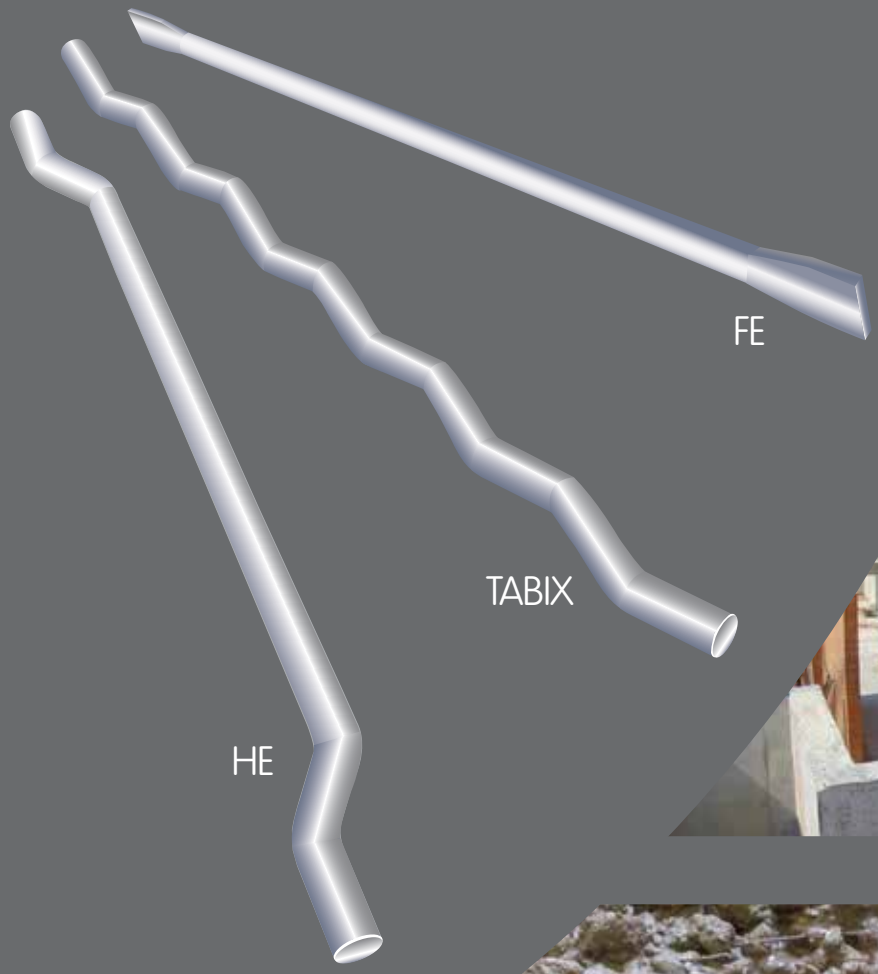
Distribution Solutions
WireSolutions

ArcelorMittal

Steel fibres
Housing applications



From the world leader in steel and wire solutions

Who are we?

WireSolutions is the wire drawing division of ArcelorMittal, the world's number one steel and mining company, and one of the world's largest wire drawers.

WireSolutions offers a diversified portfolio of low and high carbon wires, strands, ropes and corrosion-resistant solutions. Automotive, construction, energy and agriculture are all important segments for WireSolutions.

Staying close with customers and partners, WireSolutions is constantly looking to develop new solutions with the Research and Development centres of ArcelorMittal. Today the company is recognised worldwide for the quality of its corrosion resistant product range.

WireSolutions has been producing steel fibres for over 30 years and is one of the world's leading suppliers of steel fibres. Through a local presence, WireSolutions aims to be closer to its customers to improve its service.

All the fibres manufactured by WireSolutions are made from cold drawn, high tensile steel wire produced using the most modern equipment.

Our policy of continuous investment helps guarantee the durable performance of our products which are manufactured in accordance with ISO 9001, ISO 14001 and OHSAS 18001 standards. All our fibres have CE-marking.

