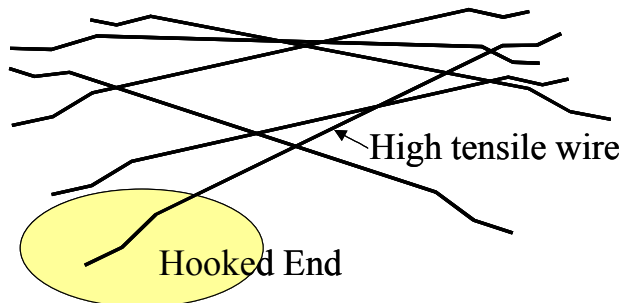
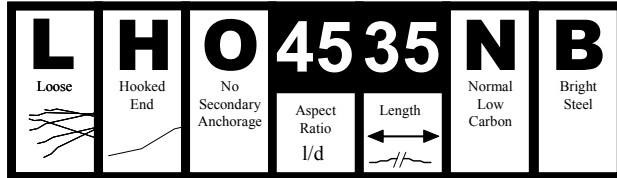


Scanfibre LHO45/35NB

Shotcrete fibre for use where fibre volume is paramount

DESCRIPTION



The properties of Scanfibre LHO45/35NB are described below. Also refer to Scancem data sheet "*Scanfibre for Slabs on Grade, Shotcrete and Precast*".

L - Loose.

Fibres are supplied loose. As the aspect ratio is 45 the fibres can be added relatively easily without balling so collation is not necessary.

H - Hooked End

The hooked end is designed to provide anchorage in a non rigid way. The fibre cross section remains unchanged so it can pull through the concrete at high loads to prevent brittle failure due to fibre breakage and to promote high energy absorption. Also refer to Scancem data sheet "*Fibre Geometry*".

O - No Secondary Anchorage

Although there is no secondary anchorage the hooks are specifically designed to maximize performance across the full range of concrete strengths.

45 - Aspect Ratio

Aspect ratio (length/diameter) is a key characteristic in determining performance. High aspect ratios lead to high performance (toughness) but without collation fibres tend to ball at aspect ratios over 50. The aspect ratio of this fibre is kept sufficiently below 50 to ensure the risk of balling is minimal.

35 - Length

Length of 35mm is generally acceptable for shotcrete. It is long enough to ensure aggregate overlap and short enough not to block equipment.

N - Normal

Normal low carbon steel is pulled through a series of dyes to give a wire strength of over 1200MPa

B - Bright

Bright steel is the norm for steel fibres in concrete. Corrosion is not generally an issue. The fibres are not interconnected so there can be no corrosion current, hence galvanizing is not normally necessary.

QUALITY

ISO 9001 - Quality Plan

The fibre is manufactured ISO9001.

QC - Production Testing

Samples of the fibre are tested for:

- Dimensional accuracy
- Tensile strength
- Surface condition

Conforms to ASTM A820 Type 1

PACKING

Paper Bags

Bags are 20kg. They are degradable and can be added directly to the mix without being opened. In each bag there are approximately 155,000 fibres or at 30kg/m³ there are over 230,000 fibres in each cubic meter of concrete. Bags are packed 6 per layer with 10 layers per pallet to give a pallet wt of 1.2T. There are 16 pallets to a container for an FCL wt of 19.2T

Manual

Paper bags are loaded into the mixer after addition of all other ingredient.

Automated

Automated systems that can be wired to the batching computer are available.

Also refer to the Scancem Materials data sheets on "*Ready Mix Production of Scanfibre Concrete*"

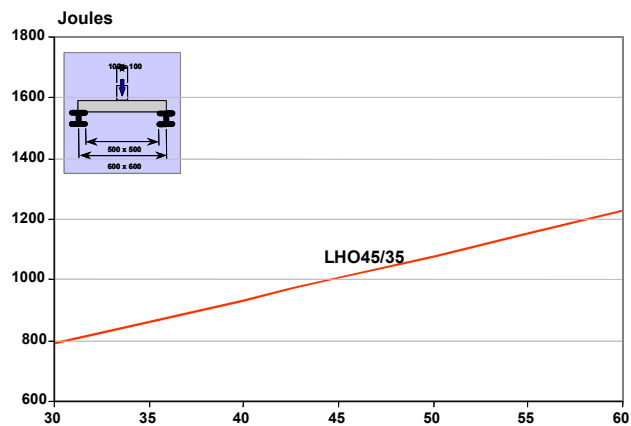
Scanfibre - The right steel wire fibre for each application

