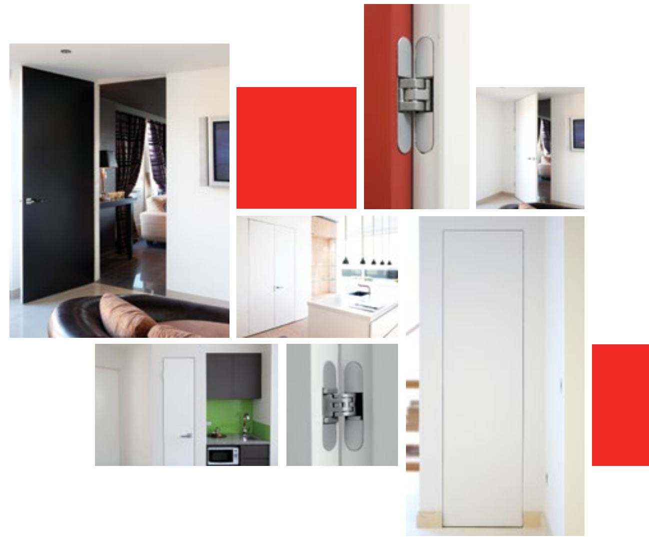
EZY Jamb®

The Trimless Door Jamb System



Ezy Jamb Test Results

For dynamic and static loading conditions
Performed on full size door frame

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EZYJAMB Test Results

Background

Ezy-jamb is a 0.75mm thick profiled steel doorjamb, G300 steel with a Z200 coating. It has been manufactured to simplify construction and site times by implementing variable widths with a click together component assembly, as well as provide several types of finish options for the domestic or commercial door installations. Ezy-jamb meets the industry standard fitting requirements of door stop, fixing to frame, adjustable alignment for 'plumb' all without the need for wedges, or packers.

Scope

This Ezy-Jamb brochure covers:
1/ the fitting requirements,
2/ structural comparison with Industry standard timber jamb
3/ range of sizes available
4/ The testing procedure used to establish the performance capabilities of the jamb under loaded conditions, based on static and dynamic conditions. Very high repetition closing operations were performed, under a range of load types including full door slamming.

Testing

The testing was conducted under laboratory conditions, and a more detailed analysis can be obtained if required.

Findings

The results verify that 'Ezy-jamb' bonds with the wall stud to form a compound section. The combined elements become stronger and stiffer, which reduces vibration in the wall as a result of the door closing action. This is the same function performed by the standard door jamb assembly, but without the wedges and/or packers, thereby creating a more consistent product.

Method

The basic requirement of the testing is to show the relative properties of the standard jamb to the Ezy-Jamb.

Several standard wall panels were constructed of the possible configurations for comparison;
1/ Timber wall stud only
2/ Steel wall stud only
3/ Timber stud - timber jamb
4/ Steel stud - steel jamb
5/ Timber stud - steel jamb.

The basic configuration of the assembly is shown above. The only timber stud tested was the 90x45 F8 seasoned Pine, versus the 76 x 0.75mm steel stud.

The range of combinations that could be tested is beyond the scope of this report. The outcome, however, is clear in the finding that the steel jamb performs more than adequately, and is at least equivalent to the 'industry standard' - timber jamb.

Each separate wall panel segment, was individually loaded with a platform overlying a block placed centrally on the appropriate stud/ stud-jamb. This created a point load at the same location in each panel.

The graph presented at the bottom of the page is the result from this testing. Both the timber and steel jambs combine with the stud they are affixed to, which then almost doubles the stiffness of the basic stud.

Standard building practice has created the timber jamb and stud combination, which automatically creates a stiffer support for the door mounting, and at the same time a means of finishing off the door frame with an architrave.

There is no building code requirement for this practice, other than good building sense. There is no requirement specified in AS 1684 – Timber Framing Manual, nor in AS 1720 - Timber Structures Code of which AS 1684 is based.