Transforming tomorrow.

Where are our steel fibres produced?

ArcelorMittal Sheffield, United Kingdom

ArcelorMittal Syców, Poland

ArcelorMittal Bissen, Luxembourg

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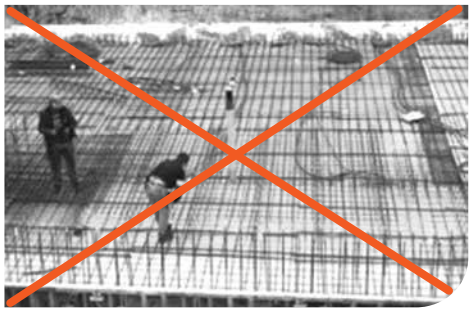
TAB-House™

Advantages

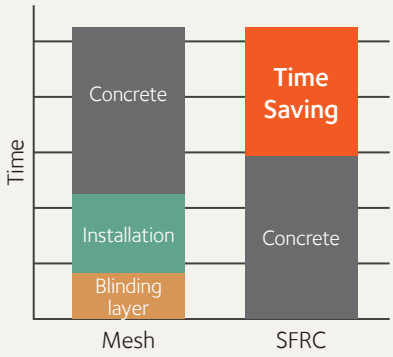
TAB-House™ is an ArcelorMittal system comprised of a number of different solutions, all using steel fibre reinforced concrete, to construct elements of a house.*

- Construction process simplified
- Improved crack control
- Avoid reinforcement mistakes
- Enhanced edge protection

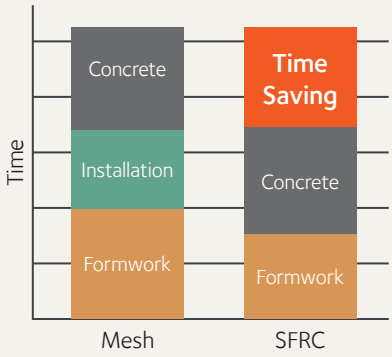


Huge time savings

- SFRC Floors (generic)

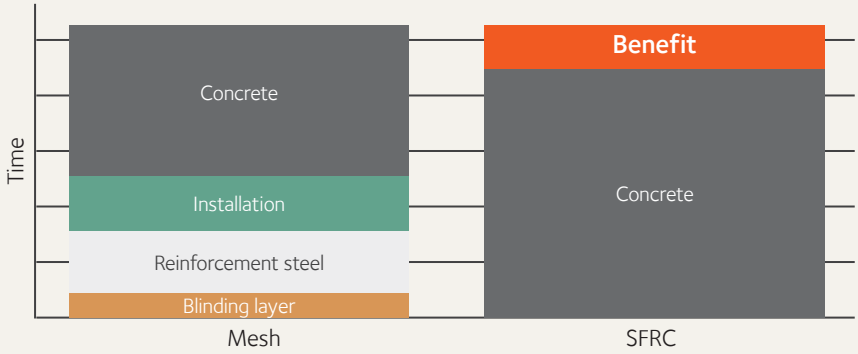


- SFRC Walls (generic)



