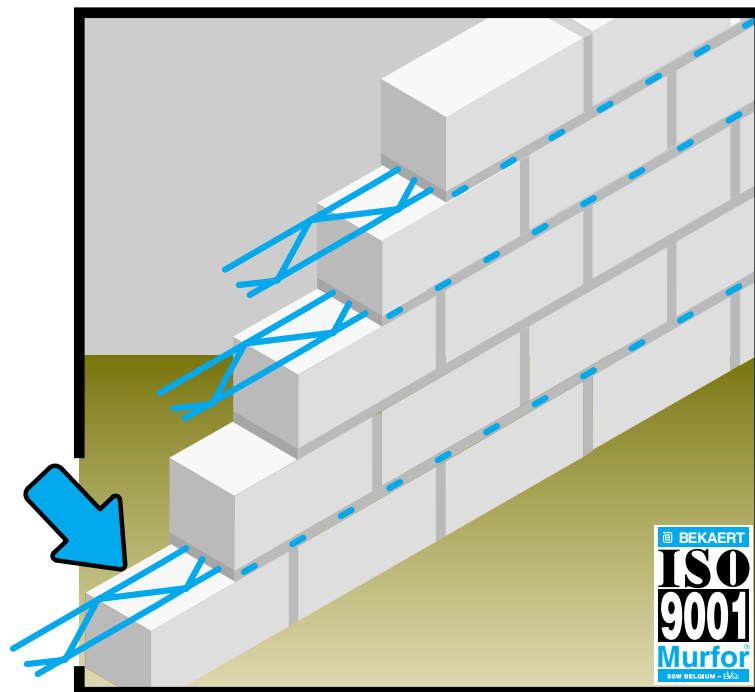


Murfor®



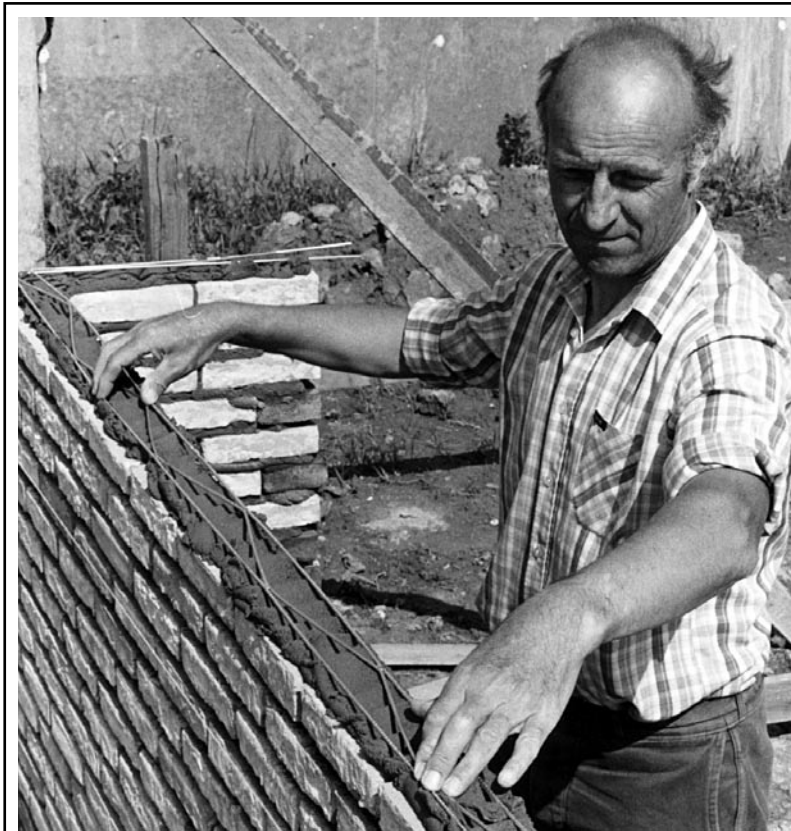
Reinforcement for masonry

**Reinforcing
confidence
for client
architect
contractor**

Murfor®

THE CONSTRUCTIVE IDEA

Murfor® reinforced masonry



Murfor®

is a prefabricated reinforcement consisting of two parallel wires welded to a continuous zigzag wire.

