**DESIGN PROJECT GROUP Pty Ltd**
**CONSULTING ENGINEERS** A.C.N. 006777920
215 Albert Street, Brunswick 3056
Telephone: (03) 9388 0801
Fax: (03) 9388 2121
Email: david@designprojectgroup.com.au

PROC: E1(A1)
JUNE 1994

# COMPUTATIONS

**PROJECT NO:** 14110.
**DATE:** Jan '14

**PROJECT TITLE** 38 meter diameter tent
for
Janlin Circuses Pty Ltd.

**REFERENCES** AS1170
AS4100

**ENGINEER**

David J. Wills
MIEAust CPEng
Chartered Professional Engineer
Membership No. 181147
The Institution of Engineers, Australia

Signature: .....

Date: Jan '14

Note :- Tent to be evacuated under the following
a) For Terrain Category 3 and 4 when wind speed reaches 28 m/sec
b) For Terrain Category 1 and 2 when wind speed reaches 25 m/sec

(1)

# Janlin Circuses Pty Ltd

ABN 29 069 720 225
Trading as Stardust Circus
Lennon Bros Circus

12 Byloss St Chester Hill 2162
0418 238881
Fax 02 96441330
Email: lindsaycircus@hotmail.com

21/1/2014

Design Project Group
Att David Wills

Dear David

Can you please do "Computations" and "Regulation 1507: Certificate of Compliance-Design" for a new tent I have had made in Italy by tent manufacturer "A Tre Alban" and steel structure from " Anceschi Carlo" also in Italy

The material in the tent is Ferrari Preconstraint

Pegs are 40m x 1200 and are driven into ground 1000 Leaving 200 for fastening of ratchets and straps which have a 2500kg rating

I have included documents for the tent and Centre Poles and Side poles etc

I will be using a cupola built in Australia, the same as we have in our current big tents

Please advise of any further info required

Regards Lindsay Lennon

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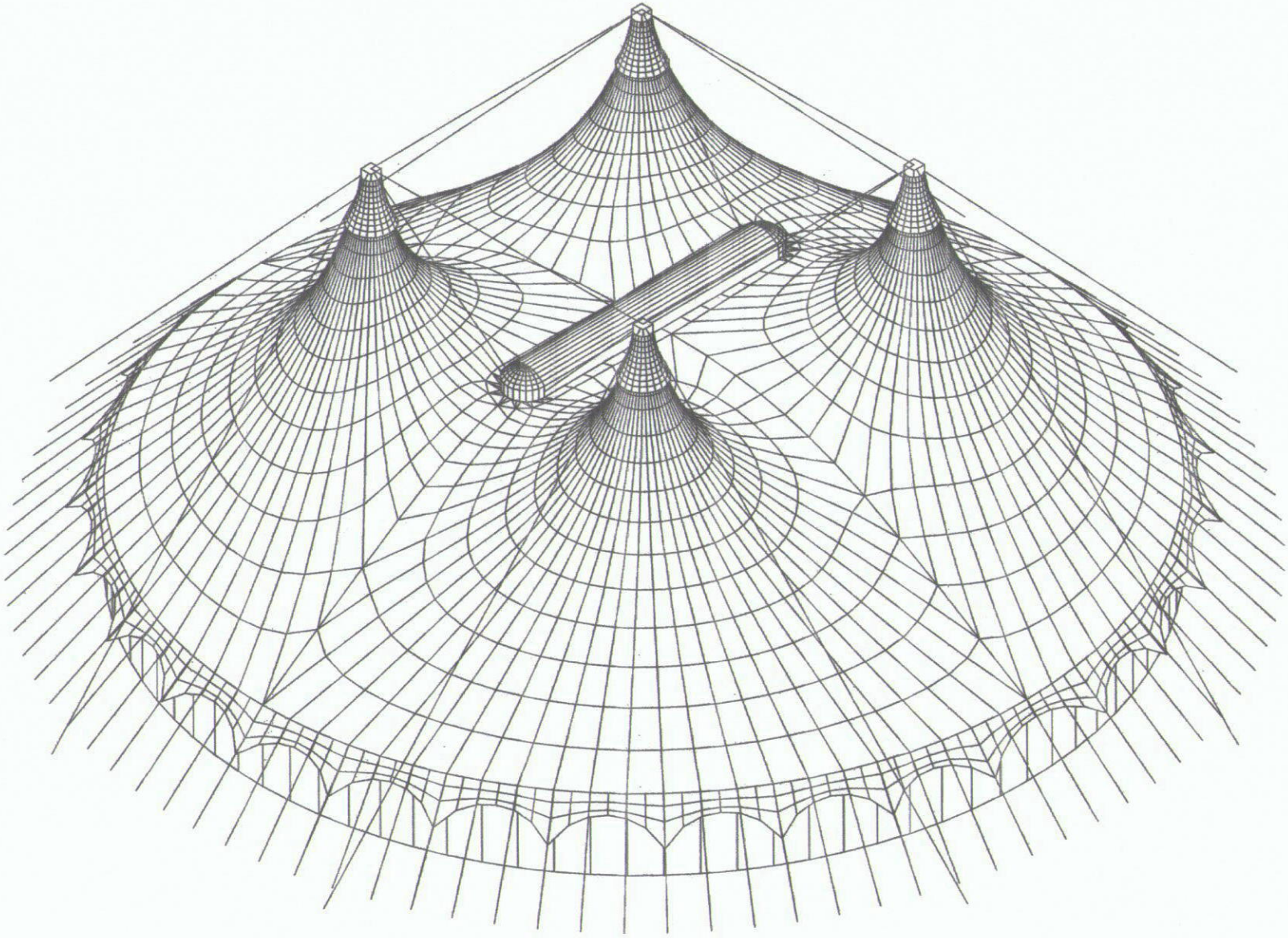
Centre poles cables and Bale ring specs in attachments also the side poles are 3500 x 60 OD X 3 Wall thickness closed at the base and a pin at the top

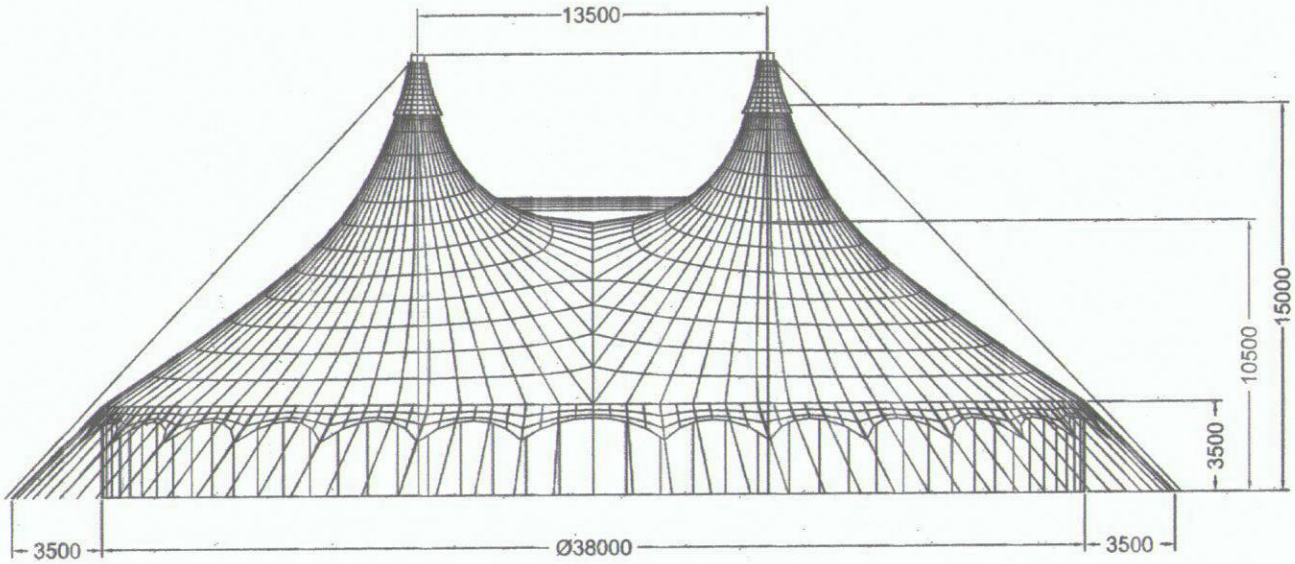
| | |
|---|---|
| ATRE | COMMITTENTE: |
| | DESCRIZIONE/DENOMINAZIONE: circo d.38 – tipo castello |
| ALBAN F.LLI s.r.l. | DATA: 02/10/13 |
| | SCALA: |
| MUSSOLENTE – VI – Tel. +390424–577384 WWW.ATREALBAN.COM ITALY | IL PRESENTE DISEGNO E' PROPRIETA' AZIENDALE, LA SOCIETA' TUTELERA' I PROPRI DIRITTI A TERMINE DI LEGGE |
| | PROGETTO: cr6513 A |
| | TAVOLA NR.: DEC03 |