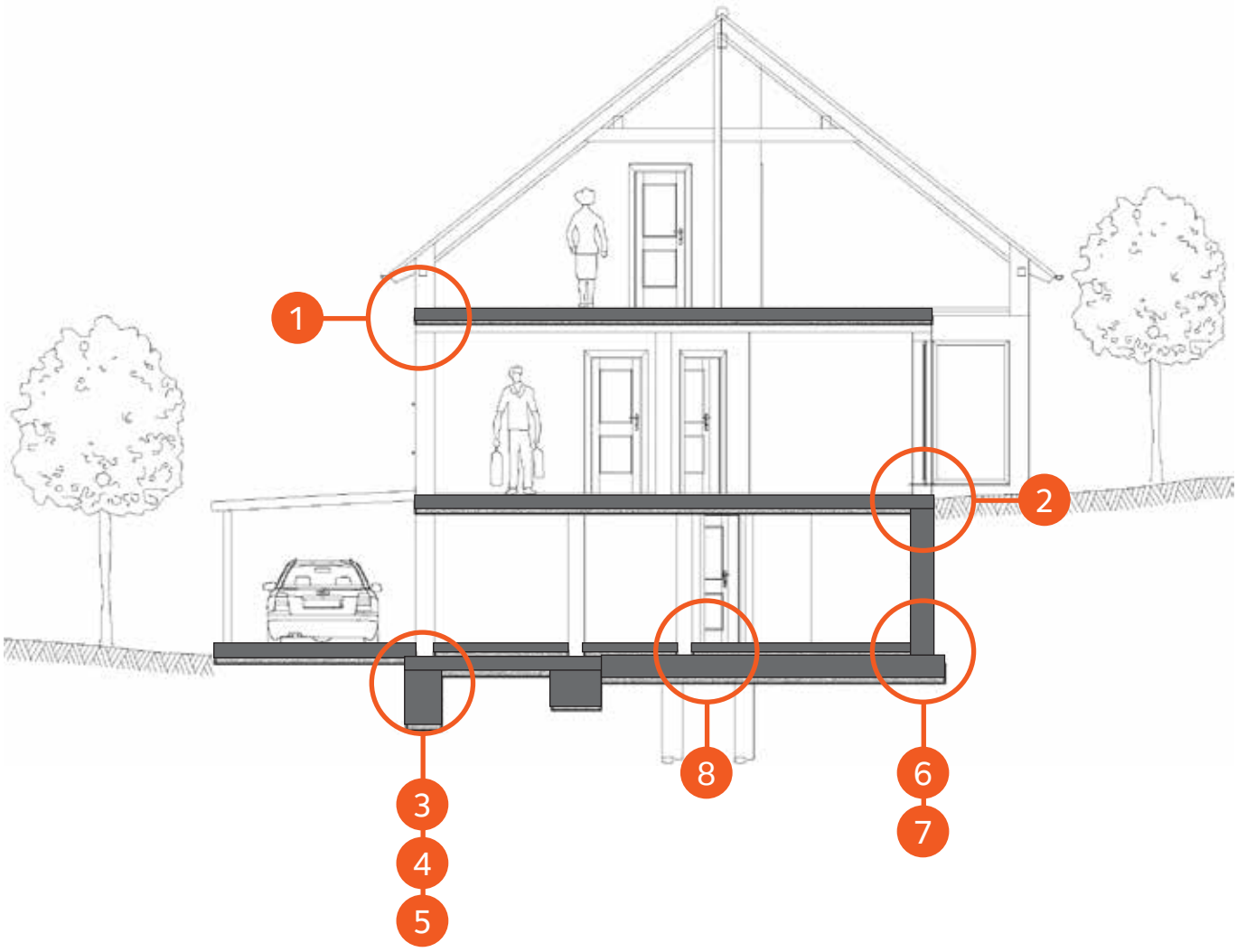
Reduced costs

- Cost-benefit relation SFRC (example)



* The use of this brochure is limited to residential construction

Applications



1 Elevated slab (compressive layer for precast elements)

For compressive layers and screed cast over precast elements, steel fibres provide an ideal form of crack control. Additional reinforcement may be required in areas where the precast elements are supported.

2 In situ cast elevated slab (TAB-Slab™)

Steel fibre reinforced concrete can be used to construct a free suspended elevated floor slab. All traditional reinforcement is replaced by steel fibres. Steel fibre reinforced concrete can be easily pumped to the house upper floors.

Please see our Structural brochure for more information.

3 Screed toppings

The steel fibre reinforced concrete improves the shrinkage behaviour and the crack control of the screed toppings.

