

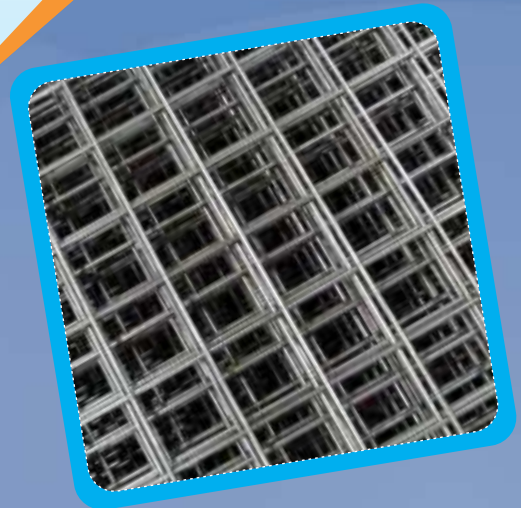
TATA STEEL

WeAlsoMakeTomorrow

Sm@rt/FAB

Build Smart Build Easy

India's first branded
welded wire fabric





Tata Steel Jamshedpur

Tata Steel Vision, Mission & Values

Vision

We aspire to be the global steel industry benchmark for Value Creation and Corporate Citizenship.

We make the difference through:



Our People

Fostering teamwork, nurturing talent, enhancing leadership capability and acting with pace, pride and passion



Our Offerings

Becoming the supplier of choice, delivering premium products and services, and creating value for our customers



Our Conduct

Providing a safe workplace, respecting the environment, caring for our communities and demonstrating high ethical standards



Our Policies

In adherence to the Tata Code of Conduct, Tata Steel's policies pertain to active sets of principles in different areas of operation that help bring uniformity in processes by clearly defining the company's approach



Our Innovative Approach

Developing leading-edge solutions in technology, processes and products

Mission

Consistent with the vision and values of the founder Jamsetji Tata, Tata Steel strives to strengthen India's industrial base through effective utilization of staff and materials. The means envisaged to achieve this are best technology and high productivity, consistent with modern management practices.

Tata Steel recognizes that while honesty and integrity are essential ingredients of a strong and stable enterprise, profitability provides the main spark for economic activity.

Overall, the Company seeks to scale the heights of excellence in all it does in an atmosphere free from fear, and thereby reaffirms its faith in democratic values.

The core values that define us

Integrity

We must conduct our business fairly, with honesty and transparency. Everything we do must stand the test of public scrutiny.

Unity

We must work cohesively with our colleagues across the group and with our customers and partners, to build strong relationships based on tolerance, understanding and mutual cooperation.

Pioneering

We will be bold and agile, courageously taking on challenges, using deep customer insight to develop innovativeness.

Excellence

We must constantly strive to achieve the highest possible standards in our day-to-day work and in the quality of the goods and services we provide.

Responsibility

We must be responsible and responsive to the countries, communities and environments in which we work, always ensuring that what comes from the people goes back to the people many times over.

About Us

We touch the lives of millions of people across the world every day with the steel that we produce. And it is highly likely that Tata Steel has affected your life today, though you may not know it.

From the vehicle you drive, to the house you live in; from the bridges you cross, to the hand tools that you use; we strive to deliver unparalleled quality through our customised value-added solutions to make your life easier.

This is made possible by our commitment to a culture of continuous improvement, through which we drive operational excellence in processes, products and people.

Tata Steel is currently the world's second-most geographically diversified steel producer. We are one of the few steel operations that are fully integrated – from mining to the manufacturing and marketing of finished products.

Continuous improvement in our product and service portfolio, along with success in value creating initiatives for customers, allows us to serve global growth markets. Today, we operate in 26 countries and have a commercial presence in over 50 countries with employees across five continents. And the numbers are growing.

Our Raw Material operations are spread across India and Canada which help us to be self-sufficient in steel production. Key manufacturing functions are performed by the raw materials and iron-making groups, while Shared Services provides maintenance support for a smooth production. In India, our downstream business activities are structured into strategic business units such as Ferro-alloys and Minerals, Tubes, Wires, Bearings, Agrico, Industrial By-products Management & Tata Growth Shop.





Sm@rtFAB, India's first branded welded wire fabric (WWF), is the latest inclusion in our downstream portfolio. It is a cold-worked, ribbed, electrically fused wire fabric, that can be used in concrete reinforcements, leading to optimum steel usage close to actual design, thus reducing steel intensity and leading to cost and time savings.

Welded Wire Fabric (WWF) is a premium offering by TATA Steel – a company that has a legacy and expertise of over 100 years, the best quality steel and the most dependable service.

