

# EXACT STRUCTURES

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## CALCULATIONS

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Design of Satellite Dish Fixings

Swifix Ltd  
21 Beech Close  
Willand  
Devon  
EX15 2SD

For Swifix Ltd

Engineer: Grenville Mann *BEng(Hons) CEng MStructE*

Date Issued: 16.07.2020  
Our Ref: 200712

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## Important Note

PROJECT: Swifix Ltd	REF: 200712	SHEET: 1
TITLE: Design of Satellite Dish Fixings	BY: GHM	DATE: 16.07.2020

Exact Structures Ltd design is based upon information and drawings provided by Swifix Ltd

### IMPORTANT NOTES

Exact Structures Ltd shall be informed of any change in material specification as this could affect loadings calculated for use in the design.

The loads used in the design shall not be exceeded.

Sketches in these calculations are for calculation purposes only and shall not be used for construction. Dimensions are often to approximate centre lines of bearings and critical construction details are not shown.

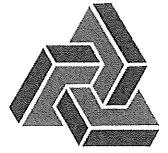
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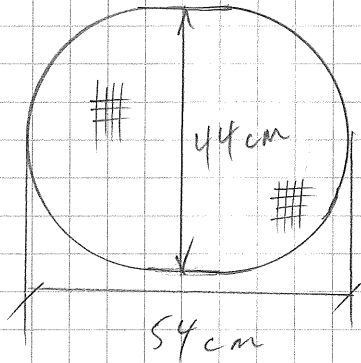
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Where listed at the head of this sheet, details, dimensions and loadings were derived from Architectural drawings and details supplied by the Client. These drawings were used for the design and are assumed to be accurate. We have not checked or verified this information supplied and shall therefore take no responsibility for any errors or omissions that may or may not affect calculations and details.



## Calculations

PROJECT:	Swiftx.	REF:	200712.	SHEET:	2.
TITLE:	loadings.	BY:	GHI	DATE:	16.7.2020



44 cm elliptical  
triax satellite dish

surface area

$$\begin{aligned} &\sim 44 \times 10 \\ &+ \pi \times 22^2 = 1565 \text{ cm}^2 \\ &= 0.16 \text{ m}^2 \end{aligned}$$

wind loading for 100 mph

$$\begin{aligned} \text{dynamic pressure } q_s &= 0.613 \times V_e^2 \\ &= 0.613 \times 100^2 \\ &= 6130 \text{ Pa} \\ &= 6.13 \text{ kN/m}^2. \end{aligned}$$

∴ worse case horizontal force

$$\begin{aligned} \text{acting on dish} &= 6.13 \times 0.16 \\ &= 0.98 \text{ kN.} \\ &= 980 \text{ N.} \end{aligned}$$

DISH plus fixings worse case ZONE 2.

$$\begin{aligned} \text{see sheet \# 3} &= 3.621 \text{ kg.} \\ &= 36 \text{ N.} \end{aligned}$$

3  
200712.

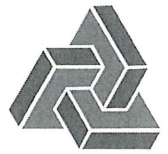
## DISH + COMPONENT WEIGHTS.

COMPONENT	G.I PART ID	WEIGHT KG
ZONE 1		
Dish	GI323	1.15
Antenna Bracket	GI324	0.243
Wall Plate	GI054	0.264
Feed Leg	GI325	0.172
Pivot	GI326	0.118
Swing Arm	GI327	0.488

2.435

COMPONENT	G.I PART ID	WEIGHT KG
ZONE 2		
Dish	GI197	2.012
Antenna Bracket	GI199	0.357
Wall Plate	GI201	0.276
Feed Leg	GI331	0.227
L-Tube	GI207	0.513
Elevation Bracket	GI205	0.236

3.621

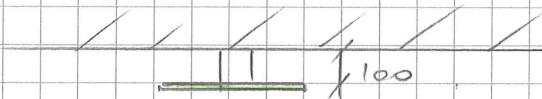


## Calculations

PROJECT:	SWIFIX	REF:	200712	SHEET:	4
TITLE:	arrangements	BY:	GH	DATE:	17.7.2020

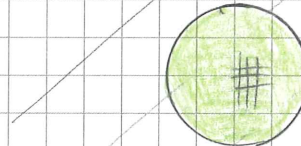
### 3 No. DISH ARRANGEMENTS

#### A. PLAN



dish parallel to wall.

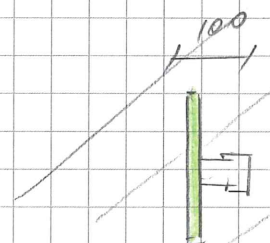
#### ELEVATION



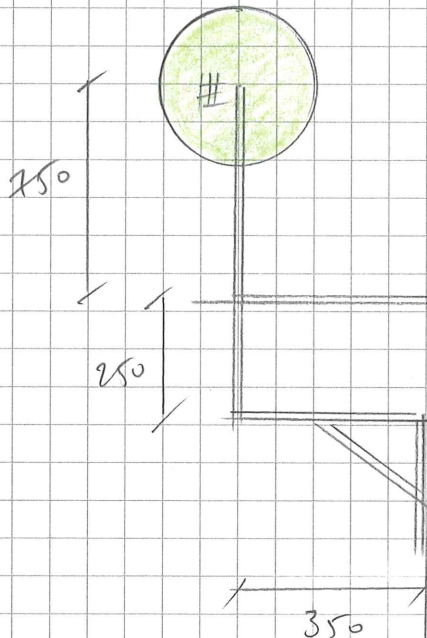
#### B.



dish perpendicular to wall.



#### C.



dish secured to a pole.

(see sheet # 5 for typical set up.)

Typical set up of dish on pole.







## Calculations

PROJECT:	SWIFIX LTD.	REF:	200712	SHEET:	6
TITLE:	analysis.	BY:	GHT	DATE:	17.7.2020

### LOADINGS PER EACH ARRANGEMENT

A. dish parallel to wall

$$\text{max shear force} = 36 \text{ N}$$

$$\text{max moment} = \frac{36}{1000} \times 0.1 = 3.6 \times 10^{-3} \text{ kNm}$$

$$\text{max compression} = \underline{\underline{980 \text{ N}}}$$

B. dish perpendicular to wall

$$\text{max shear force} = \underline{\underline{980 \text{ N}}}$$

$$\text{moment}_1 = \frac{36}{1000} \times 0.35 = 0.013 \text{ kNm}$$

$$\text{moment}_2 = \frac{980}{1000} \times 0.35 = 0.34 \text{ kNm}$$

C. dish on pole

$$\begin{aligned} \text{max shear force,} &= 980 \text{ N over 2 fixings} \\ &= 490 \text{ N / fixing} \end{aligned}$$

$$\text{moment about p} = \frac{980}{1000} \times 0.75 = 0.74 \text{ kNm}$$

$$\begin{aligned} \therefore \text{shear at bottom fixing} &= 0.74 \times 0.25 \\ &= 0.185 \text{ kN} \\ &= 185 \text{ N} \end{aligned}$$

from BRE test report conclusion (see sheet 7).

2 hole fixing has 1300 N shear resistance

5800 N compression resistance  
as bracket resistance is larger than actual ✓ OK



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## 5 Conclusion

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Tests have been carried out at BRE

Based on the test results the following conclusion can be drawn:

The results from these tests show that the Swifix fixings if installed correctly following the installation guide can hold substantial loads of circa 1300N in the pull down (shear tests) and withstand compression loads of circa 5800N (see accompanying videos of compression test) with only minor deformation.