

**Document: Technical Construction File**

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**Revision: A1**

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**Product: Steel fiber for concrete**

**MODEL: SDS-80/60 SDS-75/50 SDS-45/35 SDS-55/50 SDS-50/10 SDS-65/13**

**SDS-80/16 SDS-72/16 SDS-60/13 SDS18-23/13 SDS18-35/13**

According to

**No 305/2011 Construction products Regulation**

**presented by**

**TENGZHOU STAR SMITH METAL PRODUCTS CO.,LTD**

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<b>Technical File No.</b>	<b>Issue Date</b>	<b>Prepared by</b>	<b>Approved by</b>
<b>TCF(21)-064-CPR</b>	<b>May 12, 2021</b>		

Test Property	Test Method	Test Principle / Requirements	Test Result
Group	EN 14889-1:2006 Clause 5.1	<p>Steel fibres shall be classified into one of the following groups, in accordance with the basic material used for the production of the fibres.</p> <p>Group I : cold-drawn wire            Group II : cut sheet            Group III : melt extracted            Group IV : shaved cold drawn wire            Group V : milled from blocks</p>	Pass. Group I : cold-drawn wire
Shape	EN 14889-1:2006 Clause 5.1	<p>Fibres shall be either straight or deformed. The manufacturer shall declare the shape of the fibre. The control and tolerances on the shape shall be specified for each different shape separately, and may be performed using optical equipment.</p> <p>When applicable, the type of bundling shall be declared.</p> <p>When steel fibres are supplied with a coating (e.g. zinc coating), the type and characteristic quantity in g/m<sup>2</sup> shall be declared. The control of the quantity shall be a function of the type of coating and shall be declared by the manufacturer.</p>	Pass.
Fibre length	EN 14889-1:2006 Clause 5.2.2	<p>For fibres of group I and II, the length, equivalent diameter and aspect ratio shall be declared. The tolerances shall be as given in Table 1. Specimens of fibres, when sampled in accordance with 6.2.2 and measured in accordance with 5.2.2 and 5.2.3 shall not deviate from the declared value by more than the tolerances given in Table 1. At least 95 % of the individual specimens shall meet the specified tolerances in both cases. The length shall be measured with a marking gauge (callipers) with an accuracy of 0,1 mm.</p> <p>In the case of an irregular cross section, the developed length of the fibre shall also be determined to calculate the equivalent diameter. If straightening of the fibre is necessary, it shall be done by hand or, if this is not possible, by hammering on a level of wood, plastic material or copper using a hammer of similar material.</p> <p>During the straightening the cross section</p>	Pass. Length:60± 1.5mm

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		<p>should not be changed.</p> <table border="1"> <thead> <tr> <th>Property</th> <th>Symbol</th> <th>Deviation of the individual value relative to the declared value</th> <th>Deviation of the average value relative to the declared value</th> </tr> </thead> <tbody> <tr> <td>Length and developed length</td> <td><math>l, l_d</math> (if applicable)</td> <td><math>\pm 10\%</math></td> <td></td> </tr> <tr> <td>&gt;30 mm</td> <td></td> <td></td> <td><math>\pm 5\%</math></td> </tr> <tr> <td><math>\leq 30</math> mm</td> <td></td> <td></td> <td><math>\pm 1,5</math> mm</td> </tr> </tbody> </table>	Property	Symbol	Deviation of the individual value relative to the declared value	Deviation of the average value relative to the declared value	Length and developed length	$l, l_d$ (if applicable)	$\pm 10\%$		>30 mm			$\pm 5\%$	$\leq 30$ mm			$\pm 1,5$ mm					
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Determination of (equivalent) diameter	EN 14889-1:2006 Clause 5.2.3	<p>The diameter of the fibre shall be measured with a micrometer, in two directions, approximately at right angles, to an accuracy of 0,01 mm. The fibre diameter shall be the mean of the two diameters.</p> <table border="1"> <thead> <tr> <th>Property</th> <th>Symbol</th> <th>Deviation of the individual value relative to the declared value</th> <th>Deviation of the average value relative to the declared value</th> </tr> </thead> <tbody> <tr> <td>(Equivalent) diameter</td> <td><math>d</math></td> <td><math>\pm 10\%</math></td> <td></td> </tr> <tr> <td>&gt;0,30 mm</td> <td></td> <td></td> <td><math>\pm 5\%</math></td> </tr> <tr> <td><math>\leq 0,30</math> mm</td> <td></td> <td></td> <td><math>\pm 0,015</math> mm</td> </tr> <tr> <td>Length/diameter ratio</td> <td><math>\lambda</math></td> <td><math>\pm 15\%</math></td> <td><math>\pm 7,5\%</math></td> </tr> </tbody> </table>	Property	Symbol	Deviation of the individual value relative to the declared value	Deviation of the average value relative to the declared value	(Equivalent) diameter	$d$	$\pm 10\%$		>0,30 mm			$\pm 5\%$	$\leq 0,30$ mm			$\pm 0,015$ mm	Length/diameter ratio	$\lambda$	$\pm 15\%$	$\pm 7,5\%$	Pass. Diameter: $0.75 \pm 0.015$ mm
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Length/ diameter ratio	EN 14889-1:2006 Clause 5.2.3	<p>The length shall be measured with a marking gauge (callipers) with an accuracy of 0,1 mm.</p> <p>The diameter of the fibre shall be measured with a micrometer, in two directions, approximately at right angles, to an accuracy of 0,01 mm.</p> <table border="1"> <thead> <tr> <th>Property</th> <th>Symbol</th> <th>Deviation of the individual value relative to the declared value</th> <th>Deviation of the average value relative to the declared value</th> </tr> </thead> <tbody> <tr> <td>Length/diameter ratio</td> <td><math>\lambda</math></td> <td><math>\pm 15\%</math></td> <td><math>\pm 7,5\%</math></td> </tr> </tbody> </table>	Property	Symbol	Deviation of the individual value relative to the declared value	Deviation of the average value relative to the declared value	Length/diameter ratio	$\lambda$	$\pm 15\%$	$\pm 7,5\%$	Pass.												
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Tensile strength of fibres	EN 14889-1:2006 Clause 5.3 & EN 10002-1	<p>The test pieces shall be held by suitable means such as wedges, screwed grips, parallel jaw faces, shouldered holders, etc. Every endeavour should be made to ensure that test pieces are held in such a way that the tension is applied as axially as possible, in order to minimize bending. After determination of the required yield/proof strength properties the test rate may be increased to a strain rate (or equivalent crosshead separation rate) to no greater than <math>0,008 \text{ s}^{-1}</math>.</p> <p>If only the tensile strength of the material is required to be measured, the test rate shall not exceed <math>0,008 \text{ s}^{-1}</math> throughout the test.</p>	Pass. Tensile strength ( $R_m$ ): 398 MPa.																				

