Burton Industries Pty Ltd A.C.N. 067 219 612

Manufacturers of Prefab Coolroom and Sandwich Panel Constructions

PANELS
Standard panels with 0.6 Colorbond skins and expaned Polystyrene Core.

NOMINAL SIZES
Width
- 1200mm

Thickness (mm)
- 50, 75, 100, 125, 150, 175, 200, 225, 250.

Note: Non-standard thicknesses are subject to quantity considerations.

PANEL SKINS
Standard panels faced with Lysaght Colorbond off-white Polyester of Acrylic at 25% or 80% gloss levels.

LENGTH
The continuous production method permits an infinite range of panel lengths. Maximum length is therefore limited only by handling and transport considerations. Lengths to 15 metres are not uncommon.

ELEVATED SERVICE TEMPERATURE
Maximum recommended continuous operating temperature is 75 degrees C, however, panels will be unaffected by temperatures to 85 degrees C for short periods such as hot water cleaning etc.

LYSAGHT PAINT SPECIFICATIONS
Dry film thickness totals 25 um and consists of 20 um, Acrylic/Polyester applied over 5 um of primer.

TABLE A - PANEL WEIGHTS

Thickness mm	50	75	100	125	150	175	200	225	250
Weight kg/m2	12.15	12.50	12.86	13.21	13.87	13.92	14.35	14.83	14.95

N.B. *Nominal panel weights as shown include the weight of jointing extrusions, sealants, etc., generally applicable to the completed assembly.*

TABLE B - WALL PANEL SPANS

Thickness mm	50	75	100	150	200
Span mm *	5000	6200	7200	8800	10200

TABLE C - CEILING ROOF PANELS

Thickness mm	50	75	100	150	200
Span mm *	3800	4800	5300	6500	7800

* *The spans are calculated for wind velocities of 44 M/S in a category 3 terrain.*

TABLE D - CO-EFFICIENT OF THERMAL TRANSMITTANCE OF 'U' VALUE

Panel Thickness mm	50	75	100	125	150	175	200	225	250
Vertical W/m2oC	0.589	0.398	0.305	0.248	0.209	0.181	0.158	0.141	0.128
Horizontal W/m2oC	0.543	0.386	0.299	0.243	0.206	0.178	0.157	0.140	0.127

N.B. "U" values as shown are based on still air conditions and mean panel face temperatures of 10oC.

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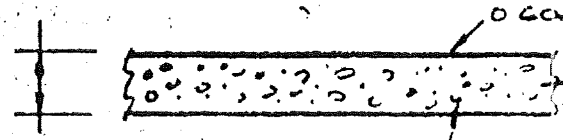
KNEEBONE & BERETTA PTY. LTD
CONSULTING STRUCTURAL & CIVIL ENGINEERS

15-17 MARION STREET, PARRAMATTA, N.S.W. 2150
BOREC HOUSE, STATION STREET, PENRITH, N.S.W. 2750

Ref. 22025 12th September, 1978.

STRUCTURAL INSULATING PANELS

ENGINEERING CALCULATIONS.



Cross breaking strength	=	179kPa
Compressive strength at 10% deformation	=	69kPa
Flammability	-	Self extinguishing

1 ... **Determination of design stresses in metal skins of panels.**

(a) **Bending Stresses.**

See charts for test results on 150mm thick panels as beams. Take top of straight section of load versus deflection curve as the maximum desired load.

Panels C & D - a core joint 900mm from centre of pa
(1200mm wide)
(150mm thick)

Maximum desired load from chart = 1300lbs.
= 5.78KN

Test panel loaded midspan

Span - 10' - 0" = 3.049m

BM in panel = $\frac{5.78 \times 3.049}{4}$

= 4.4KN

150 PANELS

C/C skins = 149.4mm

Max. compression and tension = $\frac{4.4}{.1494}$ = 29.5 kN

BURTON TURNER MODULAR SYSTEMS PTY. LTD.