The quality of the steel complies with reinforcement standards

- *min. breaking strength 550 N/mm²*
- *min. yield strength 500 N/mm²*
- *shear strength of the welds min. 2500 N*
- *the wires are serrated to ensure good bonding to the mortar*

1 Murfor®

increases strength

- ✓ Murfor® increases the compressive strength of the masonry particularly with respect to eccentric loads.
- ✓ Murfor® increases the rigidity of the construction by joining bearing walls and partition walls, and prevents the progressive collapse effect.
- ✓ Murfor® offers new architectural possibilities, e.g.:
 - Stack bonded masonry
 - Collar jointed walls
 - Replacement of concrete lintels
 - Replacement of concrete ring beams
 - Longer wall sections between movement joints

2 Murfor®

prevents cracking

The use of Murfor® in masonry is extremely effective in preventing crack formation.

The main causes of cracks in masonry are:

- ✓ overloading due to bending, shear
- ✓ shrinkage, creep and expansion
- ✓ differential settlement
- ✓ earthquakes, vibrations, explosions

3 Murfor®

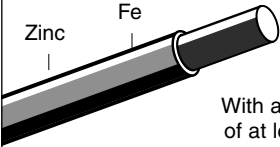
is user-friendly

Murfor® is easily positioned in the mortar joints. In addition, thanks to the parallel longitudinal wires and the well-chosen length of Murfor® elements, use on the construction site has been made easy.

Product range

Three types

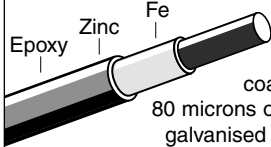
Z = Hot dip galvanised



Zinc Fe

With a zinc coating of at least 70 g/m², for masonry exposed to a dry environment.

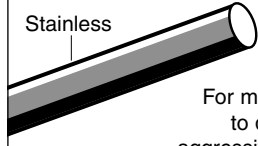
E = Epoxy-coated



Epoxy Zinc Fe

With an epoxy coating of at least 80 microns on the standard galvanised wire to provide better protection.

S = Stainless steel

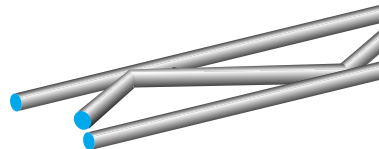


Stainless

For masonry exposed to dampness or an aggressive environment.

2 Types

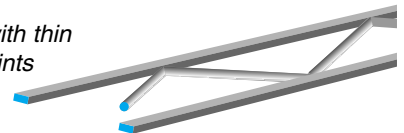
Murfor® RND/Z
RND/E
RND/S

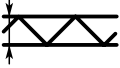








→ for masonry with mortar joints

Murfor® EFS/Z

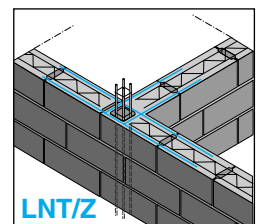
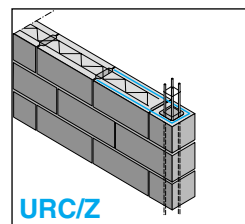
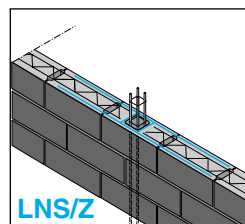
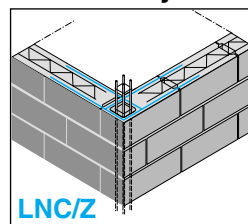
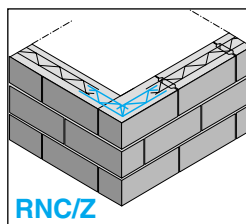
→ for masonry with thin bed (glued) joints



