674**	0.00000	-0.01656	-0.00000

Element Displacement Detail Summary

Displacements shown in italic indicate the presence of an element offset

	Emt	L/C	d (m)	X (mm)	Y (mm)	Z (mm)	Resultant (mm)
Max X	10	C2	0.266	**180.133**	-0.000	-0.598	180.134
Min X	9	C1	2.160	**-93.288**	0.000	-0.115	93.288
Max Y	2	C1	5.328	0.000	**0.358**	-0.455	0.579
Min Y	18	C1	5.328	0.000	**-0.358**	-0.455	0.579
Max Z	11	C2	0.799	126.375	-0.000	**180.532**	272.596
Min Z	10	C1	5.328	0.000	-0.000	**-190.777**	248.777
Max rX	11	C2	0.799	126.375	-0.000	190.532	**190.596**

D C Townend Chtd Engr.	Job No 11691	Sheet No 2	Rev
Software licensed to D C Townend & Co Ltd	Part Frame		
Job Title Frames P3, P4 . P5 & P6	Ref		
	By DCT	Date 09/1/18	Chd
Client Hoecker Structures	File 11691	Date/Time 09/1/18	



D C Townend Chtd Engr.	Job No 11691	Sheet No 3	Rev
Software licensed to D C Townend & Co Ltd	Part Frame		
Job Title Frames P3, P4, P5 & P6	Ref		
	By DCT	Date 09/1/18	Chd
Client Hoecker Structures	File 11691	Date/Time 09/1/18	

Element End Force Summary

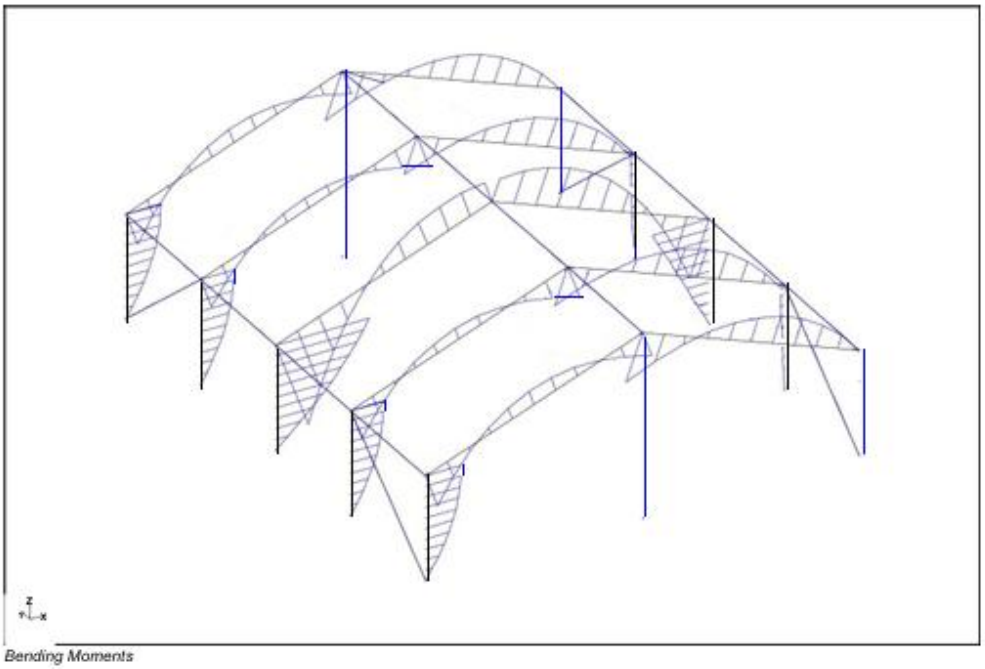
The signs of the forces at end B of each element have been reversed. For example: this means that the Min Fx entry gives the largest tension value for an element.

				Axial	Shear		Torsion	Bending	
	Emt	Node	L/C	Fx (kN)	Fy (kN)	Fz (kN)	Mx (kNm)	My (kNm)	Mz (kNm)
Max Fx	45	26	C1	**11.345**	0.000	-0.001	0.000	-0.000	-0.000
Min Fx	45	26	C2	**-11.345**	0.439	0.000	0.000	-0.000	0.000
Max Fy	45	26	C2	-10.428	**0.439**	0.000	0.000	-0.000	0.000
Min Fy	2	2	C1	-2.660	**-0.001**	2.329	0.000	-1.435	-0.000
Max Fz	9	11	C2	-5.658	-0.000	**3.122**	0.000	0.000	-0.000
Min Fz	10	12	C2	-3.667	0.000	**-3.144**	-0.000	7.880	0.000
Max Mx	2	2	C1	-2.660	-0.001	2.329	**0.000**	-1.435	-0.000
Min Mx	3	3	C1	-4.548	0.001	2.801	**-0.000**	-2.694	0.004
Max My	9	12	C2	-5.658	-0.000	1.825	0.000	**7.880**	0.000
Min My	9	12	C1	5.466	-0.000	-2.657	0.000	**-6.378**	0.000
Max Mz	2	3	C1	-4.548	-0.001	-2.801	0.000	-2.694	**0.004**
Min Mz	45	3	C2	-10.428	0.439	0.000	0.000	0.002	**-1.861**

Reaction Summary

			Horizontal		Vertical	Moment		
	Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
Max FX	11	C1	**2.657**	-0.000	5.466	0.000	0.000	0.000
Min FX	11	C2	**-4.741**	-0.000	-5.658	0.000	0.000	0.000
Max FY	21	C2	-2.745	**0.979**	-3.968	-0.000	-0.000	0.000
Min FY	1	C2	-2.745	**-0.979**	-3.968	-0.000	-0.000	0.000
Max FZ	26	C1	-0.000	0.001	**10.996**	0.000	0.000	0.000
Min FZ	26	C2	-0.439	-0.000	**-10.428**	0.000	-0.000	0.000
Max MX	16	C1	0.621	-0.000	1.950	**0.000**	0.000	0.000
Min MX	25	C2	-0.085	0.904	-2.909	**-0.000**	0.000	-0.000
Max MY	11	C1	2.657	-0.000	5.466	0.000	**0.000**	0.000
Min MY	21	C2	-2.745	0.979	-3.968	-0.000	**-0.000**	0.000
Max MZ	25	C1	-0.598	-0.979	3.484	0.000	0.000	**0.000**
Min MZ	25	C2	-0.085	0.904	-2.909	-0.000	0.000	**-0.000**

D C Townend Chtd Engr.	Job No 11691	Sheet No 4	Rev
Software licensed to D C Townend & Co Ltd	Part Frame		
Job Title Frames P3,P4, P5 & P6	Ref		
	By DCT	Date 09/1/18	Chd
Client Hoecker Structures	File 11691	Date/Time 09/1/18	



Bending Moments

Element End Stresses Summary

	Emt	Node	L/C	Corner 1 (N/mm^2)	Corner 2 (N/mm^2)	Corner 3 (N/mm^2)	Corner 4 (N/mm^2)	Max Tens (N/mm^2)	Max Comp (N/mm^2)
Max Corner 1	45	26	C1	**11.332**	10.512	10.512	10.512	0.000	10.512
Min Corner 1	45	26	C2	**-9.970**	-9.970	-9.970	-9.970	-9.970	0.000
Max Corner 2	45	26	C1	10.512	**10.512**	10.512	10.512	0.000	10.512
Min Corner 2	45	26	C2	-9.970	**-9.970**	-9.970	-9.970	-9.970	0.000
Max Corner 3	45	26	C1	10.512	10.512	**10.512**	10.512	0.000	10.512
Min Corner 3	45	26	C2	-9.970	-9.970	**-9.970**	-9.970	-9.970	0.000
Max Corner 4	45	26	C1	10.512	10.512	10.512	**10.512**	0.000	10.512
Min Corner 4	45	26	C2	-9.970	-9.970	-9.970	**-9.970**	-9.970	0.000

D C Townend Chtd Engr.	Job No 11691	Sheet No 5	Rev
Software licensed to D C Townend & Co Ltd	Part Frame		
Job Title Frames P3, P4, P5 & P6	Ref		
	By DCT	Date 09/1/18	Chd
Client Hoecker Structures	File 11691	Date/Time 09/1/18	

Element Stress Detail Summary

Distance d is given from end A.

	Emt	L/C	d (m)	Corner 1 (N/mm²)	Corner 2 (N/mm²)	Corner 3 (N/mm²)	Corner 4 (N/mm²)	Max Tens (N/mm²)	Max Comp (N/mm²)
Max Corner 1	45	C1	0.000	**11.3312**	10.512	10.512	10.512	0.000	10.512
Min Corner 1	45	C2	0.000	**-9.970**	-9.970	-9.970	-9.970	-9.970	0.000
Max Corner 2	45	C1	0.000	10.512	**10.512**	10.512	10.512	0.000	10.512
Min Corner 2	45	C2	0.000	-9.970	**-9.970**	-9.970	-9.970	-9.970	0.000
Max Corner 3	45	C1	0.000	10.512	10.512	**10.512**	10.512	0.000	10.512
Min Corner 3	45	C2	0.000	-9.970	-9.970	**-9.970**	-9.970	-9.970	0.000
Max Corner 4	45	C1	0.000	10.512	10.512	10.512	**10.512**	0.000	10.512
Min Corner 4	45	C2	0.000	-9.970	-9.970	-9.970	**-9.970**	-9.970	0.000

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 18/11/16 *EngrDCT* *Sht.* 1	
	Description.. Types P7,P8, P9 & P10	*Job. No.* 11542a	

CALCULATIONS

hoecker® STRUCTURES

CALCULATIONS IN RESPECT OF DEMOUNTABLE STRUCTURES TYPES P7, P8, P9 AND P10 FOR CONSTRUCTION IN MAINLAND UNITED KINGDOM

Produced by:

D C TOWNEND & Co Ltd
Chartered Structural Engineers
15 Devon Way, Trowse, Norwich NR14 8GE. England.
Tel 44 1603 766787 Fax 44 1603 763727 Email dctownend@fsmail.net

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 18/11/16	
		EngrDCT	*Sht.* 2
	Description.. Types P7,P8, P9 & P10	*Job. No.* 11542a	

CALCULATIONS

11542a.odt

PREAMBLE.