Catering to today's need for fast & efficient constructions, Sm@rtFAB provides:



Increase in speed of construction



Labour productivity enhancement



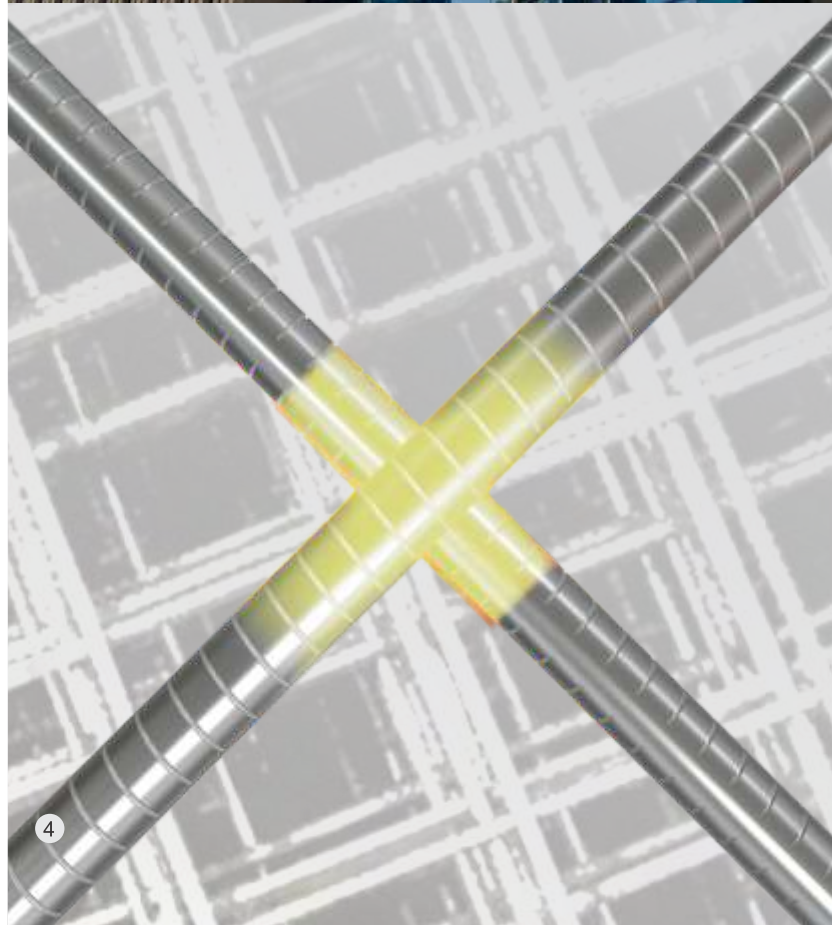
Material cost reduction



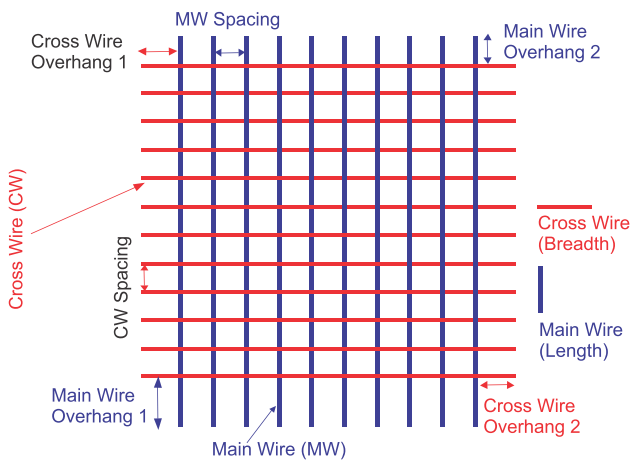
Effective site management



Better quality assurance



Characteristics of Sm@rtFAB



Standard Sm@rtFAB Sizes

Type	Fabric Shape	Spacing
Type A	Square Fabric	200mm main wire spacing / 200mm cross wire spacing
Type B	Rectangular Fabric	100mm main wire spacing / 200mm cross wire spacing
Type D	Small Square Fabric	100mm main wire spacing / 100mm cross wire spacing
Type E	Square Fabric	150mm main wire spacing / 150mm cross wire spacing

Available in:

- **Wire Diameter:** From 2mm to 12mm at an interval of 1mm
 - a) From 2mm to 4.9 mm (plain WWF in roll form)
 - b) From 5mm to 12 mm (ribbed WWF in flat customized shapes)
- **Spacing interval:** In rectangular grids from 75mm to 300mm at an interval of 5mm
- **Fabric Size:** Up to 2.4 meter (width) x 6 meter (length)