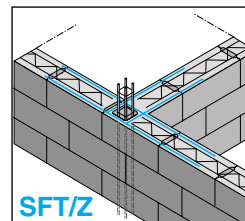
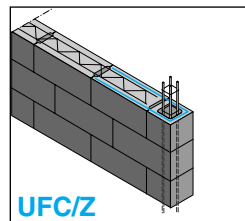
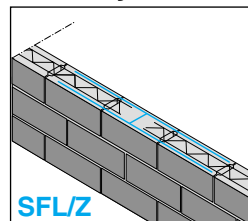
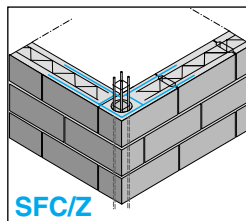
Type	length (m)	Dimensions in mm			piece/bundle	bundle/palet
						
RND/Z (Galvanised) 	3,05	50 100 150 200	4 4 4 5	3,75	25	40
RND/E (Epoxy) 	3,05	50 100 150 200	4 4 4 5	3,75	25	40
RND/S (Stainless steel) 	3,05	50 100 150 200	4 4 4 5	3,75	25	40
EFS/Z (Galvanised)  (Stainless steel on request)	3,05	40 90 140 190	8 x 1,5	1,50	25	40

Other width available on request.

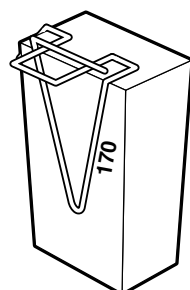
Accessories for mortar bed joints



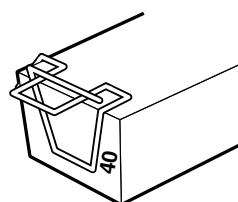
Accessories for thin bed joints



Lintel hooks



LHK/S
170

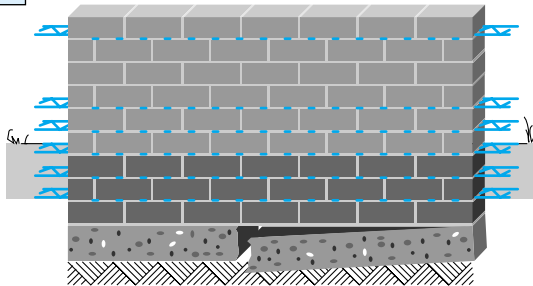


LHK/S
40

13 Classic applications

1

Differential settlement of the site

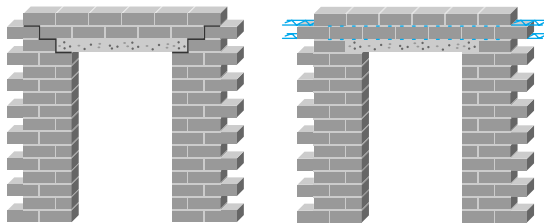


If building has to be carried out on ground which is not completely settled, or if the site is subject to differential settlement, reinforcement of the masonry with Murfor® can greatly reduce the resultant problems. It is recommended that the first five joints (including the foundation masonry) all be reinforced with Murfor®, and that thereafter Murfor® be inserted at 450-625 centers.

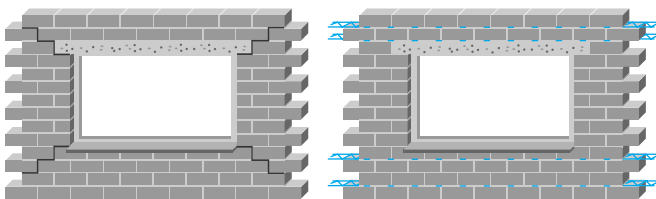
2

Concentrated stresses

Stresses occur around door and window openings. These tensile and shear stresses are completely taken up by Murfor®.



Around door openings, it is recommended to place two Murfor® reinforcements above the opening.

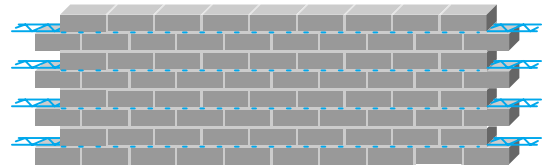
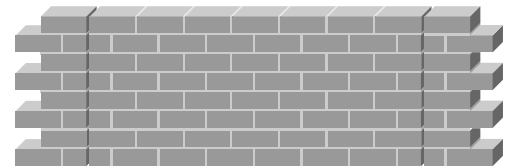


It is recommended to place two Murfor® reinforcements under and above the window opening. In both cases it is very useful to continue this reinforcement around the whole building, in order to build ring anchors.