This document is based on information from the German Designers and checks the building in accordance with BS EN 1991-1-4:200+A1:2010 [wind], BS EN 13782: 2015, Temporary Structures, - Tents Safety... and BS EN 1999 Eurocode 9. Design of aluminium structures.

Analysis has been carried out based on the maximum loads imposed by the worst likely wind conditions in mainland UK. Analysis is by computer 3-dimensional program "Q S E Space for Windows version 8.1" and the results have been included in this document.

The most onerous factors have been assumed to allow for long term erection, open elevated country and any combinations of length, width and height, when calculating the wind loads.

However, for this series of buildings, less than 10 metres span and 5 metres high, the recommended design pressure in ***Clause 6.4.2.2 of BS EN 13782: 2015*** *of 0.3kN/m2 will be assumed.*

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 18/11/16 *EngrDCT* *Sht.* 3	
	Description.. Types P7,P8, P9 & P10	*Job. No.* 11542a	

CALCULATIONS

DESCRIPTION OF STRUCTURES

The buildings consist of aluminium frames positioned at 3 metre centres along the length.(Figs 1,2 & 3) The greatest height to eaves is 2.4m and to ridge 4.24m. Side to side stability is provided by the stiffness of the frames and longitudinal

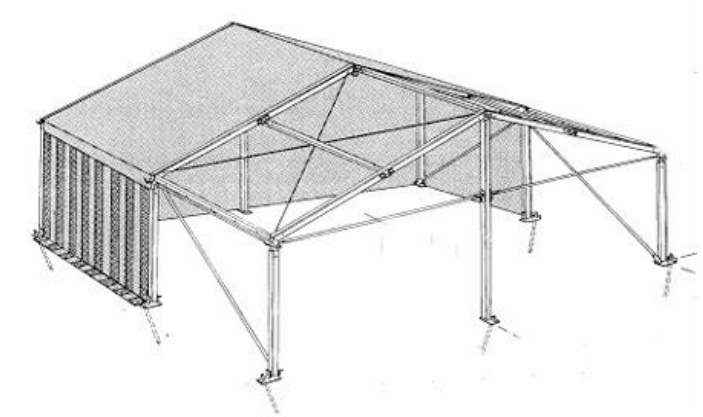


Fig. 1

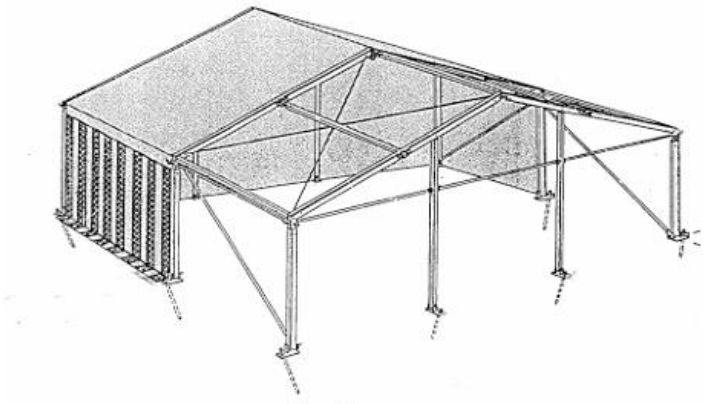


Fig. 2

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 18/11/16 *EngrDCT* / *Sht.* 4	
	Description.. Types P7,P8, P9 & P10	*Job. No.* 11542a	

CALCULATIONS

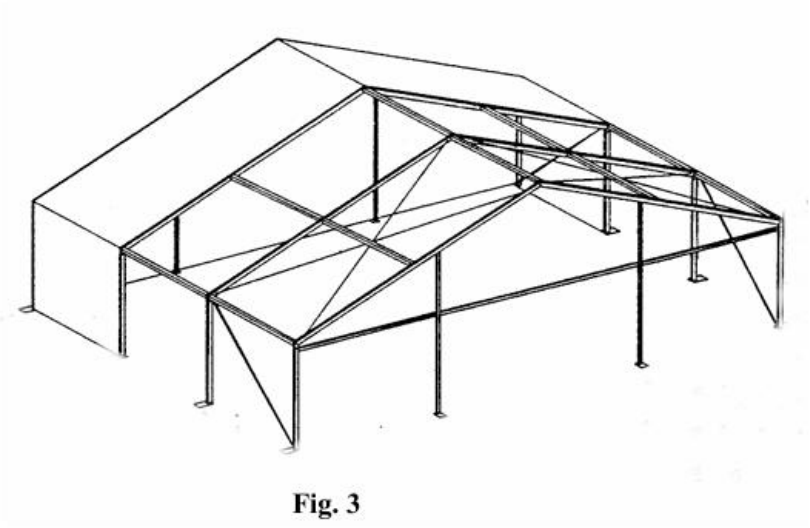


Fig. 3

stiffness by wall bracing. 60 x 60 aluminium tube purlins are provided between the frames and CHS rails at eaves and ground level help carry the side curtains.

The roof membranes are supported continuously along the lengths of the frames using wide piping [keder] which slides into the pre-formed tracks in the aluminium sections. This keder system also supports the vertical edges of the side curtains.

SECTION PROPERTIES *(from manufacturers information)*

Frame legs and Rafters

Two track extrusions:

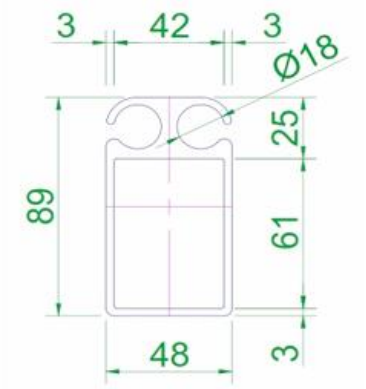
Area	=	*10.46cm2*
Ix	=	*95.7cm4*
Iy	=	*129.7cm4*
Zy	=	*18.8cm2*

Four track extrusions:

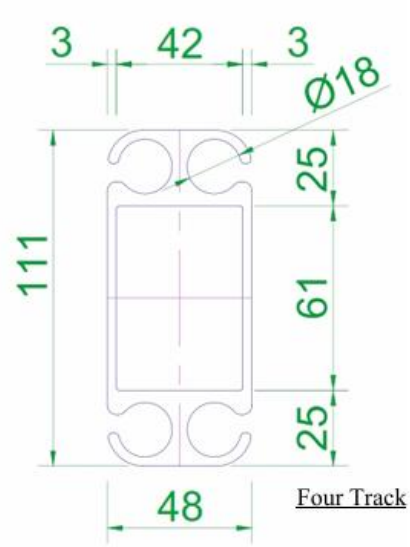
Area	=	*15.3cm2*
Ix	=	*222.36cm4*
Iy	=	*37.51cm4*
Zy	=	*40.06cm2*

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 18/11/16 *EngrDCT* *Sht.* 5	
	Description.. Types P7,P8, P9 & P10	*Job. No.* 11542a	

CALCULATIONS



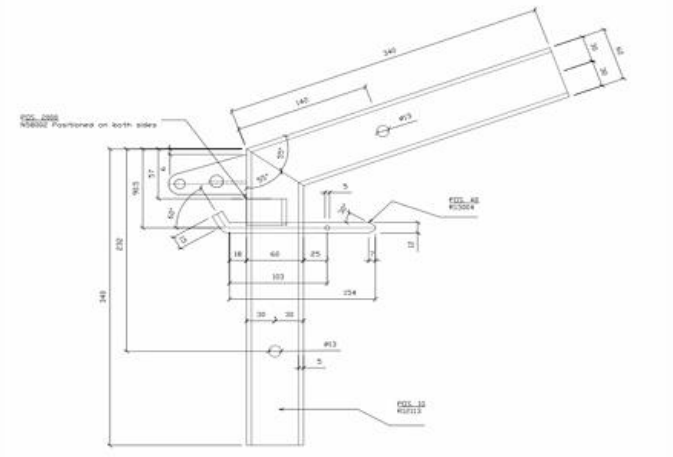
Two Track



Four Track

Inserts at Eaves

These are from steel rectangular tube of size 60 x 40 x 5mm thick.