4 Ground - slab

Traditional reinforcement in the ground floor can be replaced completely. There is no need to place a blinding layer under the slab. Floor thickness can be reduced as there is no requirement for concrete cover. Underfloor heating systems can be used with SFRC.

5 Strip and single foundations

Traditional reinforcement can be replaced. This is especially beneficial in cases where foundation lines change direction.

6 Walls

Steel fibre reinforced concrete can be used to construct basement walls. The only traditional reinforcement required is connecting bars or meshes between the walls and the slab. Using SFRC reduces the setup time before the concrete is placed.

7 Raft/Foundation plate (TAB-Raft™)

The whole slab is designed as the foundation. In areas of high stress, local traditional reinforcement can be used in conjunction with SFRC.

Please see our Structural brochure for more information.

8 Slabs on piles (TAB-Structural™)

In areas with poor ground conditions, SFRC can be used to construct a pile supported ground floor slab. A TAB-Structural™ slab can be constructed using only steel fibre concrete. No traditional reinforcement is required.

Please see our Structural brochure for more information.

Concrete mix requirements

Planning, mixing and placing

The intended concrete mix must not only achieve the required compressive strength, but it should also optimize the anchorage of the fibres while providing good workability. In addition to the compressive strength intended steel fibre reinforced concrete is characterized by its residual flexural or equivalent flexural strength.

Typically C25/30 concrete is used although C30/37 and C35/45 concrete are used where required. When mechanical placement methods are implemented, the slump should be class S4 or S3. The concrete at any slump should be stable without segregation of materials.

Pure CEM I cement, composite cements with moderate additives of limestone (CEM II/A-L 32,5 N) or slag (CEM II) are useful. Material with high slag content (CEM III) requires special consideration. Due to the heat of hydration that naturally occurs, the chosen cement type should produce a moderate hardening along with any specific early strength requirement.

The minimum cement content should be between 310 to 340 kg/m^3. The water-cement ratio should be between 0.50 and 0.55.

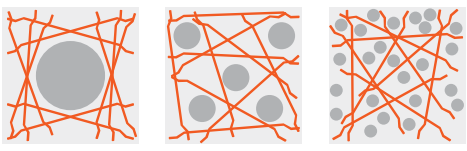
The concrete mix design should show a stable gradual sieve curve with a maximum aggregate size of 16 or 22 mm.

The maximum aggregate size is to be limited to no greater than 32 mm when using steel fibres. The maximum aggregate size used should in any case be smaller than the average distance between fibres. Using aggregates larger than the average distance between fibres increases the risk of fibre balling.

The mix should have enough fines to allow for easy integration of the fibres and promote stability of the mix. It is mandatory that freshly placed concrete is cured in order to prevent early age, plastic shrinkage cracking. The purpose of curing is that the rate of evaporation of water within the concrete needs to be slowed in order to allow the hydration process to occur without causing cracks.
The concrete must be cured immediately after the disappearance of bleed water and after the final finishing process is completed. The means and methods of curing are many and vary according to the type of concrete used, the use of the floor and the final finish that is to be applied if any. The best method of curing concrete is through the use of water. This is not always practical as the water must be kept continually on the entire slab area. Curing blankets and membranes work well. The chosen method of curing should be discussed and decided on prior to concrete placement. If curing compounds are used it is important that the contractor verifies the curing agent does not interfere with the final floor finish.

$$d_m = \frac{122 \times d}{\sqrt{V_f}}$$

d_m = average fibre distance (mm)
d = fibre diameter (mm)
V_f = fibre content (kg/m^3)



WireSolutions' steel fibres

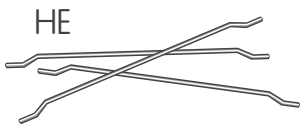
High performance solutions

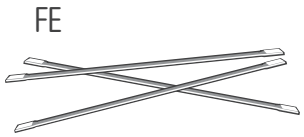
The selection of the steel fibre is related to the required performance and workability.