3

Preventing cracks in long walls

Movements in the masonry caused by shrinkage or expansion lead to cracking.



Murfor® allows greater distances to be used between expansion joints (see table below).

This table shows the distance between the movement joints in long walls as a function of the various building materials and the quantity of Murfor®.

Distance between movement joints in long walls.

wall thickness ≤ 140 mm			
material	Un-reinforced	Reinforced every 400 mm	Reinforced every 200 mm
clay brick $\epsilon < 0.1$ mm/m	20 m	30 m	35 m
calciumsilicate blocks $0.1 < \epsilon < 0.4$ mm/m	8 m	12 m	14 m
aerated autoclaved concrete blocks $\epsilon < 0.3$ mm/m	6 m	10 m	12 m
wall thickness > 140 mm			
clay brick $\epsilon < 0.1$ mm/m	20 m	30 m	35 m
calciumsilicate blocks $0.1 < \epsilon < 0.4$ mm/m	8 m	14 m	16 m
aerated autoclaved concrete blocks $\epsilon < 0.3$ mm/m	6 m	12 m	14 m

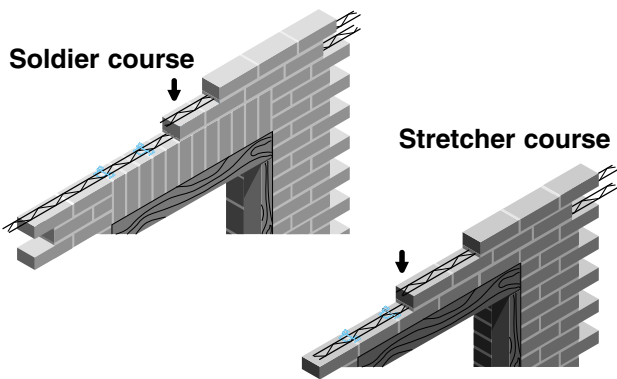
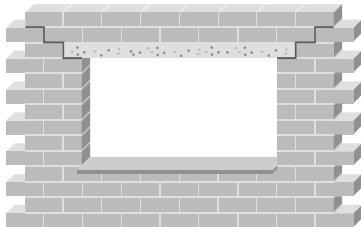
ϵ = sum of shrinkage and expansion of the brickwork

4

Lintels and beams

Prefabricated lintels always create disturbing physical and aesthetic effects in the brickwork. The use of metal lintels can lead to the additional problem of corrosion.

The use of masonry lintels fitted with Murfor® avoids these problems, and is also more economical.



The LHK lintel hooks anchor the bottom layer of the lintel.

Number of joints which must be reinforced as a function of the length and height of the lintel.

Bricks, max. height 100 mm							
Span	Height of the lintel in m						
	0,4	0,6	0,8	1,0	1,2	1,4	1,6
1 m	1	1	1	1	1	1	1
2 m	-	1	1	1	2	2	2
3 m	-	-	2	2	2	3	3
4 m	-	-	-	3	3	4	4

Bricks, height from 140 mm							
Span	Height of the lintel in m						
	0,4	0,6	0,8	1,0	1,2	1,4	1,6
1 m	-	1	1	1	1	1	1
2 m	-	-	2	2	2	2	2
3 m	-	-	-	2	2	3	3
4 m	-	-	-	-	3	4	4

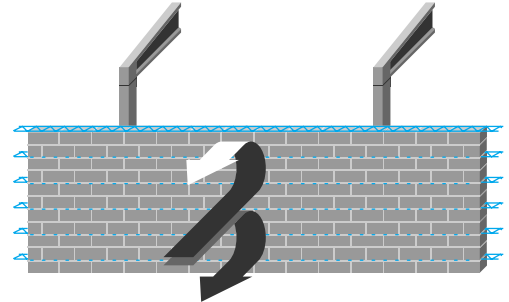
Note: after reinforcing the joints as indicated, fit further reinforcement every 450-625 mm as distribution reinforcement.

5

Walls subject to lateral load (wind pressure)

In walls which are subject to high wind load, stresses often increase to high levels. Reinforcing the brickwork with Murfor® allows the thickness of these walls to be reduced.