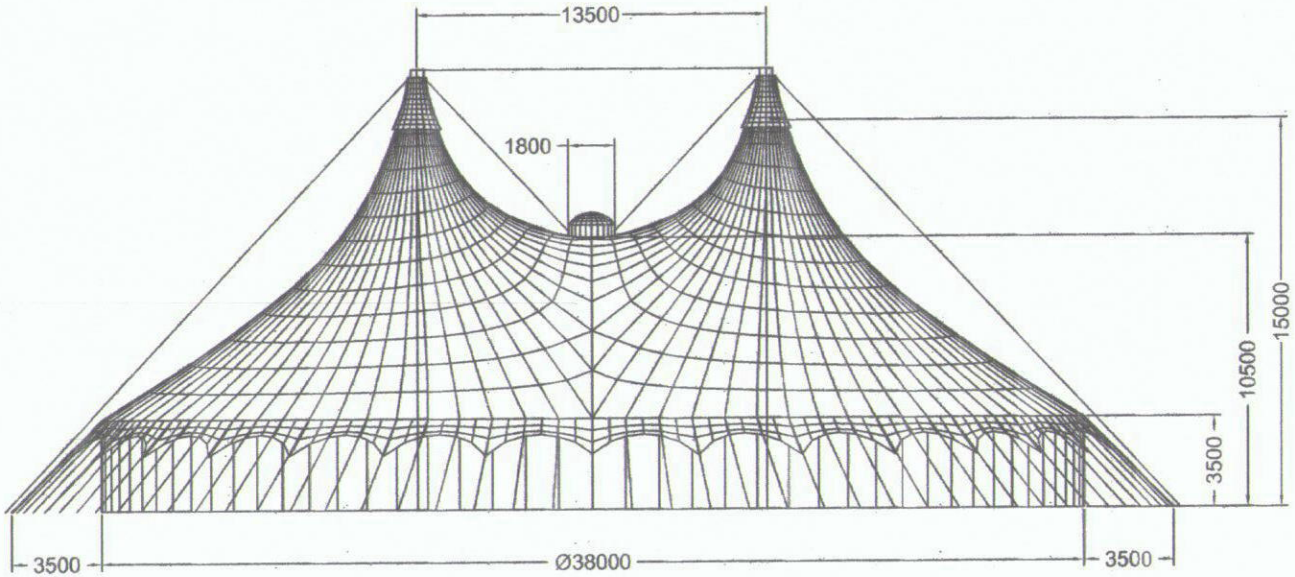


(3)

| | |
|---|---|
| ATRE ALBAN F.LLI s.r.l. MUSSOLENTE – VI – Tel. +390424-577384 WWW.ATREALBAN.COM ITALY | COMMITTENTE: — |
| | DESCRIZIONE/DENOMINAZIONE: circo d.38 – tipo castello |
| | DATA: 25/09/13 |
| | SCALA: |
| | PROGETTO: cr6513 A |
| | TAVOLA NR.: v3 14/10 |

IL PRESENTE DISEGNO E' PROPRIETA' AZIENDALE, LA SOCIETA' TUTELERA' I PROPRI DIRITTI A TERMINE DI LEGGE

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|---|---|
| ALBAN F.LLI s.r.l.<br>MUSSOLENTE – VI –<br>Tel. +390424–577384<br>WWW.ATREALBAN.COM<br>ITALY | COMMITTENTE: |
| | DESCRIZIONE/DENOMINAZIONE: circo d.38 – tipo castello |
| | DATA: 25/09/13 |
| | SCALA: |
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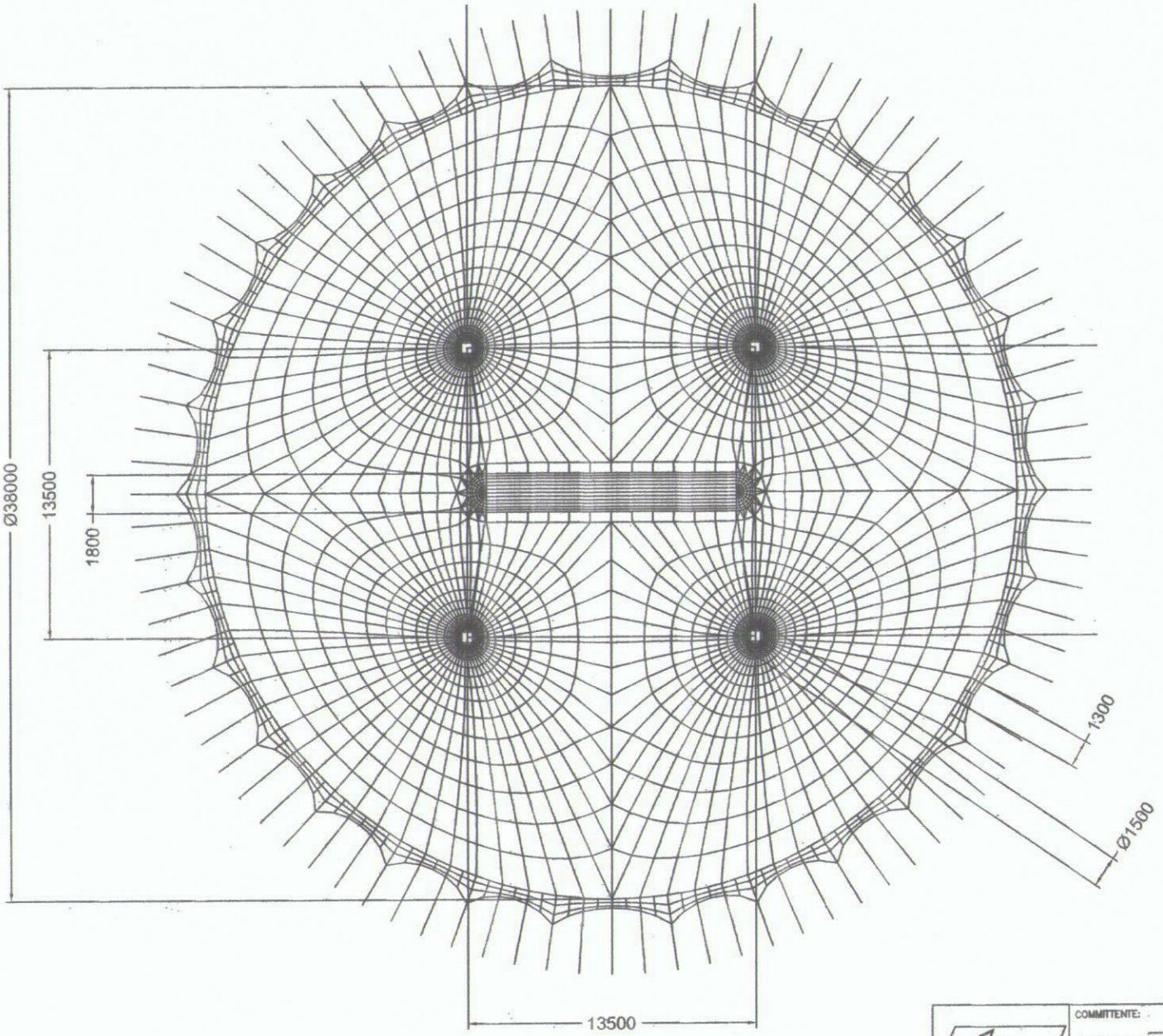
| | TAVOLA NR.: v2 14110 |