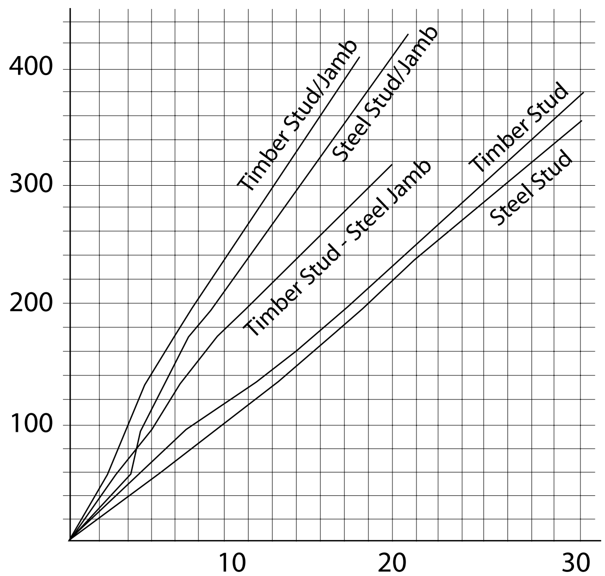
Method cont'd

There is however, door installation guides, produced in numerous books which are not standards per se, but which represent accepted practice. One such publication is 'The Australian House Building Manual' by Alan Staines - Pinedale Press, pages 99 - 102, reprint May 2000

The solid lines on the graph represent load and measured deflections by dial gauge vernier. The dashed lines are extrapolated figures of deflection to show the ultimate measured failure load applied to the test specimens.

The deviation in the steel stud/steel jamb graph would be the result of the fixing of the jamb to the stud. For a built up member, as would be found in floor joists, or laminated beams etc, the essential requirement is to cater for the shear loads applied between the elements. In simple terms this is achieved by applying several of the standard fixings at each end of the section, with a standard spacing of fasteners along the section.

It was evident for all of the sections tested that the standard fixing of nails or screws from the jamb to the stud was not entirely effective under ultimate conditions (nor is it expected to be). What became clear though is that the screw fixings of the steel jamb were far superior to the nail fixings.



As is commonly found, the steel to timber, or steel to steel connections are substantially stronger than timber to timber connections.

It is this reason why the steel stud / steel jamb graph 'bounces back' into line with the stiffness of the timber stud / timber jamb test specimen.

The connections of 200mm spacings along the length of the jamb are adequate, but when double or triple screws/nails are applied at each end of the steel jamb, the section will become more effective in a compound or built up sense.

Dynamic Testing

Justification of the relative stiffness' was one important aspect of the testing, but so too was the evaluation of repetitive opening/closing.

The life of a building is related to its contract life of seven years. To create a reasonable number of test repetitions, seven times 365 x four operations comes to about ten thousand operations. We chose 15,000 as a basic figure.

A pneumatic piston with a spring return created each operation which took almost a second to complete.

Initially the mechanism was started with a standard weight internal door, and it completed its 15,000 operations.

The 'closing' was considered to be light in this instance.

A further test was conducted with a heavier door, and a harder closing force. Another 15,000 operations was completed.

To complete the test procedure, the return spring load was increased still further so that each operation was quite hard - perhaps equivalent to someone closing a door heavily, but not slamming the door.

This operation lasted a further 10,000 operations and still there was no cracking in the plaster.

EZY Jamb®

Dynamic Testing cont'd

The final Dynamic test was conducted by physically slamming the door almost as hard as is possible - without pulling the door off its hinges. The plaster actually separated from the studs at the edge of the test specimen, but not at the door jamb itself.

This occurred at the fifteenth slam, where additional plaster fixings were placed around the perimeter of the specimen, but no additional fixings were added to the jamb assembly.

By the end of the 100 complete door slams, the hinge had actually torn out of the back of the timber door. With the hinge being completely distorted, the door had shifted within the opening and the tip of the door contacted with the top comer of the jamb. This created the only damage to the plaster around the door jamb for the whole of the dynamic test.

Conclusion

The testing of the Ezy-jamb 'clip together door jamb' did prove that the system performs at least as well in all facets of performance when compared with the industry standard timber jamb.

The steel jamb was tested with both timber and steel studs and was compared with the structurally sound hardwood timber jamb, when the softwood timber jambs would have been significantly more flexible.

The dynamic test was only performed on the steel jamb, and had it been done on the timber jamb, I suspect that the timber jamb would not have performed as well.

The fixing of the steel jamb through the pre-perforated steel lip of the jamb, directly into the plaster and through to the stud provides additional fixing of the plaster at this point. The nominal fixing of the architrave in the timber jamb application in no way compares.

This testing was conducted at the manufacturing plant by an Independent Engineer who has been working in the Building Industry for the past 14 years.

The use of steel elements bonded to timber (and or other steel elements) is now becoming commonplace in the industry. The reason this is so, is simply due to increased efficiency in construction, but also obviously to the increased performance characteristics that can be achieved.

Thus, with the testing completed, and with the double fixing at each end of the jamb into the stud with internal fixings at 200mm, I am completely satisfied that the steel Ezy-jamb will perform equally when compared with the Industry standard – timber jamb construction.

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