For the recommended dimensions of these walls, consult our manual 'Murfor® reinforcement for masonry.'

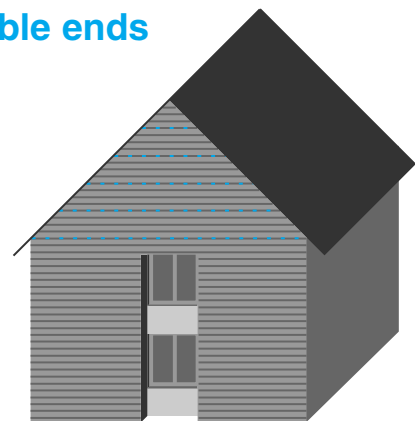


Number of joints to be reinforced with Murfor® per meter height

Wall thickness 190 - 200 mm				Wall thickness over 200 mm			
Distance between columns	wind press. in KN/m ²			Distance between columns	wind press. in KN/m ²		
	0,50	0,75	1,00		0,50	0,75	1,00
3 m	5	5	5	3 m	4	4	4
4 m	5	5	-	4 m	4	5	5
5 m	5	-	-	5 m	4,5	6	-
6 m	6	-	-	6 m	6	6	-

6

Gable ends

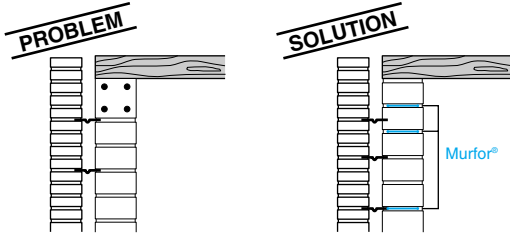


Cracks in the gable end can be prevented by reinforcing with Murfor® every 400 mm.

For gable ends over 8 m high, reinforcement every 225 mm is recommended. Depending on the material used, the instructions concerning long walls must also be taken into account. (See 3)

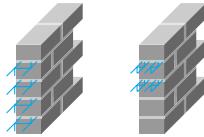
7

Ring beams



Concrete ring beams can be replaced by placing a number of Murfor® elements in the brickwork.

This can be achieved either by reinforcing each of four consecutive joints with one Murfor® element, or by placing two narrow Murfor® elements alongside each other in each of two consecutive joints.

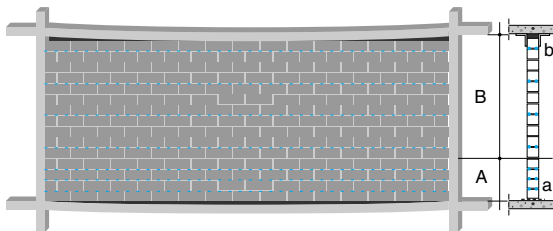


Advantages:

- reinforced concrete unnecessary
- no formwork
- better physical behaviour
- no danger of condensation, no cold bridges
- homogeneous construction
- simple and more rapid working

8

Partition walls subject to deformation



Where these partition walls are built on a floor slab or beam, cracking generally occurs as a result of flexure under load. Solution: isolate the wall from the bearing surface and apply Murfor® reinforcement according to the table. Dimensioning is similar to the dimensioning of a concrete deep beam truss. See our manual 'Murfor® reinforcement for masonry.'

- A: Main reinforcement zone.
- B: Distribution reinforcement zone.
- a: Separation layer, e.g. d.p.c. or similar.
- b: Non-inflammable, compressible material.

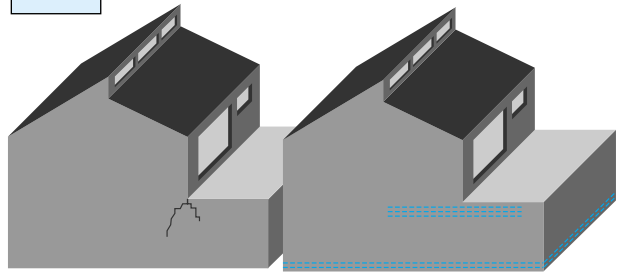
The table below shows the number of joints to be reinforced in zone A as a function of the wall length and height.