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|---|---|---|
| ATRE ALBAN F.LLI s.r.l.<br>MUSSOLENTE – VI –<br>Tel. +390424–577384<br>WWW.ATREALBAN.COM<br>ITALY | COMMITTENTE: | |
| | DESCRIZIONE/DENOMINAZIONE: circo d.38 – tipo castello | |
| | DATA: 25/09/13 | PROGETTO: cr6513 A |
| | SCALA: | TAVOLA NR.: v1 |
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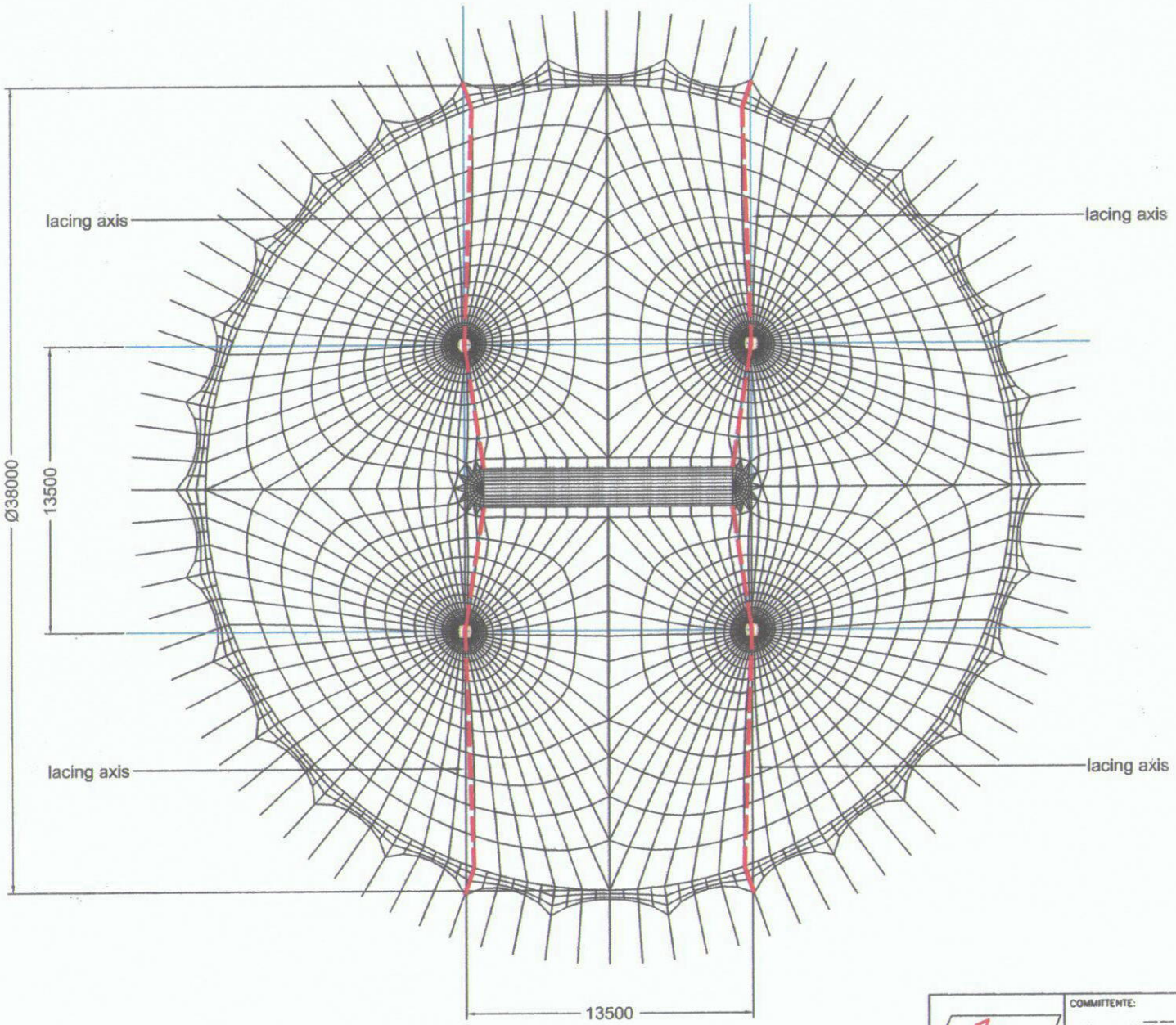


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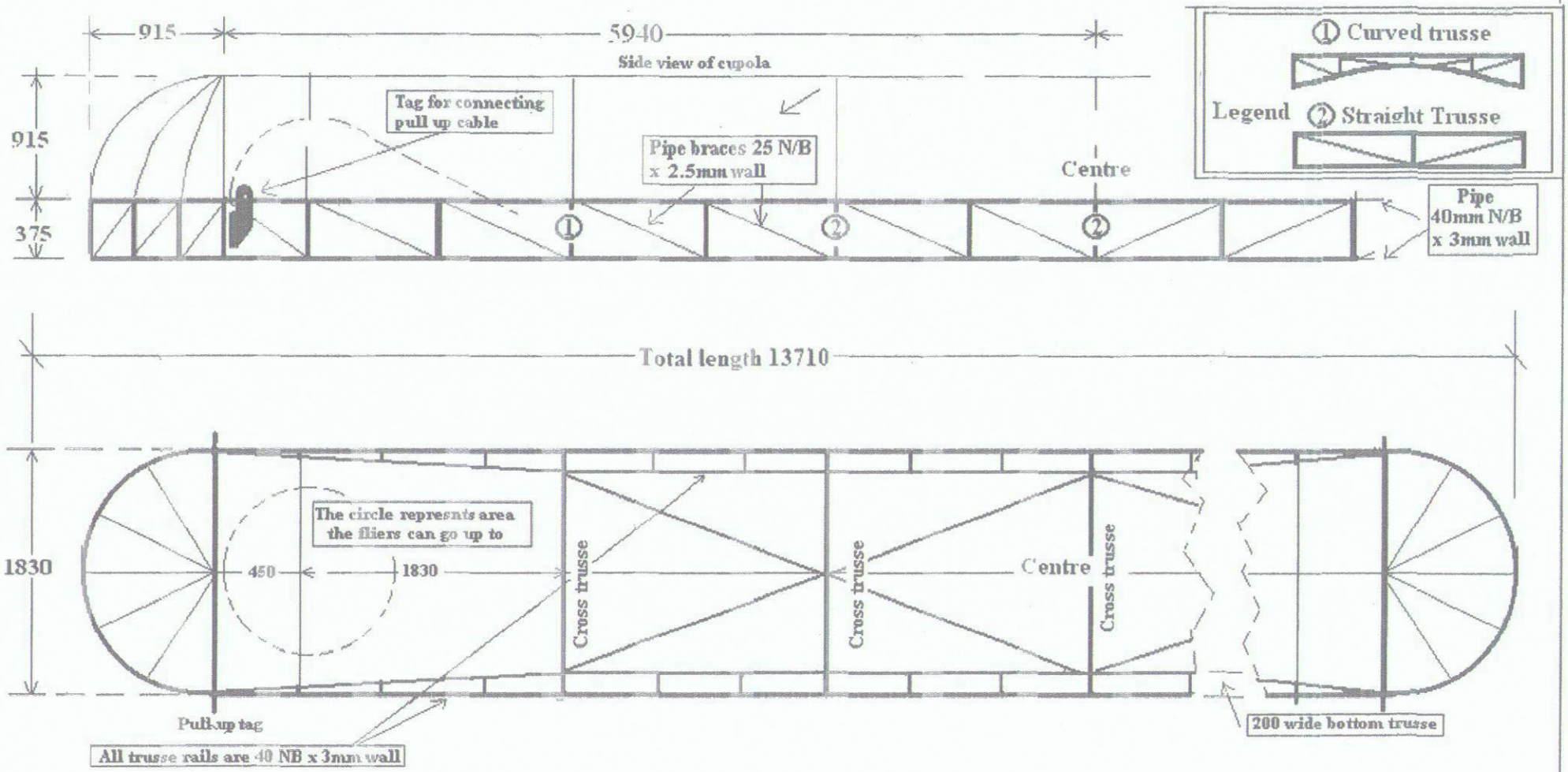
|---|---|
| ATRE<br>ALBAN F.LLI s.r.l.<br>MUSSOLENTE – VI –<br>Tel. +390424-577384<br>WWW.ATREALBAN.COM<br>ITALY | COMMITTENTE: —— |
| | DESCRIZIONE/DENOMINAZIONE: circo d.38 – tipo castello |
| | DATA: 27/08/13 |
| | PROGETTO: cr6513 A |
| | SCALA: |
| | TAVOLA NR.: SCH_00 14110 |
| | IL PRESENTE DISEGNO E' PROPRIETA' AZIENDALE. LA SOCIETA' TUTELERA' I PROPRI DIRITTI A TERMINE DI LEGGE |

