

Lateral Restraint Tie



Introduction

A common cause of bowing in historic buildings is due to a lack of mechanical connection between the walls and any joists. The traditional connection relies on friction due to gravity, which when released can leave a freestanding wall that is very susceptible to bowing. Bowing walls have been addressed in the past by installing S or X ties bonded right through the building to connect the opposite walls together.

Bow Flex Type2 uses the same principle as this proven method, with the advantage that Bow Flex Type2 can be installed invisibly and externally and uses the existing structural members to provide the necessary stability. Bow Flex, the Type2 works in compression as well as tension, negating the need to install noggins to share loads between floor joists.

The System

Bow Flex Type2 is available in 12 mm material. Installation is performed from outside the building through a 16 mm hole in the external wall. Bow Flex Type2 fits into an adapter for a SDS+ drill, and once passed through the external wall, Bow Flex Type2 will simply drill and fix into all floor joists encountered. After installation, a proof test using a Target Load Test Unit can be performed to ensure that sufficient fixing strength is achieved. The connection to the wall is then made using polyester resin and made good.

Utilising Structural Elements

By utilising the existing structural elements of the building, the solution is simple, cost-effective and quick to install. If Bow Flex Type2 is fitted into the side grain of floor joists, the load sharing is achieved via the floor boards crossing from one joist to the next. The traditional tie bar is effectively replaced by the existing floor and ceiling boards. When the joists run into the wall and sit in pockets within the masonry, the fixing is achieved with a short Bow Flex Type2 fixed into the end grain of each joist. If the joist is continuous through the property, a fixing at each end should produce the required effect. Any unconnected overlaps should be structurally jointed to allow continuity through the full joists. The installation process is described overleaf.

Load Dissipation

Rather than restrain the entire load of the wall on just one or two tie bars, it is usual to install multiple Bow Flex Type2 ties at regular intervals to take a much smaller load. If higher loads are required, these loads can be dissipated away from the end of the tie by installing in conjunction with Bar Flex, or by installing more traditional anchor plates for a decorative, historic effect.

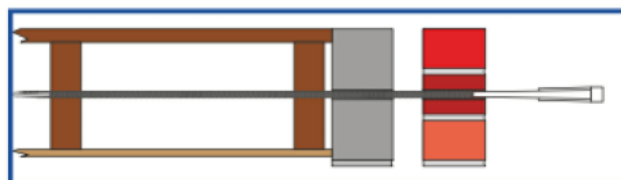
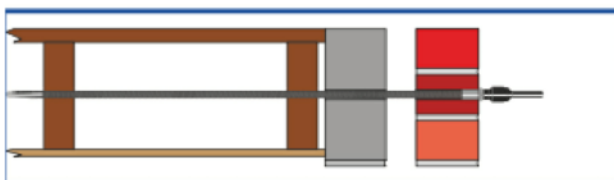
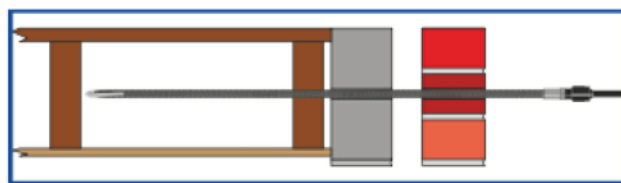
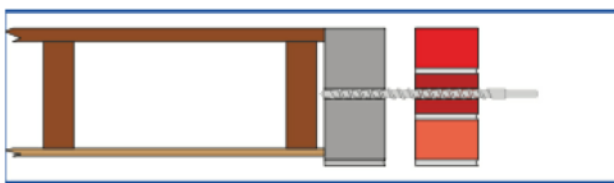
Technical

- One piece design - no moving parts to lose
- Easily tested after installation
- Simple installation
- Minimal disruption to building occupants
- Grade 304 austenitic stainless steel
- Fixes into end grain and side grain
- Virtually invisible and unobtrusive
- Excellent fixing capabilities
- High strength material



Installation

1. Before carrying out any works, check the floor and wall cavities for any services.
2. Measure and mark out the position of joists where Bow Flex Type2 ties are to be installed
3. Drill a 16mm diameter hole through the wall.
4. Insert the Bow Flex Type2 tie into the SDS+ adapter and push the tie into the drilled hole.
5. With hammer action turned off, drive the Bow Flex Type2 tie into the floor joist.
6. Driving into the first floor joist will take a few seconds, after which the tie will quickly pull itself through subsequent floor joists.
7. Remove the Bow Flex Type2 SDS+ adapter.
Note: at this stage, a tensile test may be performed to prove the fixing strength of the tie.
8. Use Target polyester resin to bond the Bow Flex Type2 tie to the wall to complete the installation



The Materials

Bow Flex Type2 is manufactured from Grade 304 austenitic stainless steel. The 12mm diameter tie has a tensile strength in excess of 14kN. The manufacturing process produces a long flute that can easily drill into Timber. Proof tests into side-grain on a 45mm timber Have yielded 6.8kN, and when installed 90mm deep Into end grain, 1.7kN has been achieved.

Testing

It is recommended that each Bow Flex Type2 is proof tested using a Target Load Test Unit. The actual tensile loading required for stabilising a wall is surprisingly Low.

For example, using a triangle of forces it can be calculated that if a wall that is 5m high and bowing outwards at its midpoint it 50mm, a horizontal load of 1kN is sufficient to withstand a vertical load of 50kN (over 5 tonnes!).

Uses

The ability to test after installation makes this a versatile and effective repair method for stabilising bowing walls. Used correctly, Bow Flex Type2 is sometimes capable of pulling a bowed wall back to its original position, however, it is primarily designed to stabilise walls in their current position. Bow Flex Type2 is recommended for use in bowed walls of two storey properties that have moves no more than 50mm from perpendicular. More severe conditions can be accommodated for, but the opinion of the manufacturer of a suitably qualified engineer should be sought. A loading of 1kN should be sufficient in most situations. It should be understood that this is a proof load, and not a test to failure. If higher loading is required, this can be achieved by introducing more Bow Flex Type2 ties.