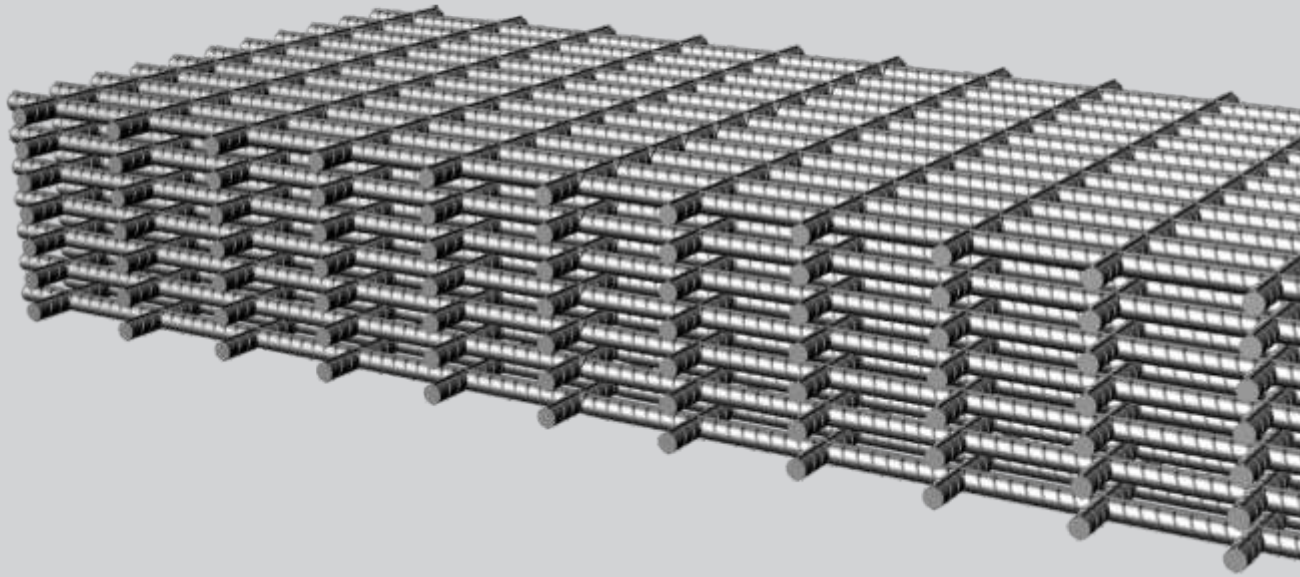
Features:

- Usage of electric fusion welding
- Spacing accuracy is guaranteed
- Produced as per **IS 1566** (Hard drawn steel wire fabric for concrete reinforcement) with steel complying to **IS 432-2**

Physical and chemical properties of Welded Wire Fabric (WWF) is determined based on IS specifications

Desired Physical Property	Unit	Min Value as per IS 432-2	Achieved 550 Gr Properties
UTS	N/mm ²	570	585
Proof Stress(0.2%)	N/mm ²	480	550
Elongation	%	7.5	10
Shear Strength	0.25 times of Ys=> as per 1566 with test method of IS 4948.		

Desired Chemical Composition - %	C	Mn	P	S
Min	0.03	0.3		
Max	0.13	0.60	0.05	0.05



Technical Details

Product Code	Wire Spacing		Wire Diameter		Cross Sectional Area		Mass per Area Kg/m ²
	Main mm	Cross mm	Main mm	Cross mm	Main mm ² /m	Cross mm ² /m	
Square WWM							
A6/6	200	200	6	6	141	141	2.22
A7/7	200	200	7	7	193	193	3.02
A8/8	200	200	8	8	251	251	3.95
A9/9	200	200	9	9	318	318	4.99
A10/10	200	200	10	10	393	393	6.17
A11/11	200	200	11	11	475	475	7.46
A12/12	200	200	12	12	566	566	8.88
D6/6	100	100	6	6	283	283	4.44
D7/7	100	100	7	7	385	385	6.04
D8/8	100	100	8	8	503	503	7.89
D9/9	100	100	9	9	636	636	9.99
D10/10	100	100	10	10	786	786	12.33
D11/11	100	100	11	11	951	951	14.92
D12/12	100	100	12	12	1131	1131	17.76
E6/6	150	150	6	6	189	189	2.96
E7/7	150	150	7	7	257	257	4.03
E8/8	150	150	8	8	335	335	5.26
E9/9	150	150	9	9	424	424	6.66
E10/10	150	150	10	10	524	524	8.22
E11/11	150	150	11	11	634	634	9.95
E12/12	150	150	12	12	754	754	11.84

Manufacturing Technology

Sm@rtFAB is a ready to use solution that aims at raising productivity standards in construction. It is a cold-worked, ribbed, electrically fused wire fabric, that can be used in concrete reinforcements.