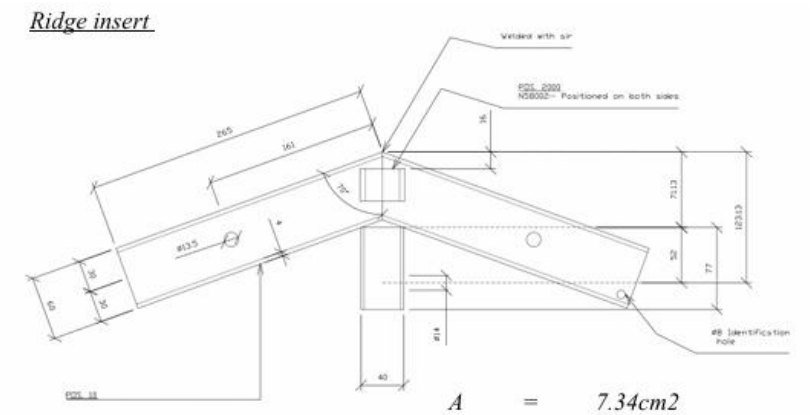


D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 18/11/16 *EngrDCT* *Sht.* 6	
	Description.. Types P7,P8, P9 & P10	*Job. No.* 11542a	

CALCULATIONS

A = [40 x 60] – [32 x 52] = 7.34cm2
Ix = bd3/12 = [40 x 60³/12] – [32 x 52³/12] = 34.5cm4
Iy = db3/12 = [60 x 40³/12] – [52 x 32³/12] = 17.8cm4
J = 92.9cm4
Zx = 9.6cm3

Ridge insert



A = 7.34cm2
Ix = 34.5cm4
Iy = 17.8cm4
J = 49cm4
Zx = 9.6cm3

Purlins and ridge beams

(60 x 60 x 2mm Rectangular tubes)....

Area = 2.36cm2
Ix = 13.7cm4
Iy = 13.7cm4

Bracing.

Standard CHS section 48.3 x 2mm

Gable Posts

As frame Legs and Rafters.

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 18/11/16 *EngrDCT* *Sht.* 7	
	Description.. Types P7,P8, P9 & P10	*Job. No.* 11542a	

CALCULATIONS 11542a.pdf

REQUIREMENTS OF BS EN 13782 – 2015: Temporary Structures

Clause 5.1: *The following calculations will ensure against overturning, sliding and lifting off.*

Clause 5.1.2: *Special loads imposed during erection should be recognized. .....Where calculation seems not sufficient to evaluate the limit states of assemblies the analysis may be substituted by testing at an independent testing body.* *{Two such tests were carried out to completed full size structures and data collected by this office which has been used for analysis of the steel inserts and leg and rafter sections}*

Clause 6.3: *A conventional load of at least 0.1kN/m2 acting downwards shall be assumed unless the dead loads are known to be greater.*

Clause 6.4.2.2: *Determine wind pressures in accordance with BS EN 1991-1-4:200+A1:2010, but assume the following minimum pressures for varying heights of building:*

Up to 5 metres high	*0.5kN/m2*
5 to 10 metres high	*0.6kN/m2*
10 to 15 metres high	*0.66kN/m2*
15 to 20 metres high	*0.71kN/m2*
20 - 25 metres high	*0.76kN/m2*

Where buildings are less than 10m width and 5m high. Pressures of 0.3kN/m2 may be assumed.

Clause 6.6.2: *Use partial factors of 1.5 for single variable action and 1.35 for more than one.*

Clause 7.2: *Factors of safety between 1 & 1.3 shall be assumed when checking overturning, sliding and lifting [depending on conditions]*

Clause 7.2: *The weight of dry canvas shall be taken as 5N/m2*

Clause 8: *The recommendations given in clause 8 shall be used in determining the suitability of holding down devices.*

D C Townend & Co Ltd
Chartered Structural Engineer.

Project		*Date* 18/11/16
Hoecker Demountable Structures	*EngrDCT*	*Sht.* 8
Description.. Types P7,P8, P9 & P10	*Job. No.*	11542a

CALCULATIONS 11542a.odt

CALCULATION OF LOADING

MAX WIND PRESSURES:

Since all the structures being considered here are less than 10m span and 5m high, the condition in ***Clause 6.4.2.2*** *above shall be adopted and all surface pressures will be assumed as* ***0.3kN/m2***

MAX. FRAME LOADS

These include above pressures x 3m spacing

WIND FROM SIDE (case 1)

Windward leg 0.9kN/m
Leeward leg 0.9kN/m
Rafters [windward slope] 0.9kN/m [Leeward slope] 0.9kN/m
Gable posts 0.9kN/m

WIND FROM END (case 2)

Legs 0.9kN/m
Gable posts [windward] 0.9kN/m [leeward] 0.9kN/m
Rafters 0.9kN/m

NOTE:
The side curtains have lightweight top rails independent from the eaves purlin. The curtains are fixed to these and to the posts. The wind load from the side walls will therefore be applied as a UDL up the height of the posts.

DEAD LOADS

The least dead loads of the fabric are 650g. per sq. metre for the walls and roof. However, ***Clause 7.2 states that*** *The weight of dry canvas shall be taken as 5N/m2.*

From manufacturers information ...
Total dead UDL to rafter = 0.16kN/m
Dead wall load applied at eaves = 0.27kN

D C Townend & Co Ltd
Chartered Structural Engineer.

Project		*Date* 18/11/16
Hoecker Demountable Structures	*EngrDCT*	*Sht.* 9
Description.. Types P7,P8, P9 & P10	*Job. No.*	11542a

CALCULATIONS

SNOW LOADS:

Most of the snow falling on the building will melt due to the lack of insulation. If severe snow is likely in the area, cables should be used between the eaves to strengthen the roof structure. These calculations assume a nominal snow loading of 0.2 kN/m2 which has been included in load combination 3 of the analysis. ***If snow in excess of 70mm depth is anticipated, cross cables will be required***

SUPERSTRUCTURE ANALYSIS.

Type P10 tent framework is the most onerous for the structures with member sizes used in this group and has been computer analysed for the worst combination of loadings and the results are enclosed. For analysis purposes it has been assumed that the building length is 12m. Variations to this will not adversely affect the analysis results. The analysis assumes 2 track posts and rails with eaves & ridge inserts.

To check the adequacy of the eaves insert, the worst loads to this joint have been abstracted from the program and the stresses in the section determined. These have been compared with the results of the destructive test carried out to the structure [enclosed as Appendix B]

The worst theoretical deflection is 266mm - OK for this type of building.

The highest stress in the aluminium frame is 10,5N/mm2 *- (Allowable 162N/mm2 x 1.25 wind factor = 202N/mm2)*

The maximum uplift load is 10.428kN.

In accordance with BS EN 13782 – 2005 Clause 8...

Where wind speeds of 27 metres per second or above are forecast. provide heavy duty holding down ratchet strops to vehicles or concrete blocks weighing 100kg or more.

CHECK THE EAVES INSERTS:

The results of a destructive test to the structure showed a maximum ultimate load to the ridge and eaves insert of 6.22kNm.. The worst likely moment

D C Townend & Co Ltd
Chartered Structural Engineer.

Project	Date 18/11/16
Hoecker Demountable Structures	EngrDCT Sht. 10
Description.. Types P7,P8, P9 & P10	Job. No. 11542a

CALCULATIONS

induced due to wind [element 12] is 4.2kNm This provides a safety factor of 6.22/4.2 = 1.51 against failure under worst wind loading. Since loads will be very short and failure [as witnessed during the test] would be unlikely to cause harm to occupants, this is considered satisfactory.

EAVES AND RIDGE INSERTS ADEQUATE UNDER WORST LIKELY WIND CONDITIONS IN MAINLAND UK.

CHECK THE WALL BARS:

These are from 26.9 x 2 steel CHS.
They carry only part of the side wind since the membranes are fixed to the posts and the top rails. Say 1m2/m carried.

Because these are between fixed points with the eaves beam above, if bending failure takes place they will act in tension to resist the loading.

Estimate of worst UDL from side walls under wind loading:

Resultant load to rails
= $\sqrt{1.29^2 + 0.4^2}$
= 1.34kN/m

Moment to rails
= 1.34kN/m x $3^2/8$ =1.5kNm

Z of section = 0.96cm3

Induced stress = M/Z

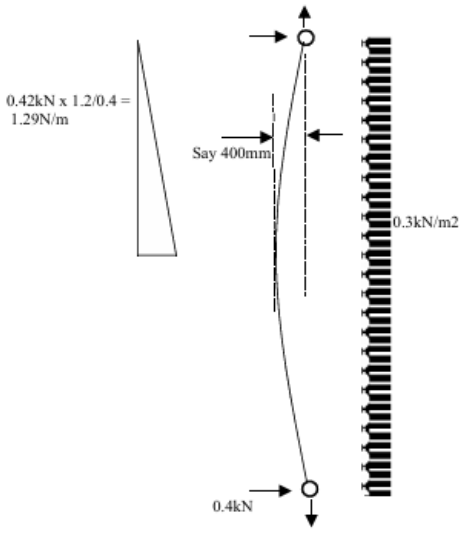
= 1562N/mm2

Therefore the rail will act as tension members.

Assume deflection has reached 150mm when tension begins to carry the load.

UDL to rail = 1.34kN/m

Approx tension in rail = 12.5kN



D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 18/11/16 *EngrDCT* *Sht.* 11
	Description.. Types P7,P8, P9 & P10	*Job. No.* 11542a

CALCULATIONS

Stress in steel = 12.5E3/ 145mm2 = 86N/mm2

IN SEVERE WIND, THE WALL BARS MAY DEFLECT BUT FAILURE IS UNLIKELY.