# Cupola frame for 38m diameter tent for Janlin Circuses Pty Ltd

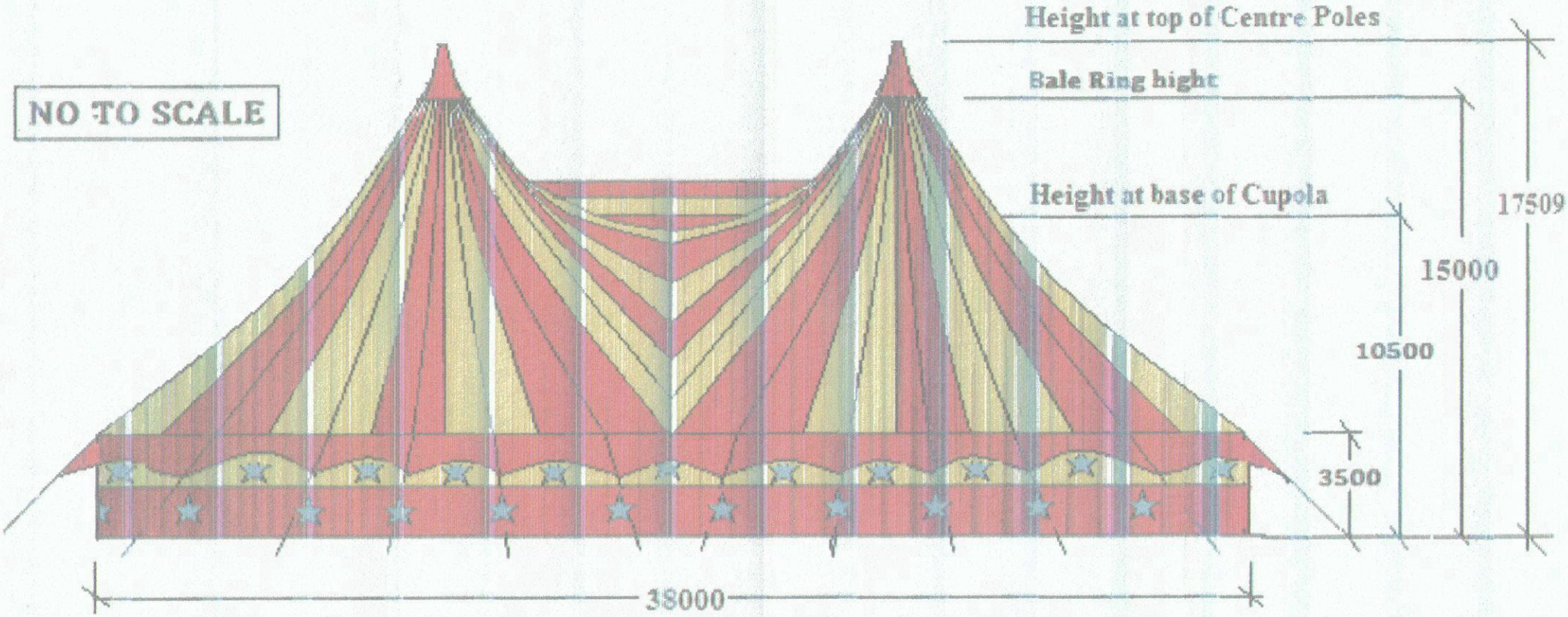



NOT TO SCALE

14110

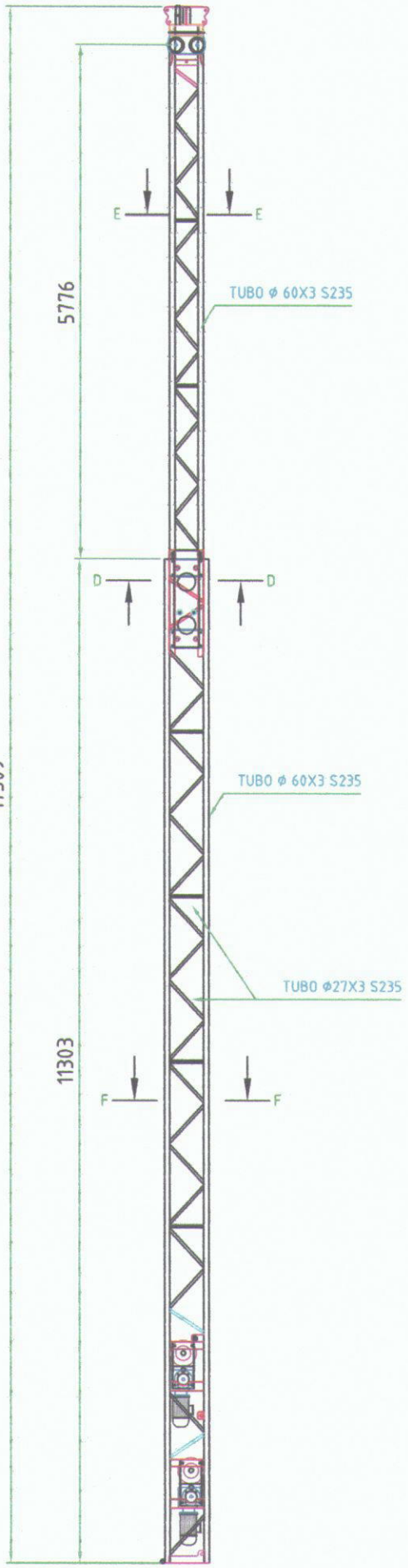
# 38m Diam Tent for Janlin Circuses Pty Ltd

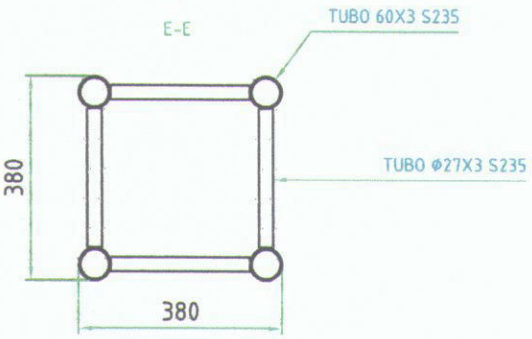
NO TO SCALE

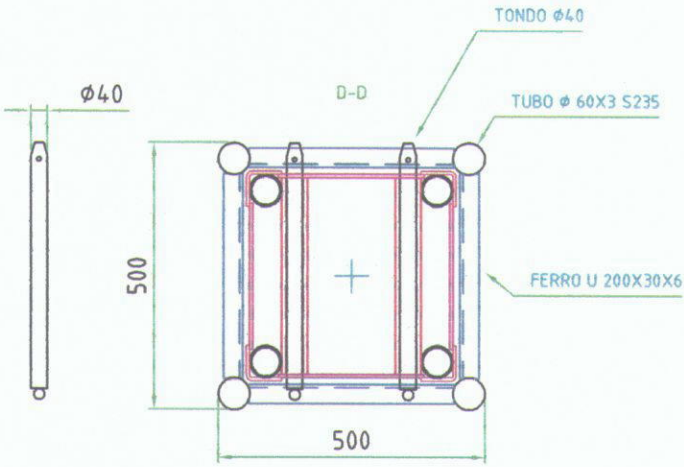


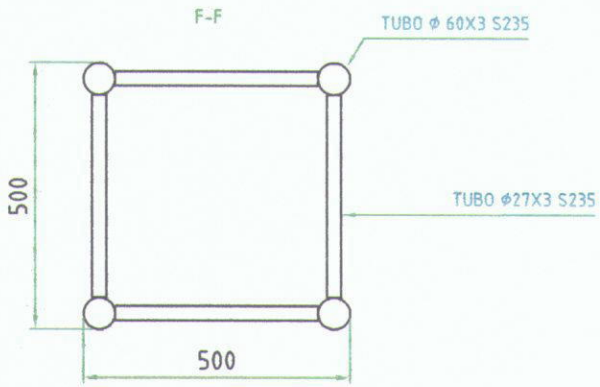

Side walls have 1500 permantely attached to the edge of tent along side pole line and the base 2000 hooks onto the bottom of 1500 top section of wall