Product Manufacturing Technology

Sm@rtFAB is manufactured using state-of-art machines and technology under Tata Steel's quality assurance guidelines. Different stages of manufacturing are detailed below:

Cold Working

Wire rods made of Low Carbon Steel of grades SAE 1008 to 1015 (IS7887 - Grade 3 to Grade 7).

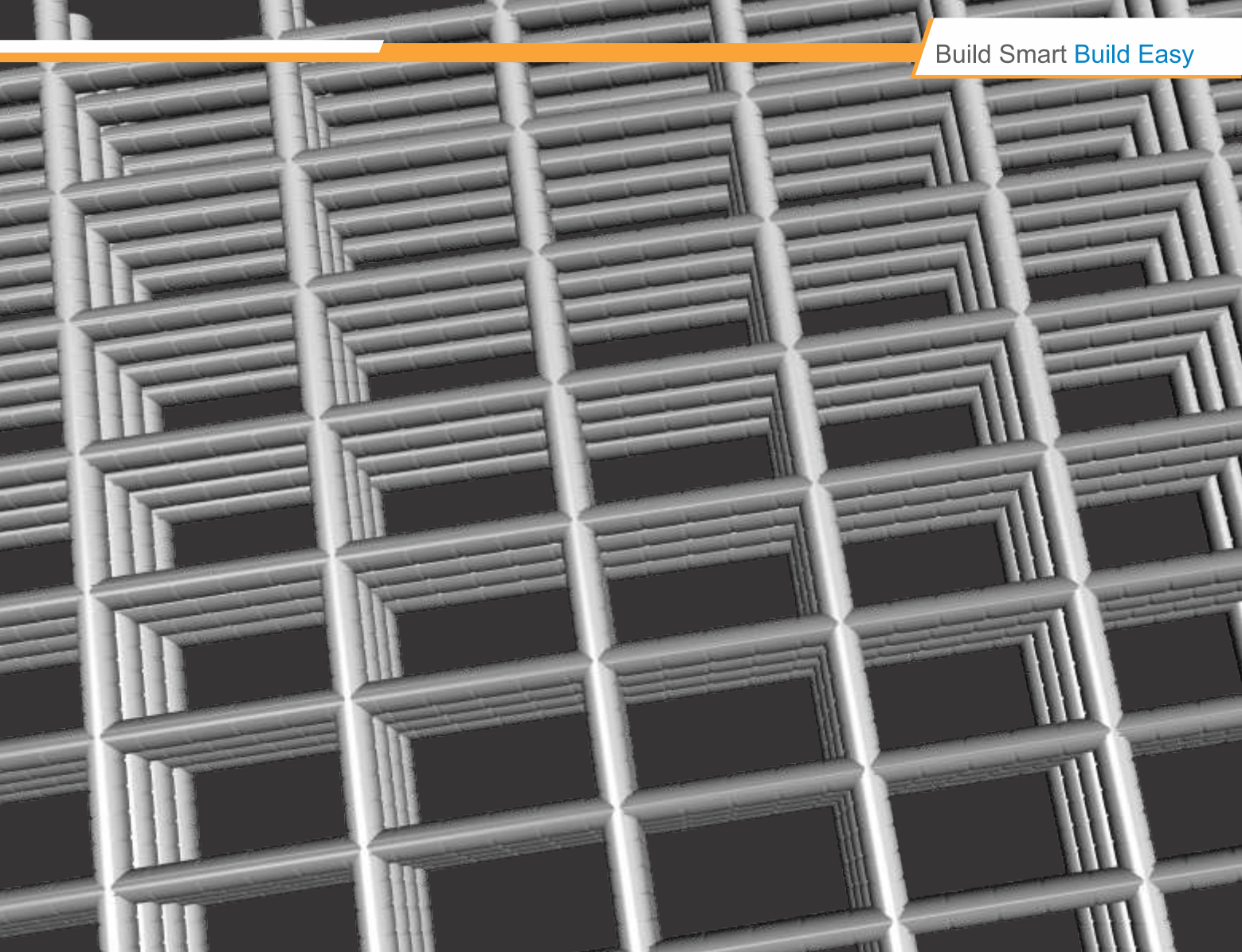
Ribbing

While cold rolling helps in increasing the tensile strength, the ribbing guarantees the perfect bond with concrete. Ribbing gives the wire the visual and mechanical properties similar to a rebar. Crack widths in concrete elements are controlled to the minimum because force is well distributed through bond effect of ribbed wire as compared to plain wire.

Electric Fusion Welding

A precise and semi-automatic type welding machine is used for making the welded wire mesh in steel. This machine has a chamber that is capable of delivering the welds at calculated junctions, which in the case of a mesh are the points of intersection of the horizontally and vertically aligned steel wires.