D C Townend Chtd Engr.	Job No 11542a	Sheet No 1	Rev
Software licensed to D C Townend & Co Ltd	Part Frame		
Job Title Frames P7, P8, P9 & P10	Ref		
	By DCT	Date 08-11-16	Chd
Client Hoecker Structures	File 11542a.asa	Date/Time 18-Nov-2016 15:43	

Node Displacement Summary

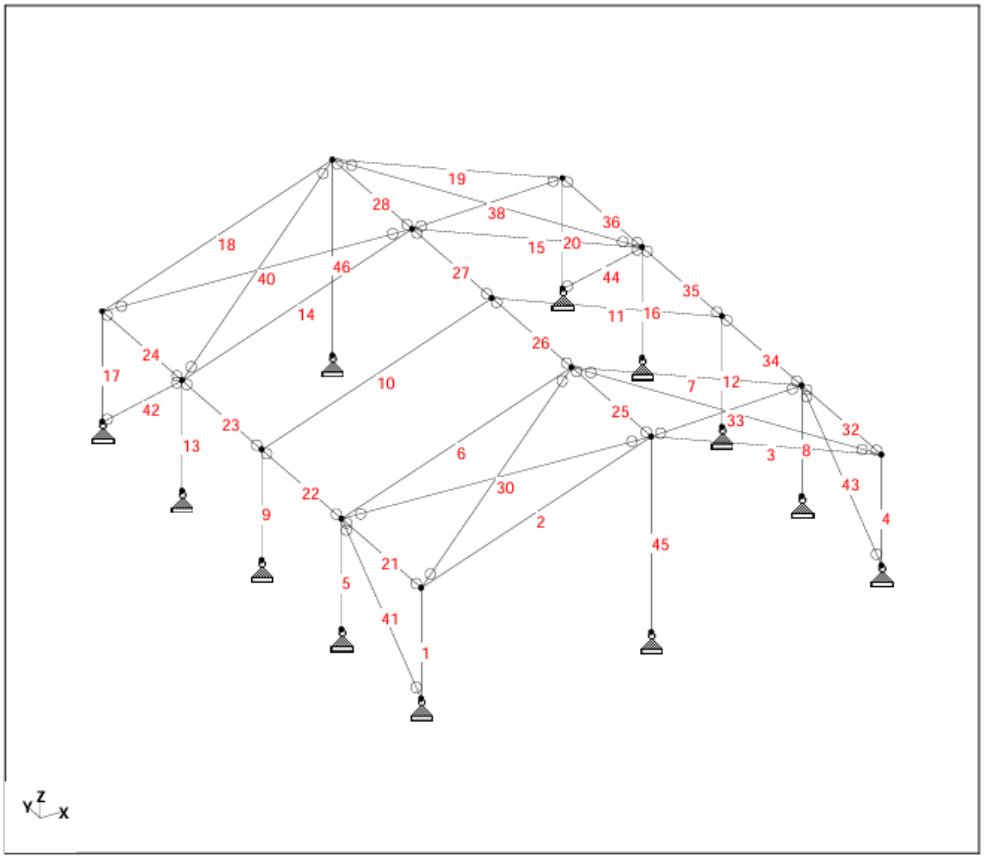
	Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)	rX (rad)	rY (rad)	rZ (rad)
Max X	12	C2	**210.854**	0.000	0.132	210.854	0.00000	0.01319	-0.00000
Min X	12	C1	**-91.313**	0.000	-0.128	91.313	-0.00000	0.01635	-0.00000
Max Y	3	C1	-0.000	**0.358**	-0.455	0.579	-0.00012	0.00000	-0.00000
Min Y	23	C1	0.000	**-0.358**	-0.455	0.579	0.00012	-0.00000	-0.00000
Max Z	13	C2	124.288	-0.000	**235.939**	266.674	0.00000	-0.01656	-0.00000
Min Z	13	C1	-0.000	-0.000	**-248.777**	248.777	0.00000	0.00000	-0.00000
Max rX	18	C1	0.000	-0.242	-3.709	3.717	**0.00015**	-0.00000	-0.00000
Min rX	8	C1	-0.000	0.242	-3.709	3.717	**-0.00015**	0.00000	-0.00000
Max rY	11	C2	0.000	0.000	0.000	0.000	-0.00000	**0.12892**	-0.00000
Min rY	11	C1	0.000	0.000	0.000	0.000	-0.00000	**-0.06525**	-0.00000
Max rZ	1	C1	0.000	0.000	0.000	0.000	0.00007	-0.00626	**0.00016**
Min rZ	4	C1	0.344	-0.158	-0.063	0.384	0.00006	-0.01210	**-0.00016**
Max Rst	13	C2	124.288	-0.000	235.939	**266.674**	0.00000	-0.01656	-0.00000

Element Displacement Detail Summary

Displacements shown in italic indicate the presence of an element offset

	Emt	L/C	d (m)	X (mm)	Y (mm)	Z (mm)	Resultant (mm)
Max X	10	C2	0.266	**211.133**	-0.000	-0.598	211.134
Min X	9	C1	2.160	**-93.288**	0.000	-0.115	93.288
Max Y	2	C1	5.328	0.000	**0.358**	-0.455	0.579
Min Y	18	C1	5.328	0.000	**-0.358**	-0.455	0.579
Max Z	11	C2	0.799	126.375	-0.000	**241.532**	272.596
Min Z	10	C1	5.328	0.000	-0.000	**-248.777**	248.777
Max rX	11	C2	0.799	126.375	-0.000	241.532	**272.596**

D C Townend Chtd Engr.	Job No 11542a	Sheet No 2	Rev
Software licensed to D C Townend & Co Ltd	Part Frame		
Job Title Frames P7, P8, P9 & P10	Ref		
	By DCT	Date 08-11-16	Chd
Client Hoecker Structures	File 11542a.asa	Date/Time	18-Nov-2016 15:43



D C Townend Chtd Engr.	Job No 11542a	Sheet No 3	Rev
Software licensed to D C Townend & Co Ltd	Part Frame		
Job Title Frames P7, P8, P9 & P10	Ref		
	By DCT	Date 08-11-16	Chd
Client Hoecker Structures	File 11542a.asa	Date/Time 18-Nov-2016 15:43	

Element End Force Summary

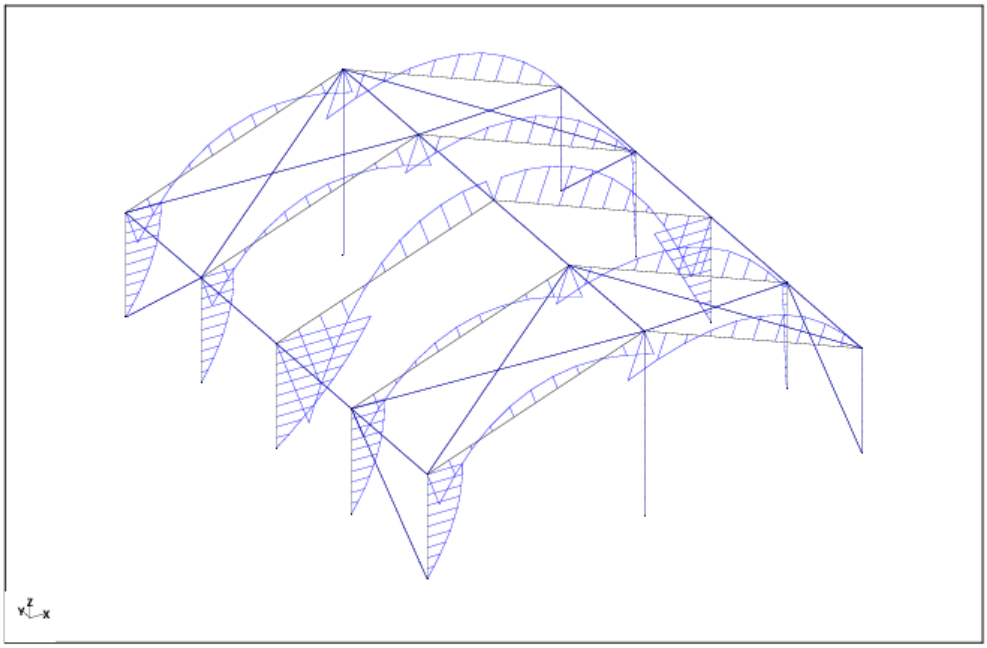
The signs of the forces at end B of each element have been reversed. For example: this means that the Min Fx entry gives the largest tension value for an element.

	Emt	Node	L/C	Axial Fx (kN)	Shear Fy (kN)	Shear Fz (kN)	Torsion Mx (kNm)	Bending My (kNm)	Bending Mz (kNm)
Max Fx	45	26	C1	**10.996**	0.000	-0.001	0.000	-0.000	-0.000
Min Fx	45	26	C2	**-10.428**	0.439	0.000	0.000	-0.000	0.000
Max Fy	45	26	C2	-10.428	**0.439**	0.000	0.000	-0.000	0.000
Min Fy	2	2	C1	-2.660	**-0.001**	2.329	0.000	-1.435	-0.000
Max Fz	9	11	C2	-5.658	-0.000	**4.741**	0.000	0.000	-0.000
Min Fz	10	12	C2	-3.667	0.000	**-4.679**	-0.000	7.880	0.000
Max Mx	2	2	C1	-2.660	-0.001	2.329	**0.000**	-1.435	-0.000
Min Mx	3	3	C1	-4.548	0.001	2.801	**-0.000**	-2.694	0.004
Max My	9	12	C2	-5.658	-0.000	1.825	0.000	**7.880**	0.000
Min My	9	12	C1	5.466	-0.000	-2.657	0.000	**-6.378**	0.000
Max Mz	2	3	C1	-4.548	-0.001	-2.801	0.000	-2.694	**0.004**
Min Mz	45	3	C2	-10.428	0.439	0.000	0.000	0.002	**-1.861**