PERFORMANCE

The performance of fibre reinforced concrete is dependent on the fibre type and dosage. Hence specifiers should use an appropriate performance specification. See also Scancem Materials data sheet *"Equivalent Dosage Charts For Different Fibre Types"*

EFNARC

The EFNARC panel test is currently the internationally favoured performance measure for steel fibre shotcrete. It mimics the behaviour of shotcrete linings. Although no strength parameter is determinable the values are a measure of the energy absorbed. The fibre dosage is related to the ground condition using the Scancem Materials modified Barton Rock Mass chart. Also refer to Scancem Materials data sheet on *"SFRC Linings in Mining and Tunneling"*



$f'_{ct,fl}$

Characteristic flexural tensile strength is calculated from the characteristic cylinder compressive strength (f'_{cm}) by the formula:

$$f'_{ct,fl} = 0.4 \times (1.25 f'_{cm})^{0.67}$$

$f_{e,3}$ & $R_{e,3}$

Equivalent Flexural Ratio ($R_{e,3}$) is multiplied by the $f'_{ct,fl}$ to give equivalent flexural strength ($f_{e,3}$). This equates to the average flexural strength up to 3mm deflection in a standard JSCE beam test..

An estimate of $R_{e,3}$ can be calculated from the formula

$$R_{e,3} = \frac{180WLD^{0.25}}{(180C) + (WLD^{0.25})}$$

where

- D = fibre diameter (mm)
- W = fibre dosage (Kg/m³)
- L = fibre aspect ratio
- C = Scanfibre LHO constant = 21

$f_{e,3}$ & $R_{e,3}$

Toughness ratio is multiplied by $f'_{ct,fl}$ to give equivalent flexural strength (f_{10-30}). This equates to the average flexural strength between I_{10} and I_{30} values (approx 0.25-0.75mm deflection) in a standard ASTM beam test. An estimate of R_{10-30} can be calculated from the formula:

$$R_{10,30} = \frac{180WL}{(180 \times C) + (W \times L)}$$

w	Dosage (kg/m ³)	3	4	5	6	70
$R_{10,30}$	(%)	4	5	6	7	82
$f_{10,30}$	Equiv. Flex. (MPa)	2.	2.	3.	3.	3.9
$R_{e,3}$	(%)	4	5	6	7	79
$f_{e,3}$	Equiv. Flex. (MPa)	2.	2.	3.	3.	3.8

Spacing

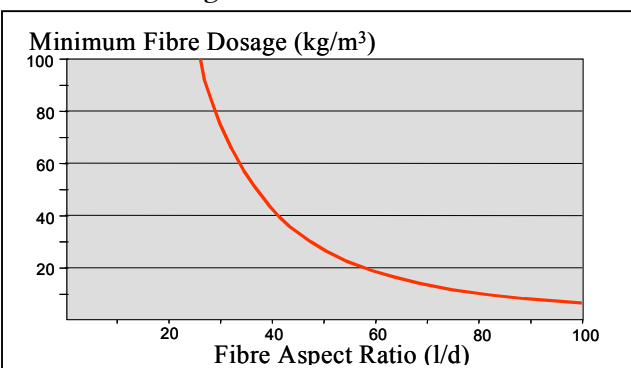
It is important that the stress is transferred from one fibre to the next by the concrete forming compression struts i.e. there is a limit to the spacing of fibres. Spacing can be calculated using spacing theory of McKee using the following formula:-

$$S = \sqrt[3]{(\pi d^2 l / 4 \sigma)}$$

The maximum average spacing of fibres should be 0.45 times the typical fibre length. This recommendation comes from a technical committee of learned professors brought together to formulate a design guideline for SFRC for use with the European Code on concrete structures. For this fibre with an aspect ratio of 45 the minimum dosage to satisfy spacing factor is 33kg/m³ as shown in the table below.

Minimum fibre Dosages to RTA QA Specification B82 for shotcrete is 30kg/m³.

See also Scancem Materials data sheet *"Minimum Performance Levels and Dosage Rates"*.



The information given is based on knowledge and performance of the material Every precaution is taken in the manufacture of the product and the responsibility is limited to the quality of supplies, with no guaranty of results in the field as Scancem Materials has no control over site conditions or execution of works

SCANCEM MATERIALS

Products For Engineered Concrete

S'pore : 2 Kallang Pudding Rd, #06-10, Mactech Ind. Building, S349307, Tel: +(65) 62558737 Fax: +(65) 62558713 email info@scancemmaterials.com
 M'sia : A-4-9, Plaza Dwi Tasik, Jln Sri Permaisuri, Bandar Sri Permaisuri 56000 Kuala Lumpur, Tel: +(60) 3 91712110 Fax: +(60) 3 91715110