14110



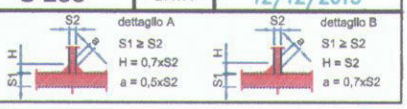



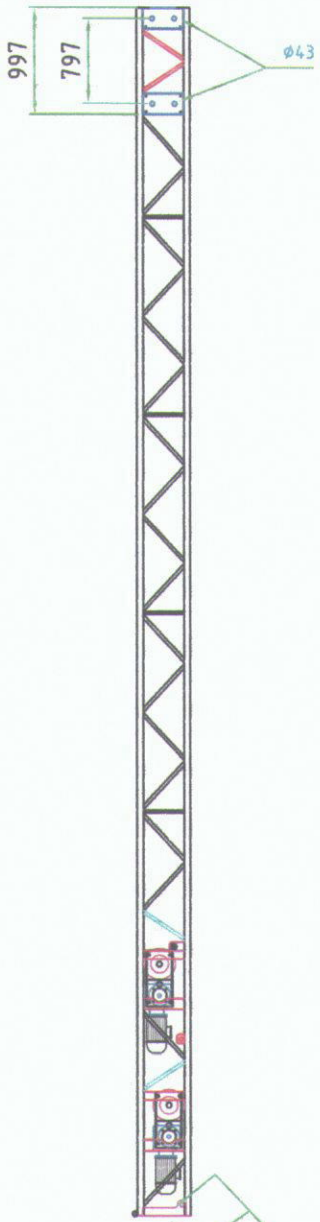



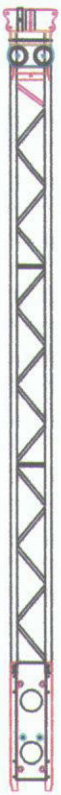



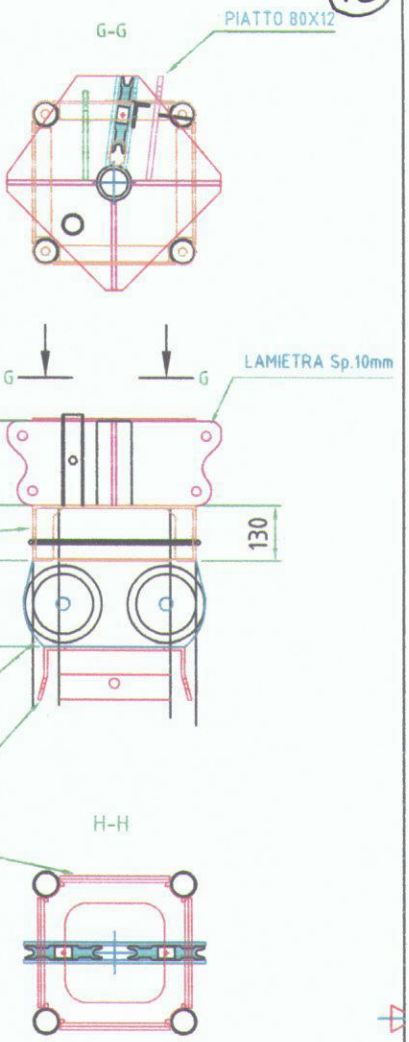

| | | | |
|---|---|---|---|
| ANCESCHI CARLO & C.<br>OFFICINA COSTRUZIONI MECCANICHE | Via MARCONI,17 RIO SALICETO (RE) ITALY<br>Tel.0522/738071 Fax.0522/649920<br>www.anceschicarlo.it | | |
| DENOMINAZIONE:<br>Telescopic KingPole H=17.5m<br>Tenet Ø38M | N° PEZZI: 4 | CODICE DISEGNO: ATTLXX0001 | POS.: 1 |
| CLIENTE: Lindsay Lennon | MATERIALE se non diversamente specificato: S 235 | SCALA: 1:50 | |
| N° ORDINE: 05-L-13 | | DIS.: Umberto | |
| | | DATA: 12/12/2013 | |

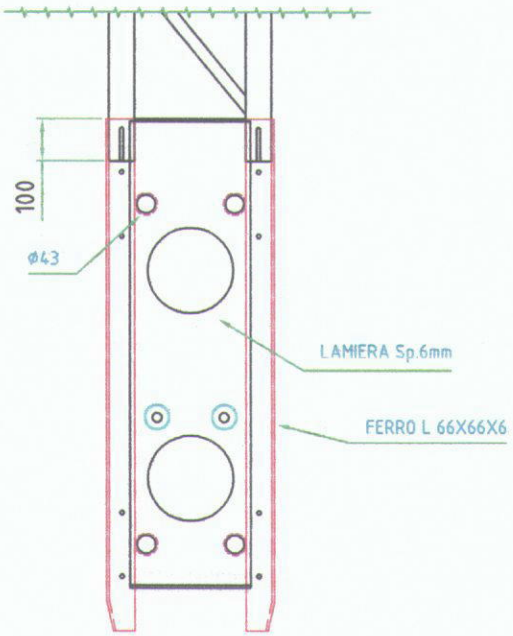
SALDATURE:
Tutte le saldature, se non diversamente indicate, sono di tipo continuo.
Per l'unione dei tubi, se non diversamente specificato, a = allo spessore minimo dei due elementi uniti.
Per l'unione di piatti, se non diversamente specificato, vedere dettagli A e B.

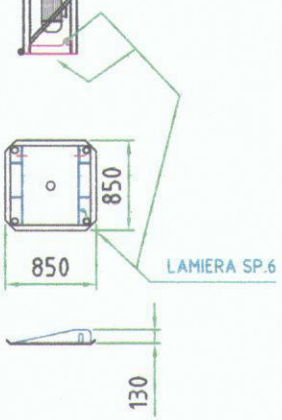




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|---|---|---|---|
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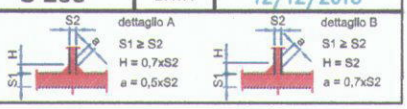
| DENOMINAZIONE:<br>Telescopic KingPole H=17.5m<br>Tenet Ø38M | N° PEZZI: 4 | CODICE DISEGNO: ATTLXX0001 | POS.: 2 |
| CLIENTE: Lindsay Lennon | MATERIALE se non diversamente specificato: S 235 | SCALA: 1:50 | |
| N° ORDINE: 05-L-13 | | DIS.: Umberto | |
| | | DATA: 12/12/2013 | |

SALDATURE:
Tutte le saldature, se non diversamente indicate, sono di tipo continuo.
Per l'unione dei tubi, se non diversamente specificato, a = allo spessore minimo dei due elementi uniti.
Per l'unione di piatti, se non diversamente specificato, vedere dettagli A e B.



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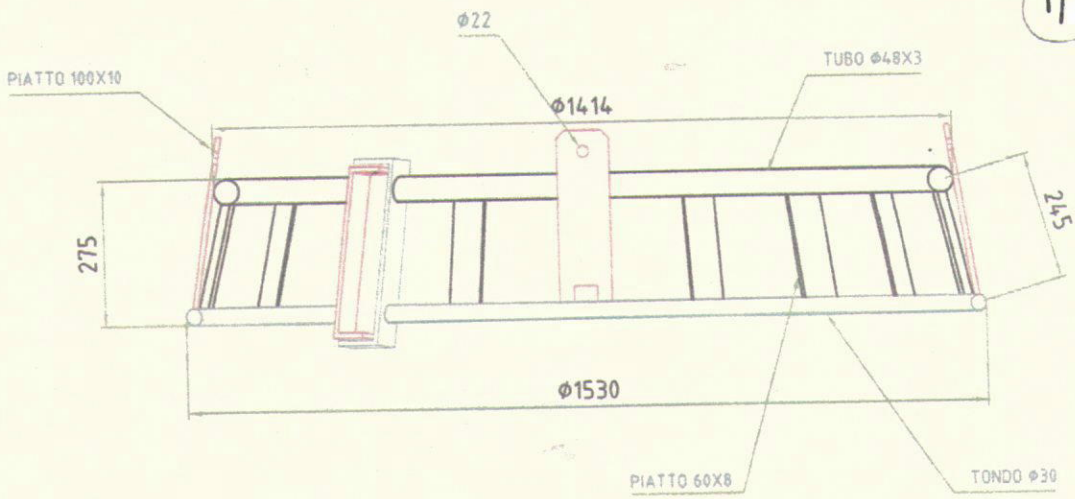