Electrical resistance is used for generating ample amount of heat to create the weld. After the welding is done, another length of the parallel wires is forwarded into the machine and the same process of welding continues. When the desirable length of welded mesh is produced, the process is stopped to be used towards the particular purpose.




Packaging

Every bundle is provided with tags for easy identification and traceability.

Each tag carries Tata Steel and Sm@rtFAB logo, along with detailed dimensions of the welded wire fabric.



TATA STEEL
We Also Make Tomorrow

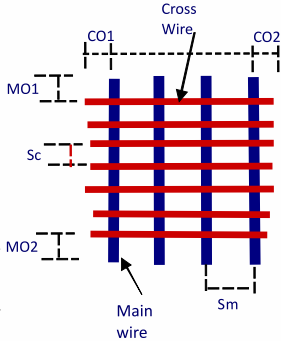


09-10-2018

5/5/150/150

Dm/Dc	5/5
Dimensions	3000x2100
Sm/Sc	150/150
Mo1/Mo2	150/150
Co1/Co2	125/125
Nm/Nc	13/19

Sheets: _____



ABC Company

N = Number of wires; D = Diameter of wires

Smart Features

High Quality Steel:

Tata Steel produces some of the world's best steel that ensures good chemistry of wire rods with low impurities, increasing its longevity. It also has a better welding ability and consistent properties

Better Concrete Bonding:

The mechanical anchorage at each welded wire intersection, and the ribbing pattern provide better bonding and stress transfer from concrete to steel

Better Crack Resistance:

The thinner wires with closer spacing ensure homogeneity in the section and eliminate the chance of displacement or omission of steel bars during concreting, thereby enhancing the structural integrity

Quality Check:

Each batch of WWF goes through thorough scrutiny and tests and is certified with a Test Certificate

Controlled Manufacturing:

Our wide range of wire diameters and spacing between wires makes it possible to match the exact cross sectional steel area required, thereby allowing customisation and flexibility to suit different structures

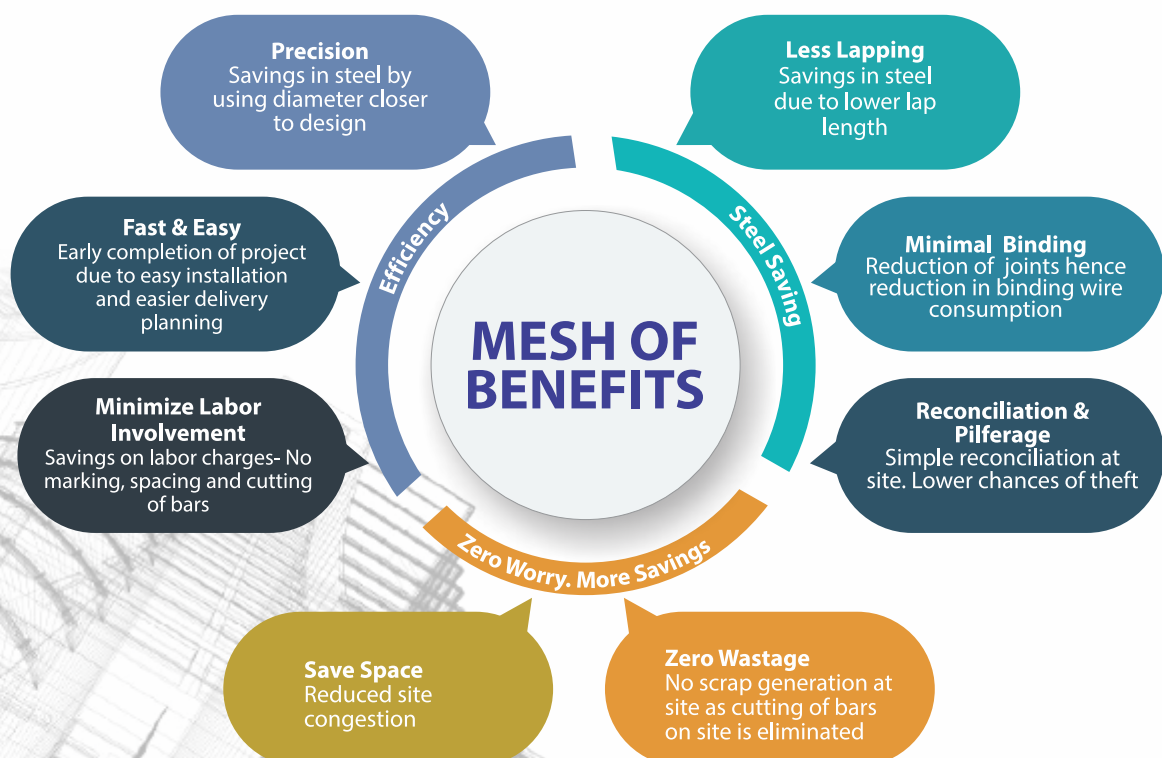
Customer-First Approach:

Tata Steel ensures the best purchasing experience for its customers. Just place the order for WWF and everything else will be taken care of by us.