Wall length	Wall thickness up to 105 mm		Wall thickness 110 - 140 mm			Wall thickness 150 - 200 mm		
	height		Wall length	height		Wall length	height	
	2,5 m	3 m		2,5 m	3 m		2,5 m	3 m
4	3	3	4	4	5	4	5	6
5	3	3	5	5	6	5	6	7
6	3	4	6	6	7	6	8	8
7	4	4	7	6	8	7	9	11

Note: In zone B: distribution reinforcement every 450-675 mm

9

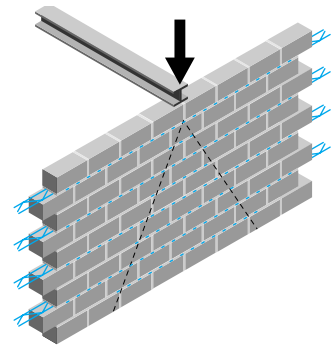
Change of building height



If the building height changes, the difference in vertical pressure causes stresses, which can be taken up by Murfor®.

10

High localised stresses under concentrated loads



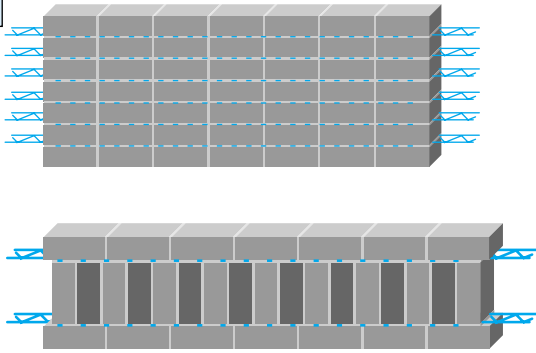
Concentrated loads, for example support points, give rise to tensile stresses in masonry and lead to crack formation. A concrete slab used as a support interferes with the homogeneous nature of the brickwork.

Depending on the size of the load, it is recommended that 3 to 5 of the joints below the load be reinforced with Murfor®.

Remember to check whether the bricks/blocks are able to withstand the local pressure under the support point.

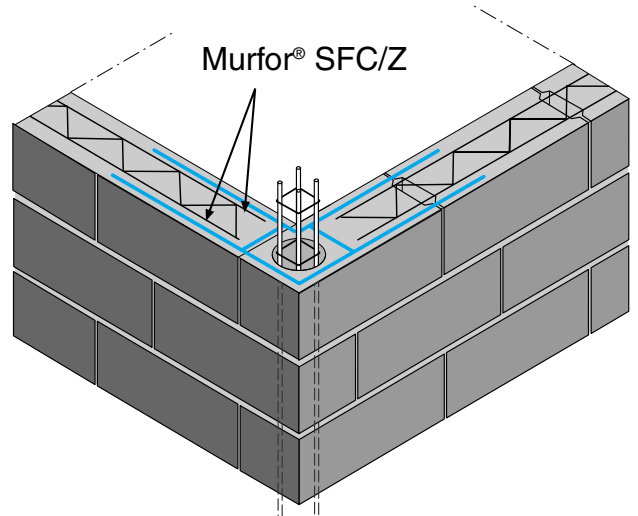
11

Unbonded masonry



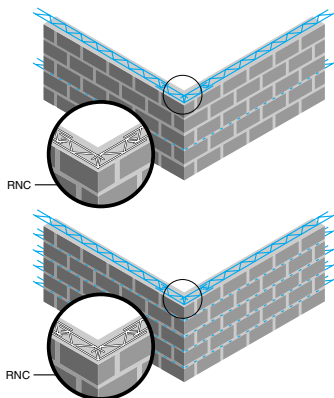
Masonry without bracing and the combining of bricks made from different materials creates a special aesthetic effect. This brickwork must be reinforced with Murfor® every 225 mm.

Angle joints for masonry with thin bed glued joints.