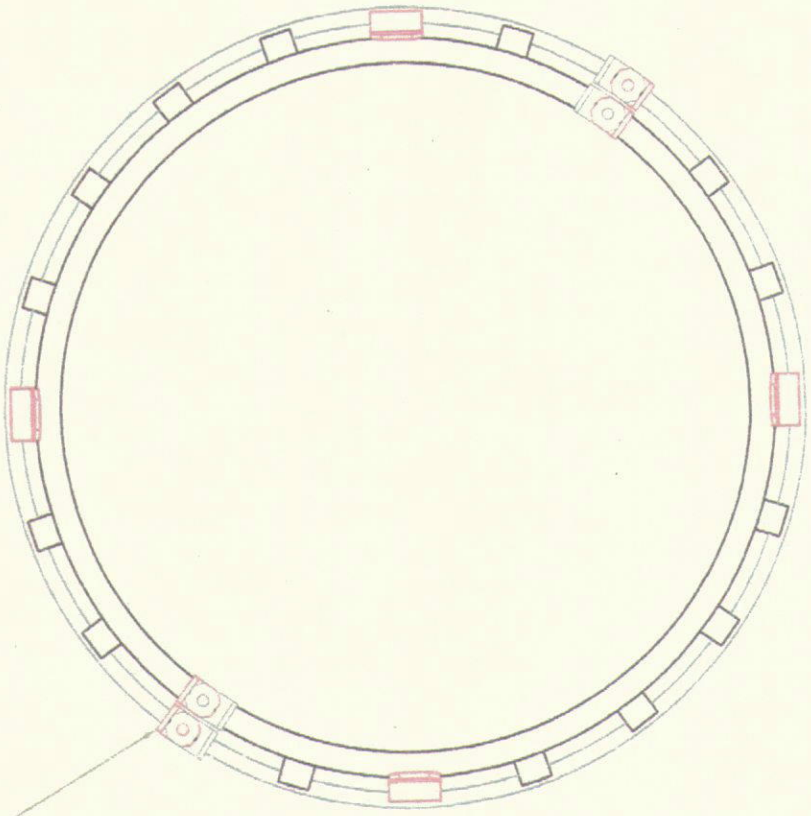

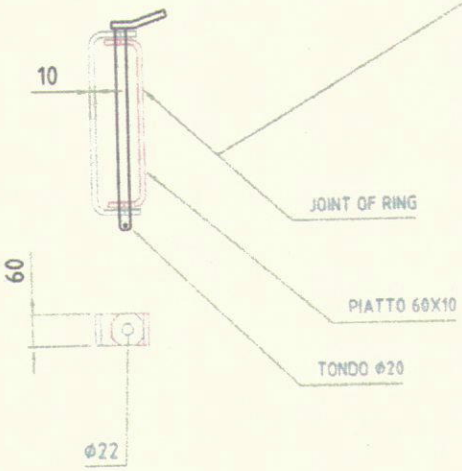


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Via MARCONI,17 RIO SALICETO (RE) ITALY
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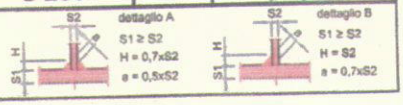
www.anceschicarlo.it

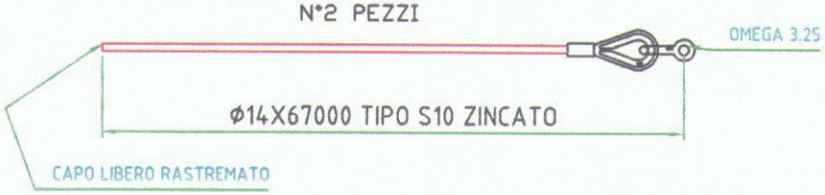
| DENOMINAZIONE: | N° PEZZI | CODICE DISEGNO | POS. |
|---|---|---|---|
| RING Ø1500<br>Tent Ø38M | 4 | ANTRXX0001 | 3 |

| CLIENTE: Lindsay Lennon | MATERIALE se non diversamente specificato: | SCALA | 1:10 |
|---|---|---|---|
| | | DIS. | Umberto |
| N° ORDINE: 05L13 | S 235 | DATA | 12/12/2013 |

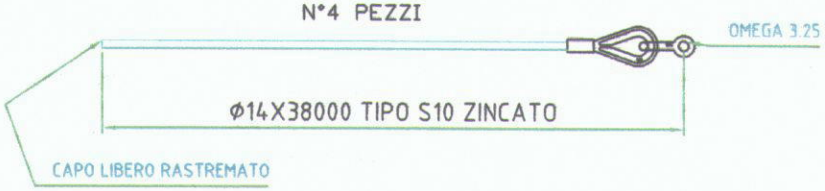
SALDATURE:
Tutte le saldature, se non diversamente indicate, sono di tipo continuo.
Per l'unione dei tubi, se non diversamente specificato, a = allo spessore minimo dei due elementi uniti.
Per l'unione di piatti, se non diversamente specificato, vedere dettagli A e B.



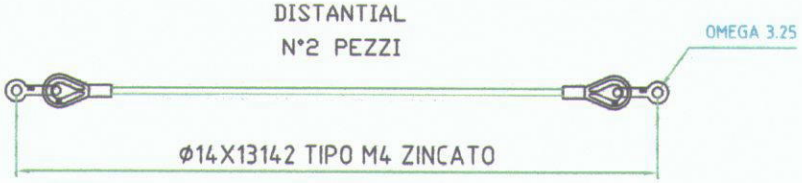
LIFT UP KINGPOLE
N°2 PEZZI



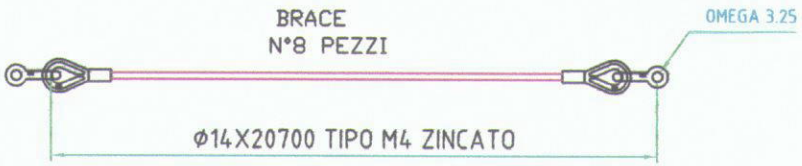

LIFT UP CUPOLA
N°4 PEZZI




DISTANTIAL
N°2 PEZZI




BRACE
N°8 PEZZI

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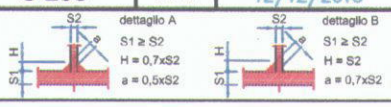
Via MARCONI,17 RIO SALICETO (RE) ITALY
Tel.0522/738071 Fax.0522/649920
www.anceschicarlo.it

| DENOMINAZIONE: | N° PEZZI | CODICE DISEGNO | POS. |
|---|---|---|---|
| Cables 1<br>Tent Ø38M | | | 4 |

| CLIENTE: Lindsay Lennon | MATERIALE se non diversamente specificato: | SCALA | 1:10 |
|---|---|---|---|
| N° ORDINE: 05L13 | S 235 | DIS. | Umberto |
| | | DATA | 12/12/2013 |

SALDATURE:
Tutte le saldature, se non diversamente indicate, sono di tipo continuo.
Per l'unione dei tubi, se non diversamente specificato, a = allo spessore minimo dei due elementi uniti.
Per l'unione di piatti, se non diversamente specificato, vedere dettagli A e B.

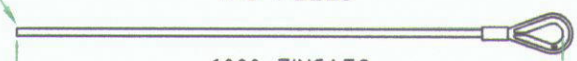


13

BRACE

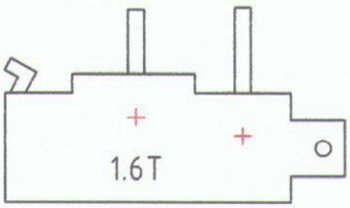
CLR

N°8 PEZZI



6000 ZINCATO
PER ARGANO A FUNE PASSANTE 1.6T

# N°8 ARGANI A FUNE PASSANTE DA 1.6t

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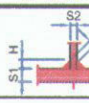
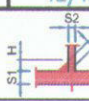
| ANCESCHI CARLO & C.<br>OFFICINA COSTRUZIONI MECCANICHE | Via MARCONI,17 RIO SALICETO (RE) ITALY<br>Tel.0522/738071 Fax.0522/649920<br>www.anceschicarlo.it | | |
| DENOMINAZIONE:<br>Cables 3<br>Tent Ø38M | N° PEZZI | CODICE DISEGNO | POS.<br>6 |
| CLIENTE: Lindsay Lennon | MATERIALE se non diversamente specificato: S 235 | SCALA | 1:10 |
| N° ORDINE: 05L13 | | DIS. | Umberto |
| | | DATA | 12/12/2013 |

SALDATURE:
Tutte le saldature, se non diversamente indicate, sono di tipo continuo.
Per l'unione dei tubi, se non diversamente specificato, a = allo spessore minimo dei due elementi uniti.
Per l'unione di piatti, se non diversamente specificato, vedere dettagli A e B.




dettaglio A
S1 ≥ S2
H = 0,7xS2
a = 0,5xS2




dettaglio B
S1 ≥ S2
H = S2
a = 0,7xS2

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215 Albert Street, Brunswick 3056
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Computations

Job No. 14110 Sheet No. 14

Eng. PW Date. Jan 14

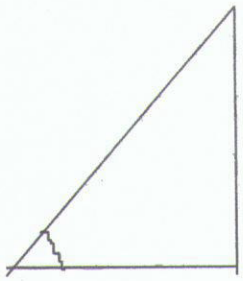
# *MARQUEES*

## WIND LOADING

From AS 1170

Vp = 41m/sec from West (1in 100 year)

## TERRAIN CATEGORIES 3 AND 4



Vz = VMzcat.Ms

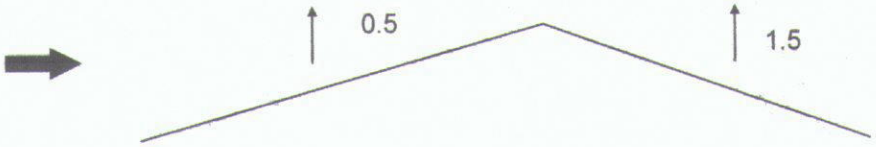
= 41 x 0.83

= 34.0 m/sec

$qz = 0.6 \times 34^2 \times 10^{-3}$

= 0.694 kPa

Worst case when sides are up and blocked underneath




Average = 1

Therefore wind load on roof = 1 x 0.694 kPa

= 0.694 kPa

## TERRAIN CATEGORY 2 & 1

Wind Load = $(0.91 / 0.83)^2 \times 0.694 = 0.8342$ kPa

Checked .....