Reaction Summary

	Node	L/C	Horizontal FX (kN)	Horizontal FY (kN)	Vertical FZ (kN)	Moment MX (kNm)	Moment MY (kNm)	Moment MZ (kNm)
Max FX	11	C1	**2.657**	-0.000	5.466	0.000	0.000	0.000
Min FX	11	C2	**-4.741**	-0.000	-5.658	0.000	0.000	0.000
Max FY	21	C2	-2.745	**0.979**	-3.968	-0.000	-0.000	0.000
Min FY	1	C2	-2.745	**-0.979**	-3.968	-0.000	-0.000	0.000
Max FZ	26	C1	-0.000	0.001	**10.996**	0.000	0.000	0.000
Min FZ	26	C2	-0.439	-0.000	**-10.428**	0.000	-0.000	0.000
Max MX	16	C1	0.621	-0.000	1.950	**0.000**	0.000	0.000
Min MX	25	C2	-0.085	0.904	-2.909	**-0.000**	0.000	-0.000
Max MY	11	C1	2.657	-0.000	5.466	0.000	**0.000**	0.000
Min MY	21	C2	-2.745	0.979	-3.968	-0.000	**-0.000**	0.000
Max MZ	25	C1	-0.598	-0.979	3.484	0.000	0.000	**0.000**
Min MZ	25	C2	-0.085	0.904	-2.909	-0.000	0.000	**-0.000**

D C Townend Chtd Engr.	Job No 11542a	Sheet No 4	Rev
Software licensed to D C Townend & Co Ltd	Part Frame		
Job Title Frames P7, P8, P9 & P10	Ref		
	By DCT	Date 08-11-16	Chd
Client Hoecker Structures	File 11542a.asa	Date/Time 18-Nov-2016 15:43	



Bending Moments

Element End Stresses Summary

	Emt	Node	L/C	Corner 1 (N/mm²)	Corner 2 (N/mm²)	Corner 3 (N/mm²)	Corner 4 (N/mm²)	Max Tens (N/mm²)	Max Comp (N/mm²)
Max Corner 1	45	26	C1	**10.512**	10.512	10.512	10.512	0.000	10.512
Min Corner 1	45	26	C2	**-9.970**	-9.970	-9.970	-9.970	-9.970	0.000
Max Corner 2	45	26	C1	10.512	**10.512**	10.512	10.512	0.000	10.512
Min Corner 2	45	26	C2	-9.970	**-9.970**	-9.970	-9.970	-9.970	0.000
Max Corner 3	45	26	C1	10.512	10.512	**10.512**	10.512	0.000	10.512
Min Corner 3	45	26	C2	-9.970	-9.970	**-9.970**	-9.970	-9.970	0.000
Max Corner 4	45	26	C1	10.512	10.512	10.512	**10.512**	0.000	10.512
Min Corner 4	45	26	C2	-9.970	-9.970	-9.970	**-9.970**	-9.970	0.000

D C Townend Chtd Engr.	Job No 11542a	Sheet No 5	Rev
Software licensed to D C Townend & Co Ltd	Part Frame		
Job Title Frames P7, P8, P9 & P10	Ref		
	By DCT	Date 08-11-16	Chd
Client Hoecker Structures	File 11542a.asa	Date/Time 18-Nov-2016 15:43	

Element Stress Detail Summary

Distance d is given from end A.

	Emt	L/C	d (m)	Corner 1 (N/mm²)	Corner 2 (N/mm²)	Corner 3 (N/mm²)	Corner 4 (N/mm²)	Max Tens (N/mm²)	Max Comp (N/mm²)
Max Corner 1	45	C1	0.000	**10.512**	10.512	10.512	10.512	0.000	10.512
Min Corner 1	45	C2	0.000	**-9.970**	-9.970	-9.970	-9.970	-9.970	0.000
Max Corner 2	45	C1	0.000	10.512	**10.512**	10.512	10.512	0.000	10.512
Min Corner 2	45	C2	0.000	-9.970	**-9.970**	-9.970	-9.970	-9.970	0.000
Max Corner 3	45	C1	0.000	10.512	10.512	**10.512**	10.512	0.000	10.512
Min Corner 3	45	C2	0.000	-9.970	-9.970	**-9.970**	-9.970	-9.970	0.000
Max Corner 4	45	C1	0.000	10.512	10.512	10.512	**10.512**	0.000	10.512
Min Corner 4	45	C2	0.000	-9.970	-9.970	-9.970	**-9.970**	-9.970	0.000

CALCULATIONS

CLIENT: *Hoecker Structures*

PREMISES: *Structure Type P12*

D C TOWNEND & Co Ltd
Chartered Structural Engineers

ALPHA HIRE

ALPHA HIRE

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 23/11/16 *EngrDCT* *Sht.* 1	
	Description.. Types P12	*Job. No.* 11542b	

CALCULATIONS

hoecker® STRUCTURES

CALCULATIONS IN RESPECT OF DEMOUNTABLE STRUCTURE TYPE P12 FOR CONSTRUCTION IN MAINLAND UNITED KINGDOM

Produced by:

D C TOWNEND & Co Ltd
Chartered Structural Engineers
15 Devon Way, Trowse, Norwich NR14 8GE. England.
Tel 44 1603 766787 Fax 44 1603 763727 Email dctownend@fsmail.net

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 23/11/16	
		EngrDCT	*Sht.* 2
	Description.. Types P12	*Job. No.* 11542b	

CALCULATIONS 11542b.odt

PREAMBLE.

This document is based on information from the German Designers and checks the building in accordance with BS EN 1991-1-4:200+A1:2010 [wind], BS EN 13782: 2015, Temporary Structures, - Tents Safety... and BS EN 1999 Eurocode 9. Design of Aluminium Structures.

Analysis has been carried out based on the maximum loads imposed by the worst likely wind conditions in mainland UK. Analysis is by computer 3-dimensional program "Q S E Space for Windows version 8.1" and the results have been included in this document.

The most onerous factors have been assumed to allow for long term erection, open elevated country and any combinations of length, width and height, when calculating the wind loads.

For this building, less than 5 metres high, the design pressures are calculated in accordance with BS EN 1991-1-4:200+A1:2010 [wind] but with minimum values as specified in BS EN 13782 – 2015: _Clause 6.4.2.2:

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 23/11/16 *EngrDCT* *Sht.* 3
	Description.. Types P12	*Job. No.* 11542b

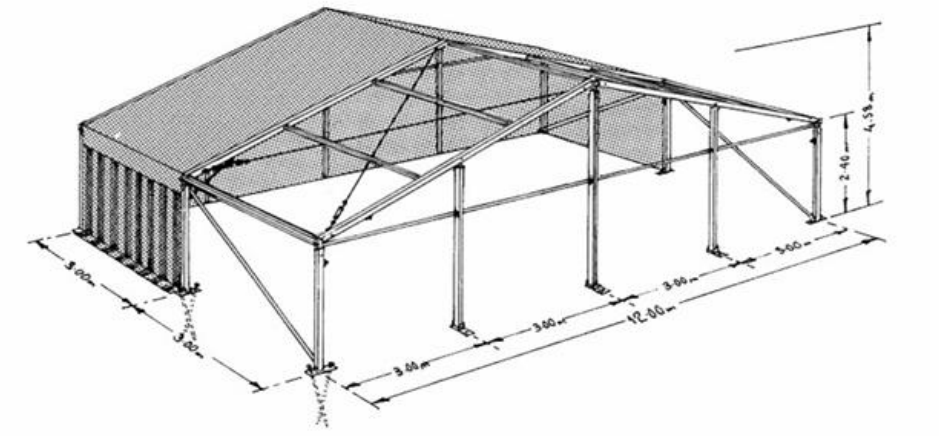
CALCULATIONS

DESCRIPTION OF STRUCTURE

The building consists of aluminium frames positioned at 3 metre centres along the length.(below) The greatest height to eaves is 2.46m and to ridge 4.6m. Side to side stability is provided by the stiffness of the frames [in this case, knee braces are provided to strengthen the joint]. and longitudinal stiffness by wall bracing. 60 x 60 aluminium tube purlins are provided between the frames and CHS rails at eaves and ground level help carry the side curtains.

The roof membranes are supported continuously along the lengths of the frames using wide piping [keder] which slides into the pre-formed tracks in the aluminium sections. This keder system also supports the vertical edges of the side curtains.

The roof membranes are supported continuously along the lengths of the frames using wide piping [keder] which slides into the pre-formed tracks in the aluminium sections. This keder system also supports the vertical edges of the curtains.



D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 23/11/16 *EngrDCT* / *Sht.* 4	
	Description.. Types P12	*Job. No.* 11542b	

CALCULATIONS

11542b.odt

SECTION PROPERTIES *(from manufacturers information)*

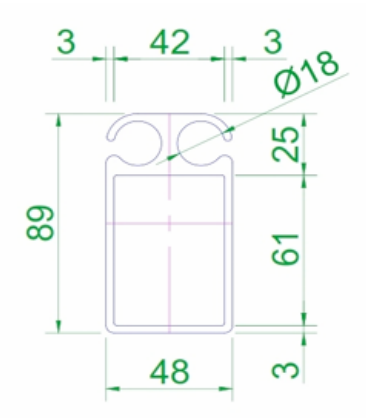
Frame legs and Rafters

Two track extrusions:

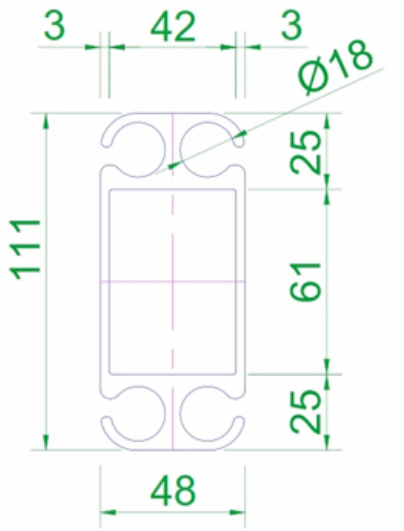
Area	=	*10.46cm2*
Ix	=	*95.7cm4*
Iy	=	*29.7cm4*
Zy	=	*18.8cm2*

Four track extrusions:

Area	=	*15.3cm2*
Ix	=	*222.36cm4*
Iy	=	*37.51cm4*
Zy	=	*40.06cm2*



Two Track



Four Track

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 23/11/16 *EngrDCT* *Sht.* 5	
	Description.. Types P12	*Job. No.* 11542b	

CALCULATIONS

11542b.odt

Inserts at Eaves

These are from steel rectangular tube of size 60 x 40 x 5mm thick.

