Stainless Steel Masonry Support Systems

Best Practice Information Sheet for Specifiers

MSIG provides guidance for engineers, architects, contractors and specialist sub-contractors on all aspects of design, buildability and good construction practice relating to stainless steel masonry support systems.

The Steel Construction Institute

Masonry Support Information Group

This Information Sheet should be read in conjunction with *Best Practice Information Sheet for Contractors* (SCI-P297).

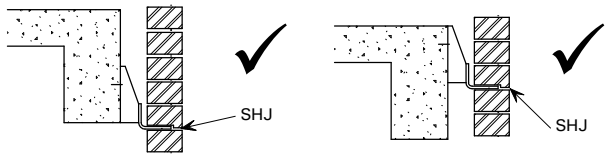
INTRODUCTION

Stainless steel masonry support systems are used to support the outer leaf of masonry cladding in buildings. The systems are fixed to the structural frame of the building and provide a horizontal ledge to support the vertical brickwork. They form an important part of the final structure and should be designed to appropriate standards and installed with care.

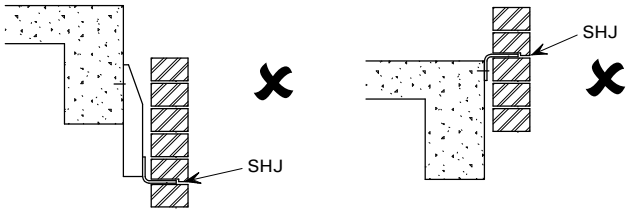
TYPES OF SYSTEMS

The main types of masonry support systems are continuous angles, bracket angles and individual brackets, all of which are suitable for different situations.

Stainless steel masonry support systems can be installed onto any type of structural frame. However, the soft horizontal joints (SHJ) should be positioned such that the masonry support system can be fixed to the structural member efficiently. Details of the type and dimensions of the main frame should be given to the support system manufacturer to ensure their system can be securely fixed.



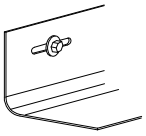
Preferred positions of soft horizontal joints in relation to structural beams



Non-preferred positions of soft horizontal joints in relation to structural beams

Continuous angles

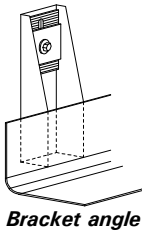
The most basic support system consists of a continuous angle fixed directly to the structural frame. The efficiency of this system significantly decreases with wider cavities. In most cases, bricklayers prefer to work off a continuous angle.



Continuous angle

Bracket angles

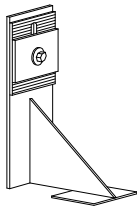
This system also consists of a continuous angle, but with brackets welded to the vertical leg of the angle. The brackets are then fixed to the structural frame. This is a more economical system for wider cavities, as the angle does not have to span the full width of the cavity and hence the thickness of the angle can be reduced; this results in a lightweight solution.



Bracket angle

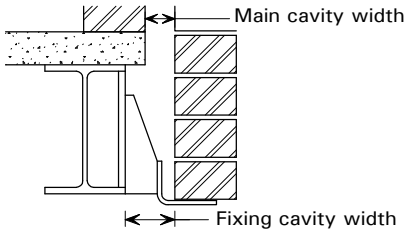
Individual brackets

This system consists of individual horizontal ledges to support the brickwork. It is recommended for use along stretches of curved or irregular masonry.



Individual bracket

CAVITY WIDTHS



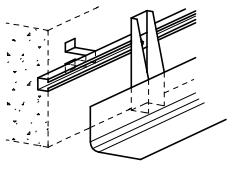
Recommended Fixing Cavity Widths

Type of Masonry Support System	Fixing Cavity Widths	
	Range	Optimum
Continuous angle	30 – 100 mm	50 mm
Bracket angle	50 – 150 mm	100 mm
Individual bracket	50 – 150 mm	100 mm

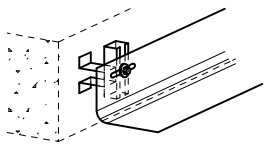
STRUCTURAL FRAME

Concrete structures

For concrete structures, an anchored channel should be cast into the concrete. This can either be a continuous horizontal anchored channel or several individual vertical anchored channels.



Continuous horizontal anchored channels



Individual vertical anchored channels

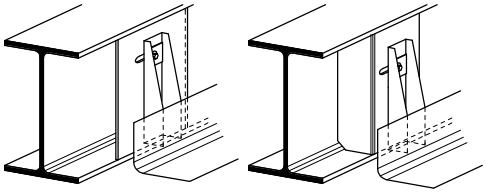
The concrete is usually of adequate depth to support the heel of the bracket or angle. If the concrete contains lightweight aggregate, it is very important to inform the support system manufacturer, as the fixings will require specialist attention.