Date .....

DESIGN

**DESIGN PROJECT GROUP Pty Ltd**
**CONSULTING ENGINEERS** A.C.N. 006777920
215 Albert Street, Brunswick 3056
Telephone: (03) 9388 0801
Fax: (03) 9388 2121

Computations

Job No. 14110 Sheet No. 15

Eng. JW Date. Jan '14

### 3.2.4 Terrain Category.

Terrain, over which the approach wind flows towards a structure, shall be assessed on the basis of the following category descriptions.

(a) Category 1 - exposed open terrain with few or no obstructions and water surfaces at servicability wind speeds ($V_s$) only.

(b) Category 2 - open terrain, grassland with few well scattered obstructions having heights generally from 1.5 m to 10.0 m and water surfaces at wind speeds ($V_u$) and ($V_p$).

(c) Category 3 - terrain with numerous closely spaced obstructions having the size of domestic houses ( 3.0 m to 5.0 m high).

(d) Category 4 - terrain with numerous large, high (10.0 m to 30.0 m) and closely spaced obstructions such as large city centres and well-developed industrial complexes.

Selection of terrain category shall be made with due regard to the permanence of the obstructions which constitute the surface roughness, in particular vegetation in tropical cyclonic regions shall not be relied upon to maintain a wooded terrain roughness.

Checked .....

Date .....

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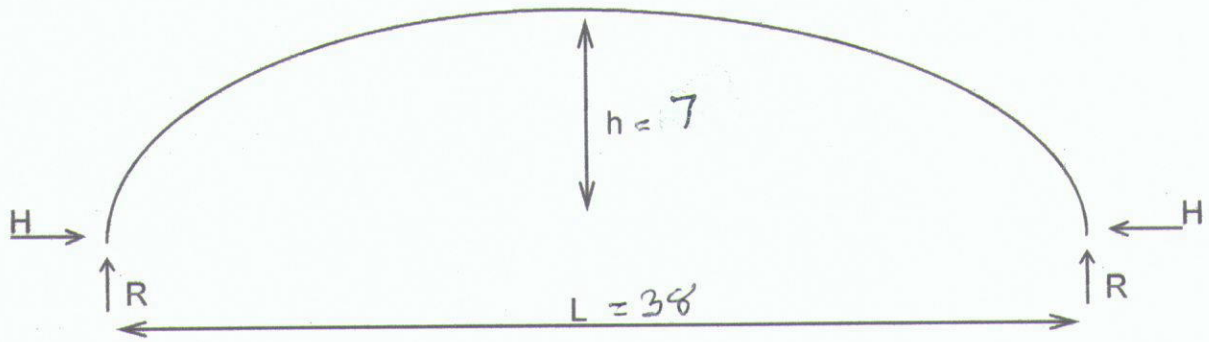
## PVC COVERING




$$H = 0.694 \times \frac{38^2}{8 \times 7} = 17.895 \text{ KN/M}$$

$$R = 0.694 \times \frac{38}{2} = 6.593 \text{ KN/M}$$

$$T_{max} = H(1 + 16\,\theta^2)^{1/2}$$

$$= 22.25 \text{ KN/M}$$

$$\theta = \frac{7}{38}$$

Capacity of Ferrari Preconstraint

$$= \frac{2.5 \times 0.9}{0.090} = 40 \text{ KN/M}$$

OK for all Terrain Categories

Checked .....

Date .....

17

| Caractéristiques techniques | Technical data | Technische Daten | Précontraint® 702 | |
|---|---|---|---|---|
| Fil: | Yarn | Garn | 1100 Dtex PES HT | TERSUISSE |
| Poids au m² | Weight sqm | Gewicht m² | 830 g/m² | EN ISO 2286-2 |
| Largeur | Width | Breite | 180 cm | |
| Résistance rupture (chaîne/trame) | Tensile strength (warp/weft) | Reisskraft (Kette/Schuss) | 280/280 daN/5cm | EN ISO 1421 |
| Résistance déchirure (chaîne/trame) | Tear strength (warp/weft) | Weiterreißkraft (Kette/Schuss) | 30/28 daN | DIN 53.363 |
| Adhérence | Adhesion | Haftung | 10 daN/5 cm | EN ISO 2411 |
| Opacité | Blackout | Opak | > 99% | |
| Finition | Finish (Varnish) | Behandlung (Schlussteck) | Vernis BIFACE | |
| Réaction au feu | Flame retardancy | Brennverhalten | NFP 92507 M2 - NFPA 701 Test 2 - OSFM T19 DIN 4102-1 B1 - BS 7837 - AS/NZS 1530.3 - SIS 650082,SITAC - UNE 23.727 - M2 | |
| Températures maximum d'utilisation | Temperature extremes (while handling) | Maximale Anwendungs-temperaturen | -30°C / +70°C | |
| Système d'assurance qualité | Quality insurance | Qualitätssicherung | ISO 9001 | |
| Les caractéristiques techniques indiquées sont des valeurs moyennes | Technical data are average values | Die angegebenen technischen Daten sind Mittelwerte | | |

| | | |
|---|---|---|
| Technique d'enduction Précontraint® FERRARI | Précontraint® FERRARI coating technology | Beschichtungstechnik Précontraint® FERRARI |
| Stabilité dimensionnelle exceptionnelle | Exceptional dimensional stability | Außerordentliche Flächenstabilität |
| Durabilité supérieure | Longer durability | Höhere Haltbarkeit |
| Excellente soudabilité | Excellent welding | Sehr gute Verschweißbarkeit |
| Opacité spéciale chapiteaux | Special blackout for big tops | Spezielle Opak-Textilien für Zirkuszelte |

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PRÉCONTRAINT GARANTIE FERRARI

PRECONTRAINT® 702

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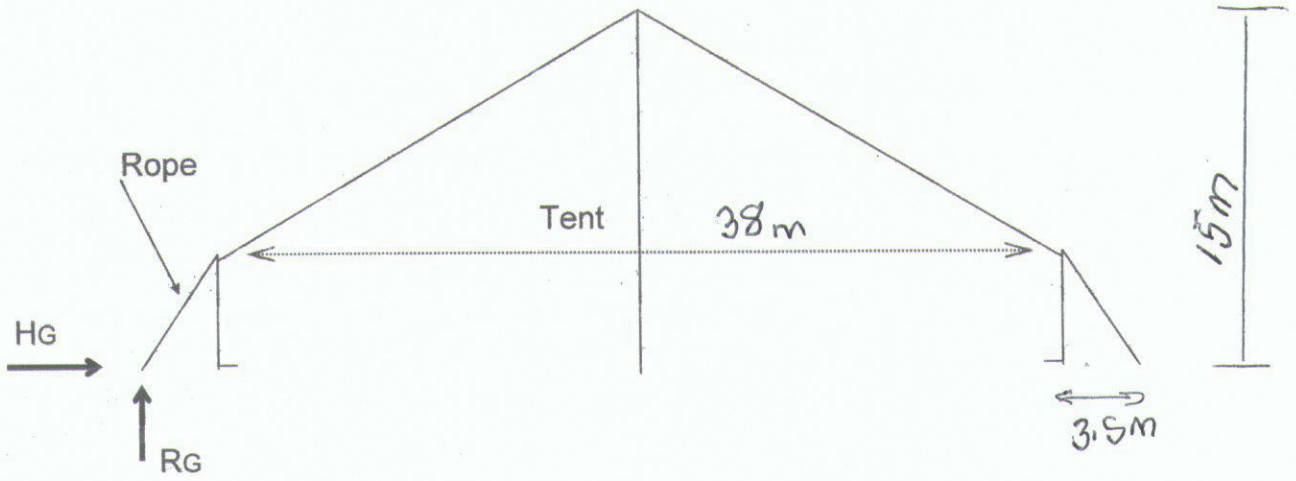
## ROPE CAPACITY