Benefits

Unique Product and Service Differentiation by Tata Steel

- Design consultancy through dedicated structural consultants contracted by Tata Steel
- Mesh detailing services through Tata Steel IT infrastructure.
- Complete Supply chain solution from wire rod to mesh at site.
- Test certificate along with each consignment.
- After sales support eg. Placement drawing.



Advantages



SAVES TIME

- A prefabricated solution that reduces slab to slab casting time
- Ready-to-use materials delivered at site
- Valuable man hours saved



HELPS WORK SMARTER

- Easy tracking to minimize pilferage
- Easy inspection for structural consultants
- Perfect spacing through mechanized process



OPTIMIZES DESIGN

- Use any dia from 2-12mm unlike rebars
- Optimized designs for reinforcement requirements
- Reduce overall steel requirement



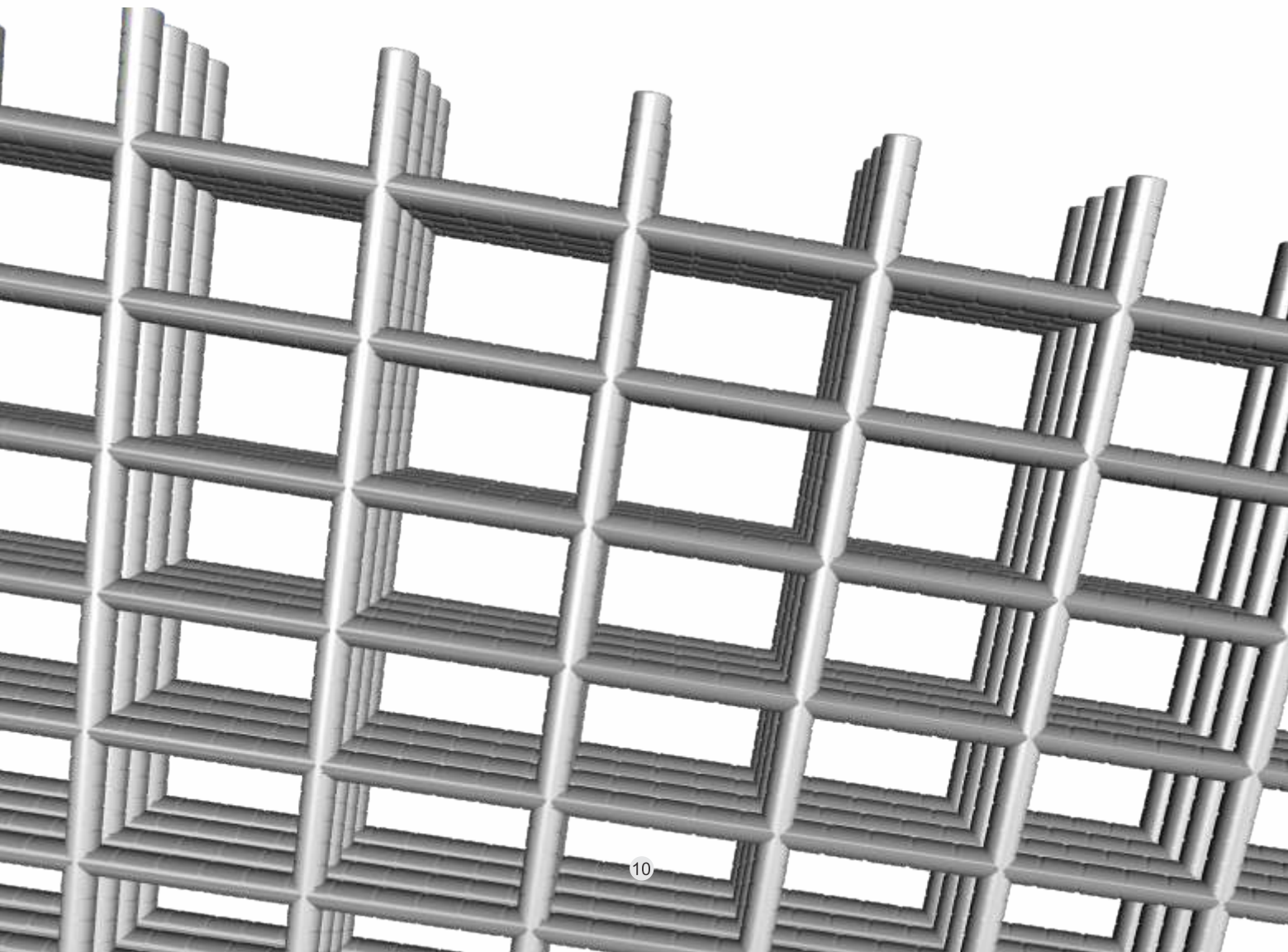
PROVIDES QUALITY ASSURANCE

- All materials with Test Certificates
- The Tata Steel assurance of good quality
- Manufactured Using only Tata Steel wire rods

