

EFFICIENT BRACING DESIGN GUIDELINES

There are many example of bracing calculations where designers have not specified GIB EzyBrace® Systems efficiently. GIB EzyBrace® Systems and the GIB EzyBrace® FP software are tools that facilitate effective and economical design but in themselves do not deliver these efficiencies without proper application and without designers understanding the “art of bracing design”.

The following are tips to ensure **better design efficiency**.

Exceeding Demand

Demand calculation using the GIB EzyBrace® FP software is tailored to the particular building design.

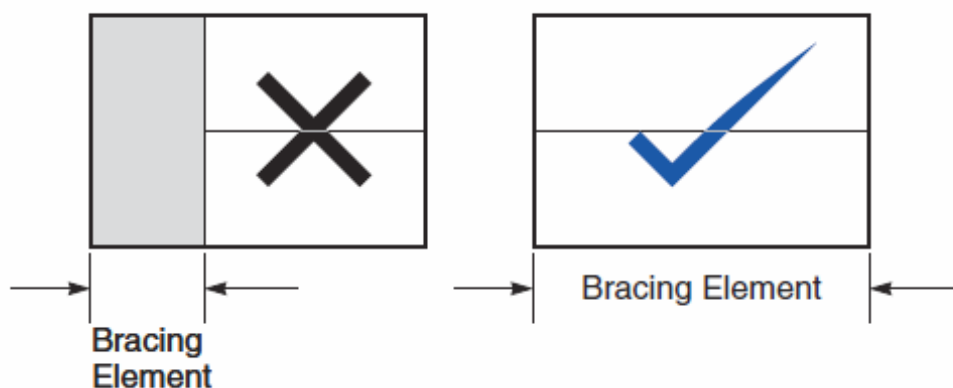
Resistance calculation is based on the sum of Bracing Units achieved for all bracing elements in a particular direction (Along or Across). Bracing Units are determined by testing three identical specimens in accordance with the BRANZ P21 test and evaluation procedure. The published Bracing Unit rating is derived from mean ultimate loads, *without application of any safety or reduction factors*.

Allowing for site variations and workmanship it is therefore prudent to incorporate some over-capacity in a design. The GIB EzyBrace® FP software automatically provides information on the ratio of resistance over demand. A ratio of between 110% and 120% is recommended.

However, there are still many inefficient designs where ratios are 150% or more.

Always use the full length of wall available for a designated bracing element

There are still many designs where shorter or part sections of a wall are selected to be a bracing element. Often designers use multiples of 1.2m sheet width or 0.6m stud spacing. If, for example, a wall between bedrooms is 3.4 metres *use that full length as a bracing element and apply the 150mm centres bracing fastener pattern to the perimeter of the entire wall available*. This results in the maximum BUs achieved and the best possible quality of finish.



Use GS elements where possible and BL where needed

Start using GS elements where possible. Use GS1 elements on external walls lined on one side only and also on internal walls lined on both sides. Using GS1 elements as much as possible means bracing elements need the bracing fastener pattern on one side only. No other special requirements are needed for GS1 bracing elements.

When this does not achieve the totals required *change internal walls lined on both sides to GS2 elements.*

Should this still not achieve the Bracing Units required, *use BL1 elements on the building perimeter, external walls first.* BLP and BLG elements are only called upon when necessary.

Note that it is not always required but *sensible to use BL1 or BLP elements on short walls adjacent to significant openings with heavy lintels* such as near bay windows, ranch sliders or garage doors.

Specifying GIB® Bracing Elements	
<i>Inside lining on External Walls</i>	Brace type
400 mm or greater	GS1, BL1, BLP
<i>Internal Walls (if only one side available for bracing)</i>	Brace type
400 mm or greater	GS1, BL1
<i>Internal Walls (if both sides available for bracing)</i>	Brace type
600 mm or greater	GS2, BLG
400 mm or greater	BLP

Distribution

The NZS3604:1999 guidelines for bracing distribution state that 70 Bracing Units must be achieved on internal bracing lines and 10 x L (m) Bracing Units on external lines. These rules alone often do not achieve the intent of even distribution of bracing throughout the building. Designers must check that bracing lines are relatively evenly spaced and that the total number of Bracing Units on each line is “similar”. *In no case should a line have less than 50% of the demand divided by the number of bracing lines used in that direction.* For example if demand is 1200 Bracing Units in the Along direction and 4 bracing lines are used, each line should not have less than 50% of 1200/4 = 150 Bracing Units.

Designers should consider the 50% rule to be a minimum and 75% is recommended.

Efficient design more often than not means simple design, effective and responsible use of materials and less chance for construction error on site.

ADVANTAGES OF USING GIB EZYBRACE® SYSTEMS, 2009

GIB EzyBrace® Systems, bracing elements and construction details

- Five base systems only (GS1, GS2, BL1, BLG and BLP)
- Short GS1 and GS2 elements for increased design efficiency
- Simple construction details (GS systems do not require hold-downs, BL systems do)
- Uniform fastening pattern for all GIB EzyBrace® systems
- Horizontal or vertical fixing permitted. BU ratings are based on the lower performance.
- Nail or screw fixing permitted. BU ratings are based on the lower performance.
- No angle braces required to achieve BU ratings but still recommended for temporary bracing and can be placed anywhere
- GIB EzyBrace® Systems permit simple specification, construction and inspection on-site
- BRANZ Appraisal No. 294(2009)

GIB EzyBrace® FP, software

- Demand (Wind and Earthquake load) calculations are based on engineering principles and not the tabular format of NZS3604
- Using First Principles (FP) engineering results in more accurate demand calculations tailored to each particular building design
- Demand calculations are more accurate for single storey buildings where the NZS 3604 tables can sometimes be non-conservative
- Savings accrue particularly when building heights, roof slope, etc. do not closely fit the increments adopted by the NZS3604 tables and for two storey buildings with different upper and lower storey dimensions
- Easy to use single sheet drop-down box format for demand calculations
- Single and two storey buildings can be designed using a single workbook
- The software allows for designs with 10 or 13 mm GIB® plasterboard options using a one step drop-down box selection
- Resistance calculations (Wall Along and Wall Across) will reflect optimum BU ratings for GIB EzyBrace® systems as a function of bracing element length
- Only appraised NZS3604:1999 construction bracing software in the market and included in BRANZ Appraisal No.294(2009)

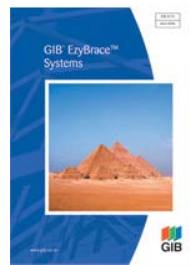
For further information refer to the following.

You can download or order these from www.gib.co.nz/ezybrace or call 0800 100 442



Supplement Brochure

"If only everything was as simple as GIB EzyBrace®"



Systems Literature

GIB EzyBrace®
Systems April 2009