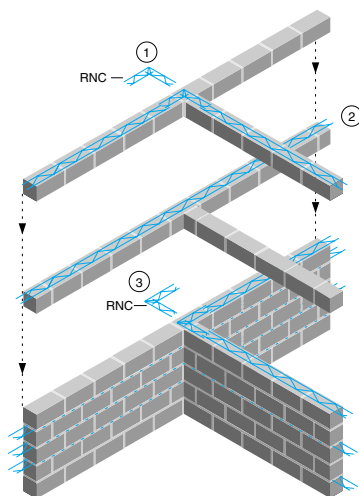
12

Angle joints and T-joints



Angle joint

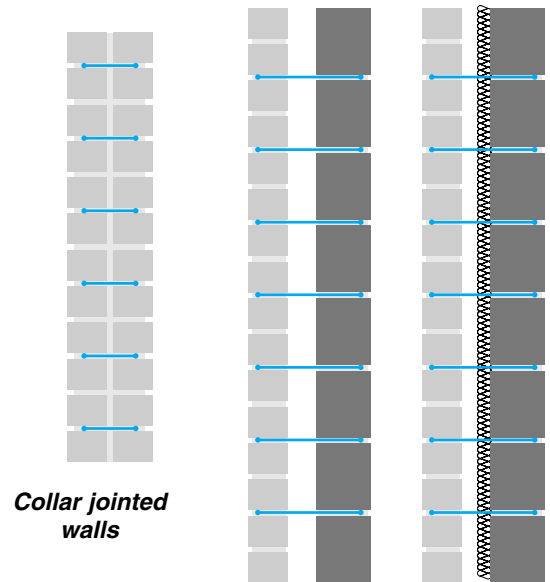
Wall joints create stress concentrations and lead to crack formation. Murfor® effectively takes up these stresses.



T-joint

13

Double walls and cavity walls



Collar jointed walls

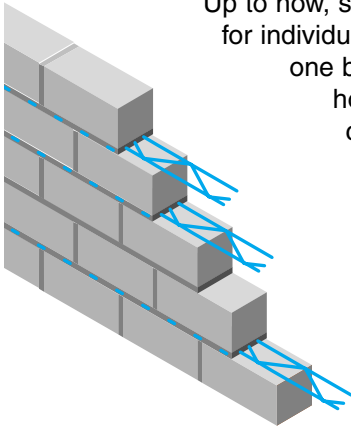
Cavity walls with and without insulation

Connecting cavity walls using Murfor® means that the two wall leaves can be regarded as one single wall.

Typical application are:

- collar jointed walls
- cavity walls supporting patios
- cavity walls subject to horizontal pressure
- lintels in cavity walls, no cold bridges

The homogeneously reinforced house



Up to now, solutions have been given for individual problem situations. Go one better, however - opt for a homogeneously reinforced construction with Murfor®. **Reinforcing confidence for client, architect and contractor.**

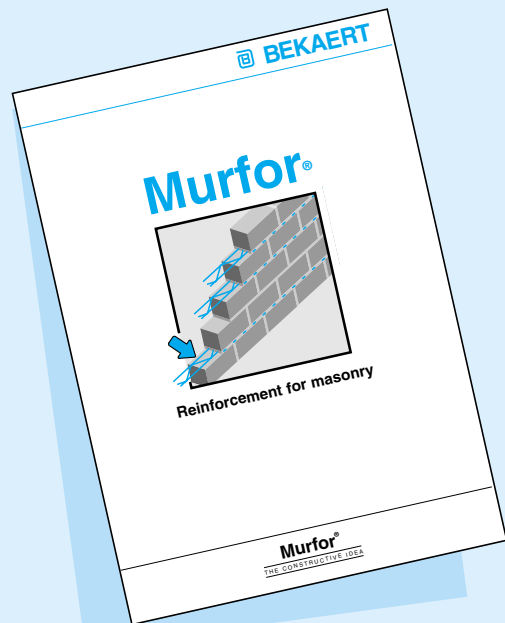


A homogeneously reinforced construction with Murfor®

- reduces the number of detail drawings and instructions on the site
- prevents the possibility of errors when carrying out work
- protects you against unforeseen problem situations

SERVICE

Bekaert has compiled a manual on Murfor® reinforced masonry for architects, design engineers and builders, at your disposal in our Bekaert office.



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Internet: [http:// www.bekaert.com/building](http://www.bekaert.com/building)

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