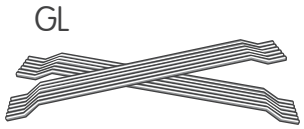
In all cases fibres should be CE marked in accordance with EN 14889-1.

The performance of the fibre depends on:

- Aspect ratio (l/d)
  = higher performance obtained but workability may be reduced
- Tensile strength of wire
  = higher performance with higher concrete grade



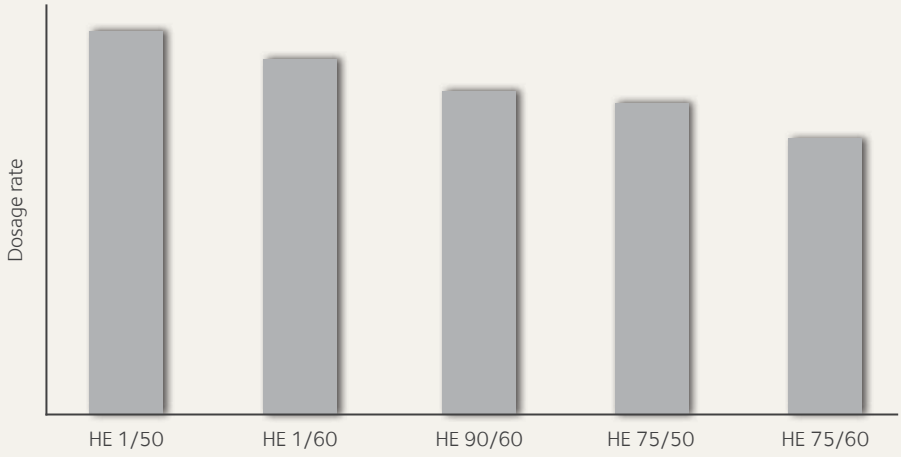




Technical data

Fibre type	Diameter (d)	Length (l)	Tensile strenght	Aspect ratio	Dosing recommendations
TABIX 1/50	1,00 mm	50 mm	1150 N/mm²	50	Blast machine
HE 1/50	1,00 mm	50 mm	1150 N/mm²	50	Manually or conveyor belt
HE 1/60	1,00 mm	60 mm	1150 N/mm²	60	Manually or conveyor belt
HE 90/60	0,90 mm	60 mm	1200 N/mm²	67	Manually or conveyor belt
HE 75/50	0,75 mm	50 mm	1200 N/mm²	67	Blast machine
HE 75/60	0,75 mm	60 mm	1200 N/mm²	80	Blast machine
HE+ 1/60	1,00 mm	60 mm	1500 N/mm²	60	Manually or conveyor belt
FE 60/36	0,60 mm	36 mm	1150 N/mm²	60	Manually or conveyor belt

Typical relation between dosage rate and SFRC performance



Product storage and packaging

The fibres have to be stored in a dry area.
Pallets and big-bags are additionally wrapped in a plastic film.

10*/20*/25 kg boxes
on 1.2/1.5 ton pallets

Big-bags
from 500 to 1100 kg

* On demand

Case studies

Elevated slab (TAB-Deck™/TAB-Slab™)

TAB-Deck™, Thanet (UK)

Floor with terracotta interjoist (B)

TAB-Slab™, Birmingham (UK)

Screed toppings

Liquid floor screed, München (D)

Screed, Eupen (B)

Screed with floor heating (B)

Ground slab/TAB-Raft™

ArcelorMittal Steel House, Tilleur (B)

Raft for housing, Jambes (B)

Raft with integrated floor heating, Bendorf (D)

Case studies

Strip and single foundations

Strip foundations, Roggentin (D)

Housing foundations, Greifswald (D)

Foundations, Dresden (D)

Walls

Cellar walls, Pfreind (D)

Wall corvers, Beringe (B)

Waterproof cellar, Regensburg (D)

Slab on piles/TAB-Structural™

Slab on piles, Carlsberg (UK)

Cold store, Gdanks (PL)

Boeing, Schiphol (NL)

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