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Stress = $\frac{29.5 \times 10^3}{1200 \times .6}$ = 41.0 MPa

PANEL E — 600mm wide, 150mm thick

(i) Failure load = 1000 lb. = 4.45 kN

(ii) Maximum desired load = 700 lb. = 3.11 kN

(i) Failure load

BM in panel = $\frac{4.45 \times 3.049}{4}$ = 3.39 kNm

load in skins = $\frac{3.39}{.1494}$ = 22.70 kN

Stress = $\frac{22.70 \times 10^3}{600 \times .6}$ = 63.07 MPa

(ii) Maximum desired load

BM in panel = $\frac{3.11 \times 3.049}{4}$ = 2.37 kNm

load in skins = $\frac{2.37}{.1494}$ = 15.89 kN

Stress = $\frac{15.89 \times 10^3}{600 \times .6}$ = 44.14 MPa

75mm PANELS 1200mm wide

(i) Failure load = 1050 lb. = 4.67 kN

BM in panel = $\frac{4.67 \times 3.049}{4}$ = 3.56 kNm

load in skins = $\frac{3.56}{.0744}$ = 47.84 kN

Stress = 66.45 MPa

Maximum desired load = 850 lbs. = 3.78 kN

BM in panel = $\frac{3.78 \times 3.049}{4}$ = 2.88 kNm

load in skins = 38.73 kN

Stress = 53.78 MPa

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DESIGN STRESSES FOR PANEL SKINS

PANEL	Stress at Failure	Stress at max. desired load
	MPa	MPa
150mm		41.00
150	63.07	44.14
75	66.45	53.78

Adopt 40 MPa as maximum design stress in 0.6mm steel skins in panels when acting as beams.

COLUMNS

Test panels 3830 panel, 150mm wide, 75mm thick $\frac{h}{t} = 51$

(i) Failure load = 1000 lb = 4.45 kN
Stress in skins
(assuming full load taken by steel) $= \frac{4.45 \times 10^3}{2 \times 150 \times}$
= 24.7 MPa

(ii) Max. desired load = 800 lb = 3.56 kN
Stress in skins $= \frac{3.56 \times 10^3}{2 \times 150 \times}$
= 19.8 MPa

Adopt max. design stress in panels as columns to be 20 MPa for $\frac{h}{t} = 50$

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WALL PANELS.

Wind loading

VZ = 44 m/s x .65 for Terrain Category 3
= 28.6 m/s

q2 = $.6 \times 28.6^2 \times 10^{-3}$
= 0.49 kPa

Pressure coeff Cp
for External pressure Cp = .80
Internal pressure Cp = -.20

Total inwards pressure on wall = 1.0 x 0.49 kPa
= 0.49 kPa

Allowable stress in metal skins = 40 MPa x 1.33 for wind
= 53.2 MPa

Allowable load/ skin/ metre = 1000 x .6 x 53.2
= 31.92 kN

BM in panels = $\frac{0.49 \times L^2}{8}$ kNm L in metres
= $0.06125\ L^2$ kNm

Load or force in skins = $\frac{0.06125\ L^2}{d}$
= 31.92

ie L^2 = $\frac{31.92 \times d}{0.06125}$
= 521 d

ie L = $\sqrt{521\ d}$ d in metres

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WALL PANELS

PANEL	d. m	max. L m
50	.0494	5.07
75	.0744	6.22
100	.0994	7.20
125	.1244	8.05
150	.1494	8.82
175	.1744	9.53
200.	.1994	10.20

ROOF PANELS

LOADING

Live loads LL. $= \frac{1.8}{A} + .12$

for a panel 1.2m x 4.0m

LL. $= \frac{1.8}{1.2 \times 4.0} + .12 = 0.5$

Take LL for all panels as 0.50 kPa

Dead load for a 200mm panel $= 3.2\ lb/ft^2$
$= 15.63\ kg/m$
$= .153\ kPa$

Total roof design load $= 0.653\ kPa$

Design panels for 0.66 kPa loads

Allowable stress in metal skins = 40 MPa

Maximum allowable load in each skin per metre $= 1000 \times .6 \times 40$
$= 24\ kN$

B.M. in panels $= \frac{0.66 \times L^2}{8}$ kNm
$= .0825\ L^2$

Force in metal skins $= \frac{.0825\ L^2}{d}$
$= 24.00$

ie $L^2 = \frac{24.00 \times d}{.0825} = 291\ d$

$\therefore L = \sqrt{291\ d}$

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Ref. 22025

PANEL	d m	max. L m
50	.0494	3.8
75	.0744	4.65
100	.0994	5.37
125	.1244	6.02
150	.1494	6.59
175	.1744	7.12
200	.1994	7.62

SUMMARY

MAXIMUM SPANS FOR STYRENE PANELS WITH 0.6mm STEEL SKINS

Wall panels have been designed for 44m/s wind velocities in a category 3 terrain. (Well wooded areas and suburbs, towns and industrial areas)
In areas of open and exposed terrain the spans will need to be reduced.