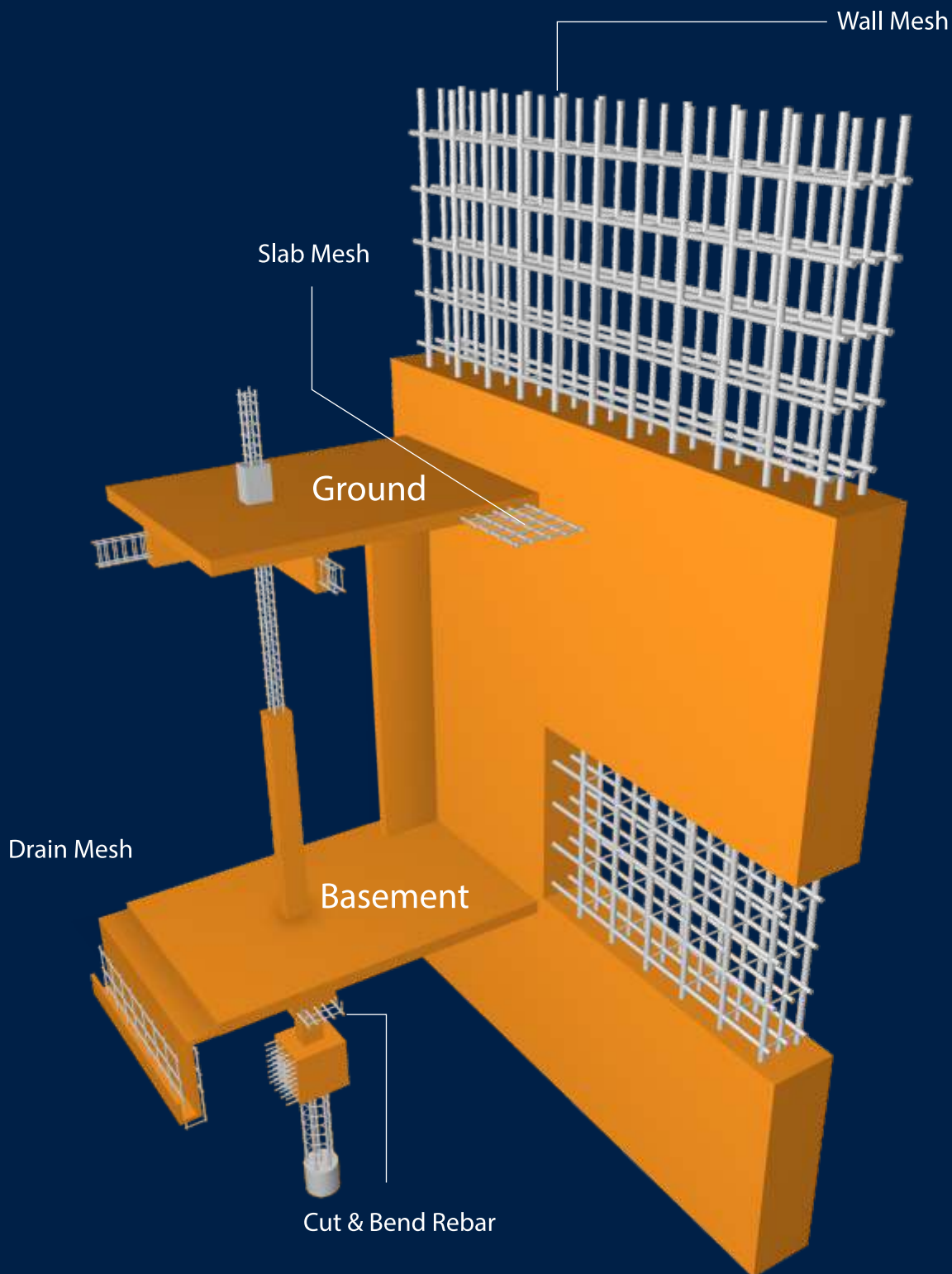


REDUCES COST

- Eliminate labor costs on cutting, binding and placing rebars
- Save cost of binding wire
- Reduce inventory costs leading to lower working capital