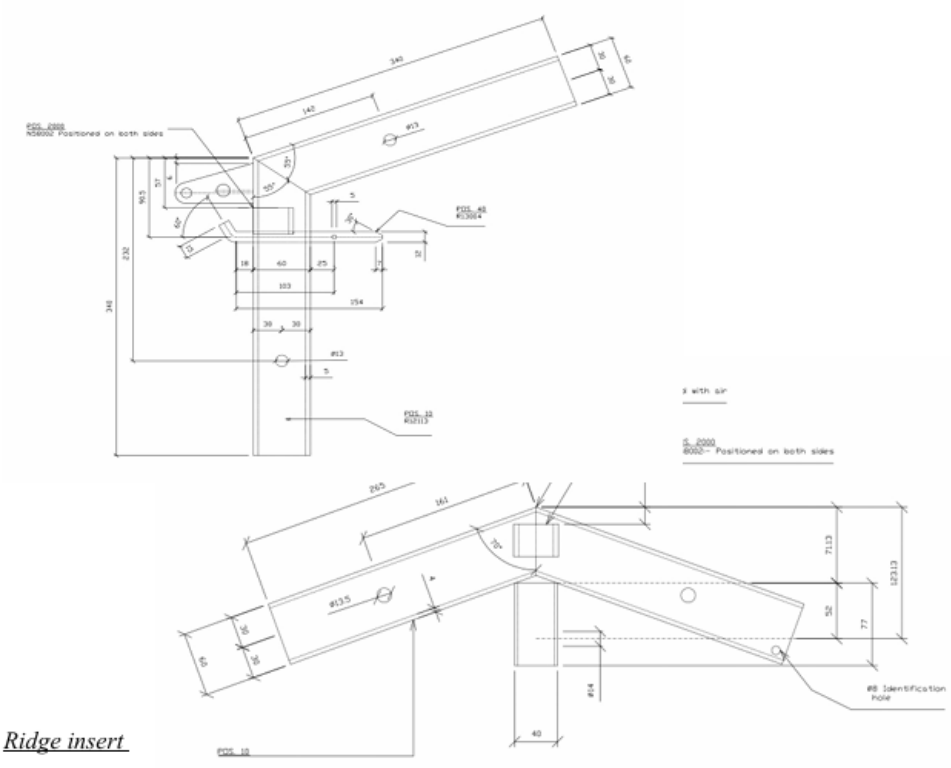
$A = [40 \times 60] - [32 \times 52] = 7.34cm2$

$Ix = bd3/12 = [40 \times 60^3/12] - [32 \times 52^3/12] = 34.5cm4$

$Iy = db3/12 = [60 \times 40^3/12] - [52 \times 32^3/12] = 17.8cm4$

$J = 92.9cm4$

$Zx = 9.6cm3$



Ridge insert

$A = 7.34cm2$

$Ix = 34.5cm4$

$Iy = 17.8cm4$

$J = 49cm4$

$Zx = 9.6cm3$

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 23/11/16 *EngrDCT* *Sht.* 6	
	Description.. Types P12	*Job. No.* 11542b	

CALCULATIONS

Purlins and ridge beams

(60 x 60 x 2mm Rectangular tubes)....

Area = 2.36cm2
Ix = 13.7cm4
Iy = 13.7cm4

Bracing.

Standard CHS section 48.3 x 2mm

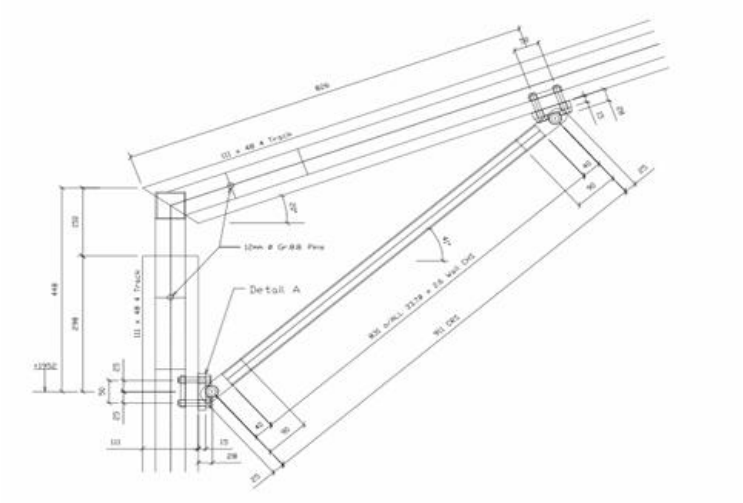
Gable Posts

As frame Legs and Rafters.

Knee Braces:

33.7mm dia x 2.6 steel CHS

With fixing brackets clamped into the tracks on the aluminium sections.



D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 23/11/16	
		EngrDCT	*Sht.* 7
	Description.. Types P12	*Job. No.* 11542b	

CALCULATIONS 11542b.odt

REQUIREMENTS OF BS EN 13782 – 2015: Temporary Structures

Clause 5.1: *The calculations will ensure against overturning, sliding and lifting off.*

Clause 5.1.2: *Special loads imposed during erection should be recognized. .....Where calculation seems not sufficient to evaluate the limit states of assemblies the analysis may be substituted by testing at an independent testing body.* *[Two such tests were carried out to completed full size structures and data collected by this office which has been used for analysis of the steel inserts and leg and rafter sections]*

Clause 6.3: *A conventional load of at least 0.1kN/m2 acting downwards shall be assumed unless the dead loads are known to be greater.*

Clause 6.4.2.2: *Determine wind pressures in accordance with BS EN 1991-1-4:200+A1:2010, but assume the following minimum pressures for varying heights of building:*

Up to 5 metres high	*0.5kN/m2*
5 to 10 metres high	*0.6kN/m2*
10 to 15 metres high	*0.66kN/m2*
15 to 20 metres high	*0.71kN/m2*
20 - 25 metres high	*0.76kN/m2*

Where buildings are less than 10m width and 5m high. Pressures of 0.3kN/m2 may be assumed.

Clause 6.6.2: *Use partial factors of 1.5 for single variable action and 1.35 for more than one.*

Clause 7.2: *Factors of safety between 1 & 1.3 shall be assumed when checking overturning, sliding and lifting [depending on conditions]*

Clause 7.2: *The weight of dry canvas shall be taken as 5N/m2*

Clause 8: *The recommendations given in clause 8 shall be used in determining the suitability of holding down devices.*

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 23/11/16 *EngrDCT* *Sht.* 8
	Description.. Types P12	*Job. No.* 11542b

CALCULATIONS

CALCULATION OF LOADING

MAX WIND PRESSURES:

Since the structure is less than 5m high, the condition for a minimum pressure of 0.5kN/m2 in ***BS EN 13782 – 2005; Clause 6.4.2.2*** *above shall be adopted as a minimum pressure if greater than the calculated values below.*

Pressures below calculated in accordance with ***BS EN 1991-1-4:2005+A1:2010 EN 1991-1-4:2005+A1:2010 (E).***

NOTE:

Wind speeds in the northern parts of the UK become sufficiently high to cause over stressing to the structure. In these areas, modifications will be required. On the chart below shows the parts of the UK below the line are where these calculations will apply.

It would be appropriate, due to the lightweight structure to consider peak velocity pressure as critical, determined from clause 4.5.

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 23/11/16 *EngrDCT* *Sht.* 9	
	Description.. Types P12	*Job. No.* 11542b	

CALCULATIONS

11542b.odt

Peak velocity pressure $q_p(z) = [1+7 \cdot I(z)] \cdot \frac{1}{2} \cdot \rho \cdot v^2(z) = c_0(z) \cdot q_b$

Where

ρ is the air density, taken as 1.25kg/m3

$c_0(z)$ *is the exposure factor .....*

$c_0(z) = q_p(z) / q_b$ ..... *Taken as 1 for flat terrain*

q_b *is the basic velocity pressure given as*

$$q = 0.5 \cdot \rho \cdot v_b^2$$

The basic wind velocity $v_b = c_{dir} \cdot c_{season} \cdot v_{b,0}$

Where:

v_b *is the basic wind velocity, defined as a function of wind direction and time of year at 10 m above ground of terrain category II*

$v_{b,0}$ *is the fundamental value of the basic wind velocity, ... Taken as* ***27m/s***

P c_{dir} *is the directional factor, ... Taken as 1*

C_{season} *is the season factor ..... Taken as 1*

$$v_b = 1 \times 1 \times 25 m/s = \mathbf{27m/s}$$

Therefore $q = 0.5 \times 1.25 \times 25^2 =$ ***390N/m2***

Drag will not be a major contributory factor here.