Test Property	Test Method	Test Principle / Requirements	Test Result
		<p>The tensile strength (<math>R_m</math>) shall be determined in accordance with EN 10002-1, except as indicated below, and shall be declared.</p> <p>For Group I (cold drawn wire), the tensile strength shall be determined from the source wire before deformation. The acceptable tolerance on the declared value of <math>R_m</math> shall be 15 % for individual values and 7,5 % for the mean value. At least 95 % of the individual specimens shall meet the specified tolerance.</p>	
Modulus of elasticity	EN 14889-1:2006 Clause 5.4	<p>The manufacturer shall declare the modulus of elasticity of the fibres.</p> <p>The modulus of elasticity may be determined for Groups I and II fibres using the tensile test as described in EN 10002-1. The test shall be done on the basic material before deformation of the fibre and the modulus of elasticity shall be calculated using the stress and the deformation at 10 % and 30 % of <math>R_m</math>.</p>	Pass. Modulus of elasticity: $2.06 \times 10^5$ MPa.
Ductility of fibres	EN 14889-1:2006 Clause 5.5	<p>If applicable, the manufacturer may declare a value for the ductility which shall be determined according to EN 10218-1 where the test is performed on the end diameter before deformation. The material shall be bent over a cylindrical support with a radius of maximum 2,5 mm. The average number of bends shall be declared.</p>	Pass. 30%-35%.
Mixing	EN 14889-1:2006 Clause 5.6	<p>Mixing instructions shall be supplied by the manufacturer which recommend the mixing sequence to be adopted when introducing the fibre into both a centrally mixed concrete plant and for a dry batch truck mixed plant.</p>	See the manufacturer instruction.
Effect on consistence of concrete	EN 14889-1:2006 Clause 5.7 & EN 14845-1 & EN 12350-3	<p>The effect of fibres on the consistence of a reference concrete conforming to prEN 14845-1 shall be determined.</p> <p>The consistence according to EN 12350-3 shall be determined on the reference concrete without fibres and then on an identical mix with fibres. The effect on consistence shall be declared.</p> <p>The amount of fibres added shall be declared by the manufacturer and shall be the minimum amount of fibres needed to obtain the required strength specified in</p>	Pass.

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		<p>5.8. If a plasticiser or super plasticer is needed in order to meet the consistence requirements when determining the required addition level of fibres, the amount and type shall also be declared by the manufacturer.</p> <p>The fibre manufacturer may additionally declare the consistence for the reference concrete with a range of dosages of fibres.</p>	
Effect on strength of concrete	EN 14889-1:2006 Clause 5.8& EN 14845-2	The effect on strength shall be determined according to EN 14845-2 using a reference concrete conforming to prEN 14845-1. The unit volume of fibres in kg/m <sup>3</sup> shall be declared by the manufacturer that achieves a residual flexural strength of 1,5 MPa at 0,5 mm CMOD (equivalent to 0,47 mm central deflection) and a residual flexural strength of 1MPa at 3,5 mm CMOD (equivalent to 3,02 mm central deflection).	Pass.
Release of dangerous substances	EN 14889-1:2006 Clause 5.9	Materials used in products shall not release any dangerous substances in excess of the maximum permitted levels specified in a relevant European Standard for the material or permitted in the national regulations of the member state of destination.	Pass. Not release any dangerous substances in excess of the maximum permitted levels.



A.1 Photos



Fig.1

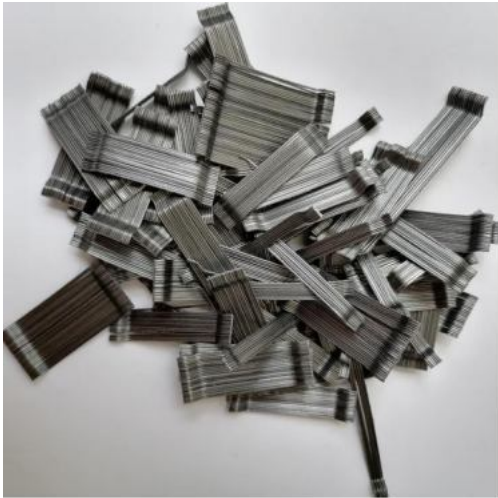


Fig.2



Fig.3



Fig.4



Fig.5



Fig.6