$R_G$ = 6.593 KN/M

$H_G \approx 0.694 \times \frac{45^2}{8 \times 15}$ = 11.71 KN/M

$T_{max} = H(1 + 16\theta^2)^{1/2}$ $\theta = \frac{15}{45}$

= 19.52 KN/M

∴ Load per rope = 19.52 x 1.3 = 25.4 KN

Use 2500 kg capacity straps & ratchets

Capacity = 0.8 x 25 = 20 KN

∴ Allowable wind speed i.s. = 36.38 m/sec. (TC 3&4)

= 33.18 m/sec. (TC 1&2)

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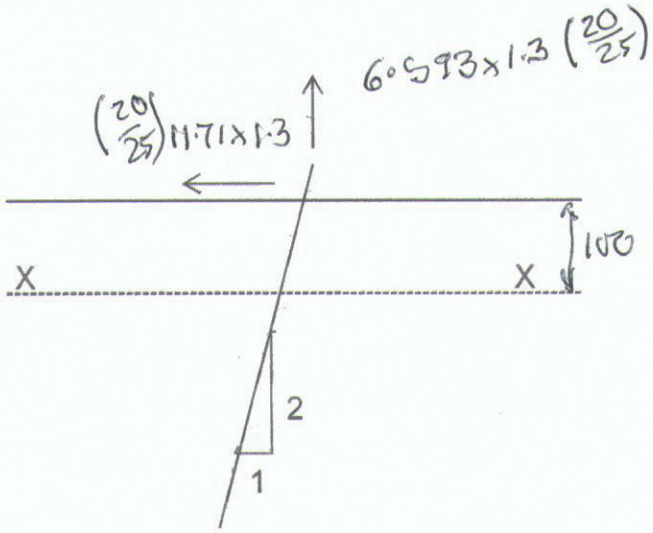
PEGS




Moment in peg about X - X

$= \left(11.71 \times 1.3 \times 0.1 + 0.05 \times 6.593 \times 1.3\right) \frac{20}{25}$

$= \left(1.951 \text{ KNm}\right) \frac{20}{25}$

$$f_b = \frac{1.951 \times 10^6}{0.0982 \times 40^3} \left(\frac{20}{25}\right) = 248 \text{ MPa} < 360 \times 0.9 \text{ MPa}$$

OK

Note:- Depth of peg to be determined on site by experience and testing

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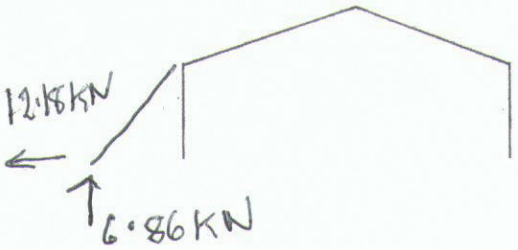
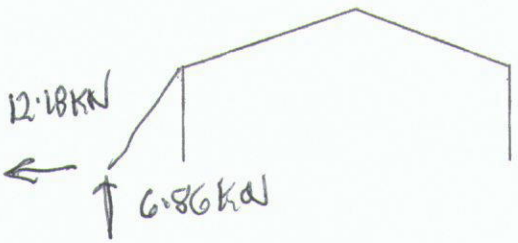
LOADS (with sides of tent up)

Terrain Category 3 & 4




Terrain Category 2 & 1

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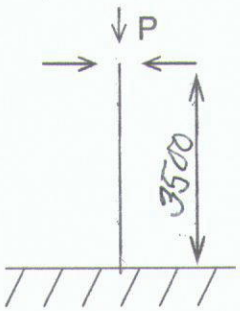
SIDE POLES 60ø x 3mm




$$\text{Area} = \pi \times \frac{60^2}{4} - \pi \times \frac{54^2}{4} = 537\ mm^2$$

$$r = \sqrt{\frac{I}{A}} = \frac{1}{4}\sqrt{60^2 + 54^2} = 20.1$$

$$\frac{L}{r} = \frac{3500}{20.1} = 139$$

$F_{ac} = 41\ MPa$

$F_{cap} = 22\ kN$

$$\text{Actual Load} = 0.01 \times 1.3\left(3.5 + \frac{3.5}{2}\right)1.414$$

$= 0.41\ kN$ OK.

Checked .....

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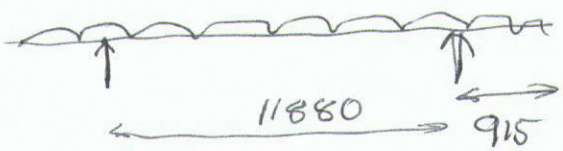
# CUPOLA DESIGN

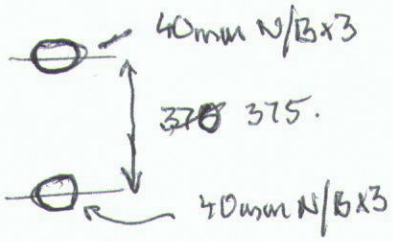



w self wt

Truss - Top chords 40 mm N/B x 3 wall
Braces 25 NB x 2.5 mm wall

see page 7

Self wt of half cupola = 0.2 kN/m
wt of canvas $.01 \times \frac{38}{2} = .017$ kN/m
0.4 kN/m




Truss Section

Truss Properes

$I = 2 \times 405 \times \left(\frac{375}{2}\right)^2 = 28.5 \times 10^6$

$Z = 779 \times 10^3 \text{ mm}^3$

$r_x = 187.6$

Moment $= 0.4 \times \frac{11.88^2}{8} = 7.05$ kNm

Chord Forces $= \frac{7.05}{0.375} = 18.82$ kN

Capacity of chords? $\frac{L}{r} = \frac{1430}{15.2} = 120$ Fcc = 53 MPa

Capacity $= 53 \times 405 \times \frac{1}{1000} = 21.5$ kN OK.

Checked .....
Date .....

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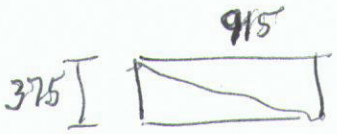
Web?  Max reaction = $\frac{11.88 \times 0.4}{2} = 2.4$ kN




length diagonal = 989 mm

Max diag load = $2.4 \times \frac{989}{375} = 6.33$ kN

Tensile capacity = 33 kN OK.

vertical capacity?  $\frac{L}{ry} = \frac{350}{9.75} = 36 \Rightarrow Fac = 130$

$\therefore$ Pall = 28 kN > 2.4 kN OK.

Deflection

$= \frac{5}{384} \times \frac{0.4 \times 11880^4}{2 \times 105 \times 28.5 \times 10^6}$

$= 18.2$ mm  $\left(\frac{span}{642}\right)$ OK.

Checked .....

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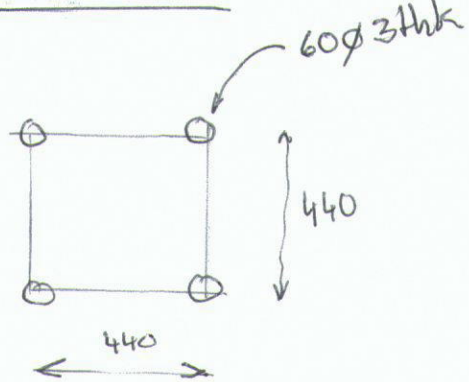
# KING POLES




60ϕ x 3 thick

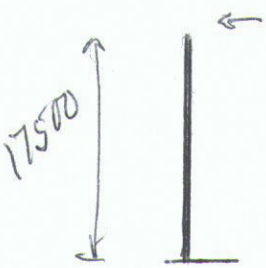
Area = 537 mm²

I of base section

≈ 2 x 2 x 537 x 220²

= 104 x 10⁶ mm⁴

$r_{xc} = \sqrt{\frac{104 \times 10^6}{537 \times 4}} = 220$




$\frac{L}{r_x} = 79.5$ $F_{ac} = 92$ MPa

⇒ Pcap = 197.6 kN.

OK.

$Z_{req} = \frac{104 \times 10^6}{220} = 473 \times 10^3$ mm²

⇒ Mcap = 65 kNm

Actual load = 10 kN

$M = 10 \times 0.\frac{44}{2} = 2.2$ kNm

∴ Pole OK.

Checked .....

Date .....

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Job No. 14110 Sheet No. 25

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Base Plate

850 x 850 sq base plate

100 kPa bearing gives capacity 72 kN OK.

Checked .....

Date .....