Worst wind pressure on external surfaces will be

$w_e = q_p(z_e) \cdot c_{pe}$

Where $q_p(z_e) \cdot = 390 N/mm2$

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 23/11/16 *EngrDCT* *Sht.* 10	
	Description.. Types P12	*Job. No.* 11542b	

CALCULATIONS

Since the calculated wind pressure from ***BS EN 1991-1-4:2005+A1:2010 EN 1991-1-4:2005+A1:2010 (E)*** *are less than the minimum value of* ***0.5kN/m2*** *stated in* ***BS EN 13782 – 2015: Clause 6.4.2.2 ,*** *the latter value will apply.*

Therefore q = ***0.5kN/m2***

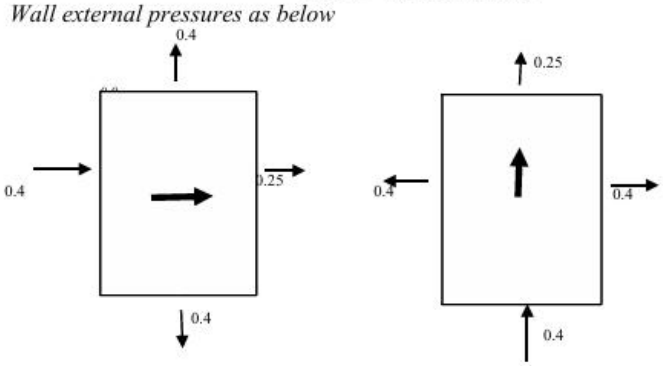
Cpe [From section 7] as below

h/d = 0.41

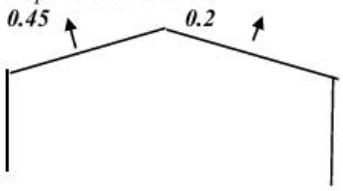
Worst Cpe {Walls}
= 0.8 or –0.5 [Windward/Leeward]

& Ave –0.8 [side walls]

Wall external pressures as below



Worst Cpe {roof} *[Take zones H & I as overall pressure]*
For roof pitch 18 deg. Take Cpe as 0.9 and 0.4



D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 23/11/16	
		EngrDCT	*Sht.* 11
	Description.. Types P12	*Job. No.* 11542b	

CALCULATIONS

11542b.odt

MAX. FRAME LOADS

These include above pressures x 3m spacing

WIND FROM SIDE (case 1)

Windward leg 1.2kN/m
Leeward leg 0.75kN/m
Rafters [windward slope] 1.35kN/m [Leeward slope] 0.6kN/m
Gable posts 1.2kN/m

WIND FROM END (case 2)

Legs 1.2kN/m
Gable posts [windward] 1.2kN/m [leeward] 0.75kN/m
Rafters 1.35kN/m

NOTE:

The side curtains have lightweight top rails independent from the eaves purlin. The curtains are fixed to these and to the posts. The wind load from the side walls will therefore be applied as a UDL up the height of the posts.

DEAD LOADS

The least dead loads of the fabric are 650g. per sq. metre for the walls and roof. However, ***BS EN 13782 – 2005: Clause 7.2 states that*** *The weight of dry canvas shall be taken as* ***5N/m2.***

Total dead UDL to rafter = ***0.15kN/m***
Dead wall load applied at eaves = ***0.27kN***

SNOW LOADS:

Most of the snow falling on the building will melt due to the lack of insulation. If severe snow is likely in the area, cables should be used between the eaves to strengthen the roof structure. These calculations assume a nominal snow loading of 0.2 kN/m2 which has been included in load combination 3 of the analysis. ***If snow in excess of 70mm depth is anticipated, cross cables will be required***

ALPHA HIRE

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 23/11/16 *EngrDCT* *Sht.* 12	
	Description.. Types P12	*Job. No.* 11542b	

CALCULATIONS 11542b.odt

SUPERSTRUCTURE ANALYSIS.

The most onerous combination of loadings together with partial loading factors taken from ***BS EN 13782 – 2005:*** *are used to analyze the structure and the results are enclosed. For analysis purposes it has been assumed that the building length is 12m. Variations to this will not adversely affect the analysis results. The analysis assumes 4 track posts and rafters.*

The worst theoretical deflection is 248mm - OK for this type of building.
The test to the structure showed deflections of 800mm under loads 50% higher than the worst likely wind loading. It was noted that the frames had entered the plastic stage under such loading]

The highest stress in unreinforced aluminium frame is 10.5N/mm2 -
(Allowable 162N/mm2 x 1.25 wind factor = 202N/mm2)
[Higher stresses were recorded in the reinforced triangle at eaves. These were considered satisfactory]

The maximum uplift load is 10.42kN.

THE ABOVE CALCULATIONS HAVE SHOWN THAT THIS BUILDING IS ADEQUATE TO CARRY THE WORST LIKELY WIND LOADS FOR A SEMI PERMANENT ERECTION PERIOD IN MOST PARTS OF MAINLAND UK [SEE SHEET 8].

IN HIGH WINDS, ADDITIONAL HOLDING DOWN MAY BE REQUIRED

Where wind speeds of 27metres per second or above are forecast. provide heavy duty holding down ratchet strops to vehicles or concrete blocks weighing 500kg or more.

D C Townend & Co Ltd *Chartered Structural Engineer.*	*Project* Hoecker Demountable Structures	*Date* 23/11/16 *EngrDCT* / *Sht.* 13	
	Description.. Types P12	*Job. No.* 11542b	

CALCULATIONS

CHECK THE WALL BARS:

These are from 26.9 x 2 steel CHS.
They carry only part of the side wind since the membranes are fixed to the posts and the top rails. Say 1m2/m carried.

Because these are between fixed points with the eaves beam above, if bending failure takes place they will act in tension to resist the loading.

Estimate of worst UDL from side walls under wind loading:

Resultant load to rails
= $\sqrt{1.29^2 + 0.4^2}$
= 1.34kN/m

Moment to rails
= 1.34kN/m x $3^2/8$ =1.5kNm

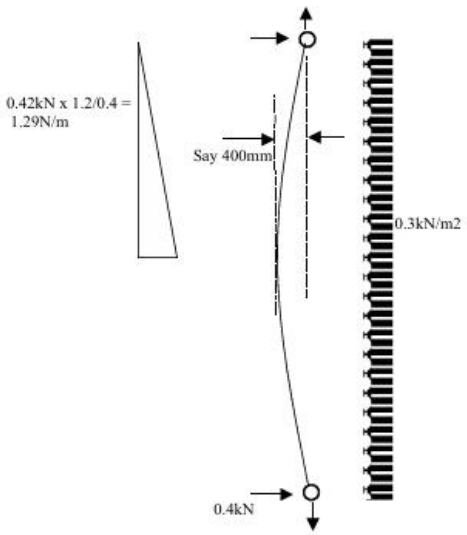
Z of section = 0.96cm3

Induced stress = M/Z

= 1562N/mm2

Therefore the rail will act as tension members.

Assume deflection has reached 150mm when tension begins to carry the load.



UDL to rail = 1.34kN/m

Approx tension in rail = 12.5kN

Stress in steel = 12.5E3/ 145mm2 = 86N/mm2

IN SEVERE WIND, THE WALL BARS MAY DEFLECT BUT FAILURE IS UNLIKELY.

D C Townend Chtd Engr.	Job No 11542b	Sheet No 1	Rev
Software licensed to D C Townend & Co Ltd	Part Part Frame		
Job Title P12 Structure	Ref		
	By DCT	Date 09-11-16	Chd
Client Hoecker UK	File 11542b.asa	Date/Time 23-Nov-2016 17:54	

Node Displacement Summary

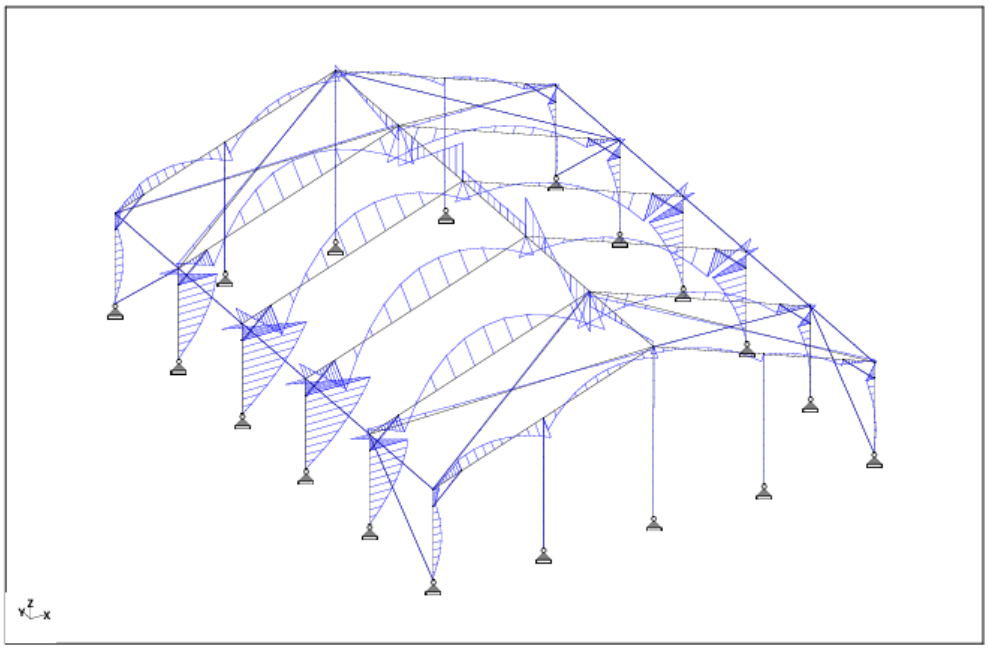
	Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)	rX (rad)	rY (rad)	rZ (rad)
Max X	25	C3	**106.445**	0.125	0.080	106.445	0.00001	-0.02562	-0.00501
Min X	27	C2	**-122.237**	-2.752	-6.268	122.428	0.00215	0.00433	-0.00009
Max Y	45	C2	-23.589	**2.765**	0.216	23.751	-0.00145	0.00410	-0.00064
Min Y	18	C2	-23.589	**-2.765**	0.216	23.751	0.00145	0.00410	0.00064
Max Z	22	C3	-1.364	-0.314	**249.673**	249.677	0.03775	0.00119	0.00000
Min Z	22	C1	-0.275	0.281	**-223.726**	223.727	-0.03380	-0.00055	0.00001
Max rX	22	C3	-1.364	-0.314	249.673	249.677	**0.03775**	0.00119	0.00000
Min rX	31	C3	-1.364	0.314	249.673	249.677	**-0.03775**	0.00119	-0.00000
Max rY	20	C2	0.000	0.000	0.000	0.000	-0.00021	**0.09926**	-0.00233
Min rY	26	C2	11.510	-0.444	71.766	72.685	0.00302	**-0.10735**	0.00201
Max rZ	14	C2	-23.664	0.303	-0.019	23.666	-0.00034	-0.00026	**0.00671**
Min rZ	41	C2	-23.664	-0.303	-0.019	23.666	0.00034	-0.00026	**-0.00671**
Max Rst	22	C3	-1.364	-0.314	249.673	**249.677**	0.03775	0.00119	0.00000