In exceptional circumstances, post-fixing methods, including expanding or chemical anchors, can be used. If necessary, the support system can be fixed onto the top of the concrete slab. Consultation with the support system manufacturer is recommended.

Where the fixing cavity widths are large, specialist advice should be sought at an early stage. Similarly, corner details often require specialist attention.

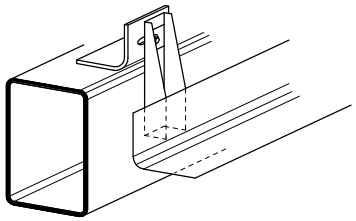
Steel structures

General guidance for designing the fixing of the support systems to steel structures is provided in a publication by the Brick Development Association and British Steel Corporation[1]. There are various methods that can be used to provide a suitable fixing. For **I-section beams**, an additional plate or angle must be welded which spans between the two outer flanges, to provide a vertical surface for fixing. This plate should have a horizontal slot cut in it to allow horizontal adjustments.



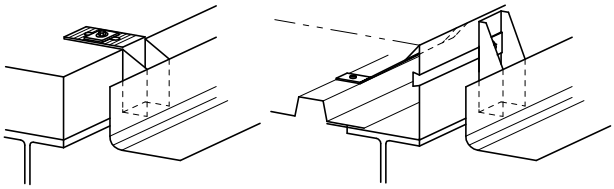
Fixing to an I-section beam

Often it is necessary to fix the support system to other steel members, for example **rectangular hollow sections**. For this, angle cleats with horizontal slots can be welded to the top of the section and the support system fixed to them.



Fixing to a rectangular hollow section beam

Alternatively, if there is a concrete slab above the steel member, the support system can be fixed to the slab rather than to the steel member. This can be achieved by bolting either to the top of the slab or to an edge trim with a continuous horizontal channel. Take care that all contact faces are hard packed as necessary.



Fixing to a concrete slab

DESIGN

General guidance for designing in stainless steel is found in Eurocode 3 Part 1.4[2] and in an SCI design guide[3]. For installation guidance, ENV 1090-6[4] should be referred to. A design method for continuous angle systems is given in SCI-P157[5]. Trade literature from manufacturers of support systems gives design tables for bracket angle systems and individual bracket systems.

When support systems are fixed to steel frames, the structural member should always be checked for deflection and torsional restraint and, if necessary, a torsional restraint beam added.

WALL TIES

Cladding needs to be tied to the inner leaf wall (or light steel framing) at a recommended maximum horizontal spacing of 450 mm within 300 mm above and below the support angle. Stainless steel ties should be used. These are essential to the correct working of the support system.

MATERIAL

Masonry support systems are generally manufactured from **Austenitic stainless steel** to BS EN 10088[6]. Grade 304 (1.4301) is suitable for general building applications. However, grade 316 (1.4401) is also available for use in more corrosive and marine environments.

AVOIDANCE OF BI-METALLIC CORROSION

Bi-metallic (galvanic) corrosion can sometimes occur when stainless steel is fixed to carbon steel if water is present. Generally, bi-metallic corrosion is not a problem. Current best practice is to ensure that the carbon steel is painted or that an isolation gasket is inserted between the carbon steel and stainless steel.

INFORMATION FOR MASONRY SUPPORT MANUFACTURER

To ensure the masonry support system is correctly manufactured, the following information must be supplied to the support system manufacturer:

- Location and use of building
- Site dimensions (unless otherwise agreed)
- Type and dimensions of main structural frame
- Grade of material of structural frame, type of concrete (e.g. normal or lightweight aggregate)
- Design wind loads (where required)
- Position of windows and other voids
- Position of DPC/cavity trays
- Position of soft horizontal joints
- Details and location of all movement joints
- Datum levels and location of masonry supports
- Type and dimensions of masonry to be supported
- Any limiting dimensions for masonry supports
- Construction programme and delivery dates
- Full set of drawings (plans, sections, elevations).

REFERENCES

1 THE BRICK DEVELOPMENT ASSOCIATION AND BRITISH STEEL CORPORATION
Brick cladding to steel framed buildings
BDA and BSC, 1986

2 ENV 1993 Eurocode 3 Design of steel structures
Part 1.4: Supplementary rules for stainless steels
CEN, 1996

3 BURGAN, B. A. & BADDOO, N. R.
Structural design of stainless steel (SCI-P291)
SCI, 2001

4 ENV 1090 Execution of steel structures
Part 6: Supplementary rules for stainless steels
BSI, 2000

5 Stainless steel angles for masonry support (SCI-P157)
SCI, 1995

6 BS EN 10088 Stainless steels
BSI, 1995

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