PANEL THICKNESS	MAX. SPAN metres	
	WALL PANELS	ROOF AND CEILING PANELS
50	5.0	3.8
75	6.2	4.6
100	7.2	5.3
125	8.0	6.0
150	8.8	6.5
175	9.5	7.1
200	10.2	7.6

I.B. Mallon M.I.E.Aust

for KNEEBONE & BERETTA PTY.LTD.
Chartered Engineers.

MECHANICAL TESTING REPORT

REPORT NO: VFN00-2202 **DATE:** 26 October, 2000

CLIENT: Burton Industries Pty Ltd

ORDER: 7135

A Commitment to Quality

ETRS Pty Ltd
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Albion
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SUBJECT:
Proof loading and testing to tensile destruction of suspension components of a ceiling support system as requested by Mr Cliff Still.

DESCRIPTION:
One system comprised an M10 turnbuckle complete with left hand eye bolt and a length of right hand M10 threaded rod. Fitted to the end of the rod was a moulded plastic dome, in which there was an M10 hexagonal steel nut.
A sketch provided by Mr Still showed the intended use of the system was that the threaded rod passed through a transverse hole in a suspended roof panel and was sandwiched between two 63mm OD x 2.4mm thick steel discs with the dome nut supporting the under face and a lock nut above. The eye bolt at the other end of the turnbuckle was shown to be then connected to an anchor chain.
As the purpose of the test was to prove the system, the roof panel was not provided by the Client, and the testing was conducted using a universal testing machine by anchoring the eye bolt with a steel clevis and pin and using a steel bearing plate under the dome nut and disc. The bearing plate had a hole 48mm diameter so that it supported the disc by no more than an 8mm land around its perimeter, thus not directly supporting the moulded in nut.
A tensile force was applied and gradually increased until there was an audible indication of movement at 10.95kN (1 116 kg) and on removal of the force it was observed that the nut had pulled out of the plastic dome and the disc was deformed.
The force was reapplied and further increased until reaching 18.0kN (1 835 kg) when the hexagonal nut pulled through the steel disc.
The component disc was replaced by a thick steel disc and the force increased until at 20.1kN (2 050 kg) the eye bolt fractured at the eye / shank transition zone.
Using two lengths of M10 threaded steel stud the turnbuckle fractured one side adjacent to the threaded end at a force of 24.0 kN (ie 2447 kg).

A second turnbuckle, complete with left hand eye bolt and a right hand open hook, was connected to the testing machine using clevis' and pins. A gauge length of 20mm was scribed on the side of the hook, from the tip to the body straddling the gap, and the overall lengths of the eye bolt and turnbuckle were measured.
A tensile force was applied and incrementally increased while assessing the resultant permanent deformation of individual components.

Force Applied (kN)	Remarks
5.0	Hook gauge length increased by 2.0mm (10% permanent opening).
6.0	Hook gauge length increased by 4.8mm (24% permanent opening).
6.3	Hook opened in a ductile manner and sufficiently to slip from the clevis pin. The hook was then replaced with an M10 threaded steel stud for testing to continue.
10.0	No permanent extension of either the eye bolt or turnbuckle.
15.0	Eye bolt length increased by 0.8mm (<1%), no extension of turnbuckle.
17.5	Eye bolt length increased by 1.6mm (1.4%), no extension of turnbuckle.
19.7	Eye bolt fractured at the eye / shank transition, no permanent extension of turnbuckle length.
24.2	Using two lengths of M10 threaded steel stud the turnbuckle fractured adjacent to the threaded ends at diagonally opposite locations.

Remarks
Mr Still suggested that the maximum load to any one suspension system would be 300kg (ie 2.94kN) which is 47% of the hook failure, seen as the weakest part of the system, 16% of the 18.0kNdome nut and disc failure force and 15% of the 19.7kN eye bolt failure force. The units provided for the testing purposes would adequately support the roofing panels as desired.

R Goold

R.Goold
Mechanical Testing Officer