Element Displacement Detail Summary

Displacements shown in italic indicate the presence of an element offset

	Emt	L/C	d (m)	X (mm)	Y (mm)	Z (mm)	Resultant (mm)
Max X	21	C3	1.809	**108.924**	0.124	0.072	108.924
Min X	73	C2	1.500	**-125.058**	0.000	-0.138	125.058
Max Y	26	C3	3.881	-14.723	**9.693**	286.904	287.445
Min Y	36	C3	3.881	-14.723	**-9.693**	286.904	287.445
Max Z	26	C2	3.327	-90.419	8.551	**357.796**	369.143
Min Z	68	C1	1.500	-0.280	0.000	**-249.074**	249.074
Max rX	26	C2	3.327	-90.419	8.551	357.796	**369.143**

D C Townend Chtd Engr.	Job No 11542b	Sheet No 2	Rev
Software licensed to D C Townend & Co Ltd	Part Part Frame		
Job Title P12 Structure	Ref		
	By DCT	Date 09-11-16	Chd
Client Hoecker UK	File 11542b.asa	Date/Time 23-Nov-2016 17:54	

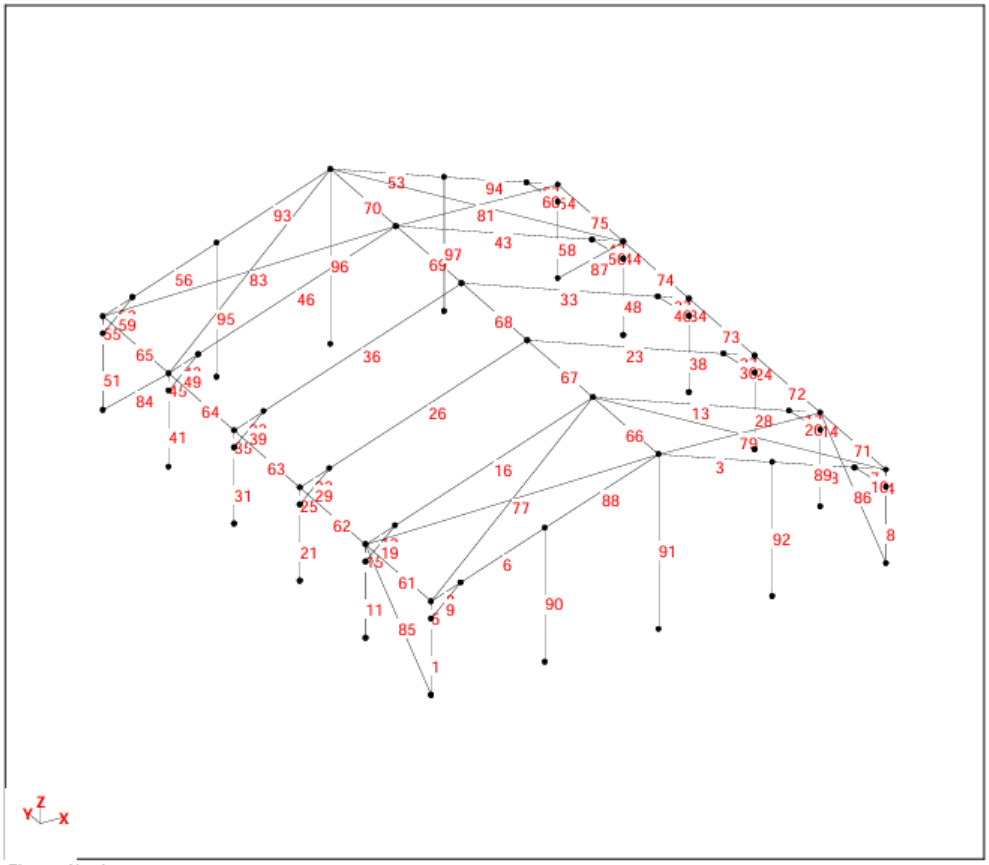


Bending Moments

Reaction Summary

	Node	L/C	Horizontal FX (kN)	Horizontal FY (kN)	Vertical FZ (kN)	Moment MX (kNm)	Moment MY (kNm)	Moment MZ (kNm)
Max FX	20	C1	**2.134**	0.012	4.329	0.000	0.000	0.000
Min FX	20	C2	**-4.881**	-0.045	-6.153	0.000	-0.000	0.000
Max FY	51	C3	-1.061	**2.629**	-4.575	0.000	-0.000	0.000
Min FY	6	C3	-1.061	**-2.629**	-4.575	0.000	0.000	-0.000
Max FZ	59	C1	0.000	-0.020	**12.272**	-0.000	-0.000	0.000
Min FZ	59	C3	0.007	0.022	**-12.122**	0.000	-0.000	0.000
Max MX	47	C3	1.083	2.625	-4.591	**0.000**	0.000	0.000
Min MX	38	C2	-3.594	0.059	-2.419	**-0.000**	-0.000	0.000
Max MY	20	C1	2.134	0.012	4.329	0.000	**0.000**	0.000
Min MY	24	C1	-2.143	0.012	4.292	0.000	**-0.000**	0.000
Max MZ	6	C1	-0.284	2.275	2.650	-0.000	-0.000	**0.000**
Min MZ	6	C3	-1.061	-2.629	-4.575	0.000	0.000	**-0.000**

D C Townend Chtd Engr.	Job No 11542b	Sheet No 3	Rev
Software licensed to D C Townend & Co Ltd	Part Part Frame		
Job Title P12 Structure	Ref		
	By DCT	Date 09-11-16	Chd
Client Hoecker UK	File 11542b.asa	Date/Time 23-Nov-2016 17:54	



Element Numbers

D C Townend Chtd Engr.	Job No 11542b	Sheet No 4	Rev
Software licensed to D C Townend & Co Ltd	Part Part Frame		
Job Title P12 Structure	Ref		
	By DCT	Date 09-11-16	Chd
Client Hoecker UK	File 11542b.asa	Date/Time 23-Nov-2016 17:54	

Element End Stresses Summary

	Emt	Node	L/C	Corner 1 (N/mm²)	Corner 2 (N/mm²)	Corner 3 (N/mm²)	Corner 4 (N/mm²)	Max Tens (N/mm²)	Max Comp (N/mm²)
Max Corner 1	67	13	C2	**324.845**	243.523	-284.590	-365.912	-365.912	324.845
Min Corner 1	67	22	C2	**-351.696**	-268.817	227.750	310.629	-351.696	310.629
Max Corner 2	67	13	C3	321.436	**320.898**	-367.244	-367.782	-367.782	321.436
Min Corner 2	69	31	C3	-351.105	**-350.558**	304.212	304.759	-351.105	304.759
Max Corner 3	67	13	C1	-287.151	-287.946	**329.470**	328.674	-287.946	329.470
Min Corner 3	67	13	C3	321.436	320.898	**-367.244**	-367.782	-367.782	321.436
Max Corner 4	67	13	C1	-287.151	-287.946	329.470	**328.674**	-287.946	329.470
Min Corner 4	67	13	C3	321.436	320.898	-367.244	**-367.782**	-367.782	321.436

Element Stress Detail Summary

Distance d is given from end A.

	Emt	L/C	d (m)	Corner 1 (N/mm²)	Corner 2 (N/mm²)	Corner 3 (N/mm²)	Corner 4 (N/mm²)	Max Tens (N/mm²)	Max Comp (N/mm²)
Max Corner 1	67	C2	0.000	**324.845**	243.523	-284.590	-365.912	-365.912	324.845
Min Corner 1	67	C2	3.000	**-351.696**	-268.817	227.750	310.629	-351.696	310.629
Max Corner 2	67	C3	0.000	321.436	**320.898**	-367.244	-367.782	-367.782	321.436
Min Corner 2	69	C3	0.000	-351.105	**-350.558**	304.212	304.759	-351.105	304.759
Max Corner 3	67	C1	0.000	-287.151	-287.946	**329.470**	328.674	-287.946	329.470
Min Corner 3	67	C3	0.000	321.436	320.898	**-367.244**	-367.782	-367.782	321.436
Max Corner 4	67	C1	0.000	-287.151	-287.946	329.470	**328.674**	-287.946	329.470
Min Corner 4	67	C3	0.000	321.436	320.898	-367.244	**-367.782**	-367.782	321.436