Application - Slab reinforcement



Application - Slab reinforcement

Segment - Commercial Buildings



Application - Slab reinforcement

Segment - Housing



Application - Slab reinforcement

Segment - Industrial Warehouse Flooring



Application

Roads & Airport Tarmac



Application

Tunnel Lining



Application

Hume Pipes • Canal Lining



Application

Gabions • Retaining Wall



Structural Engineers Table

Structural Engineers table for Welded Wire Fabric Design

With 6,7,8,9 & 10mm dia wire and spacing 75mm - 300mm with 5mm interval

Dia mm	Spacing mm	mm ² /m	Dia mm	Spacing mm	mm ² /m	Dia mm	Spacing mm	mm ² /m
6	300	94.248	7	235	163.764	7	175	219.911
6	295	95.845	6	170	166.320	9	285	223.218
6	290	97.498	7	230	167.324	8	225	223.402
6	285	99.208	8	300	167.552	6	125	226.195
6	280	100.980	8	295	170.391	7	170	226.379
6	275	102.816	7	225	171.042	9	280	227.204
6	270	104.720	6	165	171.360	8	220	228.479
6	265	106.696	8	290	173.329	9	275	231.335
6	260	108.747	7	220	174.930	7	165	233.239
6	255	110.880	8	285	176.370	8	215	233.793
6	250	113.097	6	160	176.715	9	270	235.619
6	245	115.405	7	215	178.998	6	120	235.619
6	240	117.810	8	280	179.520	8	210	239.359
6	235	120.316	6	155	182.415	9	265	240.065
6	230	122.932	8	275	182.784	7	160	240.528
6	225	125.664	7	210	183.260	9	260	244.682
7	300	128.282	8	270	186.168	8	205	245.197
6	220	128.520	7	205	187.729	6	115	245.864
7	295	130.456	6	150	188.496	7	155	248.287
6	215	131.509	8	265	189.681	9	255	249.479
7	290	132.705	7	200	192.423	8	200	251.327
6	210	134.640	8	260	193.329	9	250	254.469
7	285	135.033	6	145	194.995	7	150	256.563
7	280	137.445	8	255	197.120	6	110	257.039
6	205	137.924	7	195	197.356	8	195	257.772
7	275	139.944	8	250	201.062	9	245	259.662
6	200	141.372	6	140	201.960	10	300	261.799
7	270	142.535	7	190	202.550	8	190	264.555
6	195	144.997	8	245	205.165	9	240	265.072
7	265	145.225	7	185	208.024	7	145	265.410
7	260	148.017	6	135	209.440	10	295	266.237
6	190	148.812	8	240	209.440	6	105	269.279
7	255	150.920	9	300	212.058	9	235	270.712
6	185	152.834	7	180	213.803	10	290	270.827
7	250	153.938	8	235	213.896	8	185	271.705
7	245	157.080	9	295	215.652	7	140	274.889
6	180	157.080	6	130	217.495	10	285	275.578
7	240	160.352	8	230	218.546	9	230	276.597
6	175	161.568	9	290	219.370	8	180	279.253

Dia mm	Spacing mm	mm ² /m	Dia mm	Spacing mm	mm ² /m	Dia mm	Spacing mm	mm ² /m
10	280	280.499	9	180	353.429	8	100	502.655
6	100	282.743	10	220	356.999	10	155	506.708
9	225	282.743	8	140	359.039	9	125	508.938
7	135	285.070	9	175	363.527	7	75	513.127
10	275	285.599	10	215	365.301	10	150	523.599
8	175	287.231	7	105	366.519	8	95	529.110
9	220	289.169	8	135	372.337	9	120	530.144
10	270	290.888	10	210	373.999	10	145	541.654
8	170	295.679	9	170	374.219	9	115	553.193
9	215	295.894	6	75	376.991	8	90	558.505
7	130	296.035	10	205	383.121	10	140	560.999
10	265	296.377	7	100	384.845	9	110	578.339
6	95	297.625	9	165	385.559	10	135	581.776
10	260	302.076	8	130	386.658	8	85	591.359
9	210	302.939	10	200	392.699	10	130	604.152
8	165	304.639	9	160	397.608	9	105	605.879
7	125	307.876	8	125	402.124	8	80	628.319
10	255	307.999	10	195	402.768	10	125	628.319
9	205	310.328	7	95	405.100	9	100	636.173
6	90	314.159	9	155	410.434	10	120	654.498
8	160	314.159	10	190	413.367	9	95	669.655
10	250	314.159	8	120	418.879	8	75	670.206
9	200	318.086	9	150	424.115	10	115	682.955
10	245	320.571	10	185	424.540	9	90	706.858
7	120	320.704	7	90	427.606	10	110	713.998
8	155	324.293	10	180	436.332	10	105	747.998
9	195	326.242	8	115	437.091	9	85	748.438
10	240	327.249	9	145	438.740	10	100	785.398
6	85	332.639	10	175	448.799	9	80	795.216
10	235	334.212	7	85	452.759	10	95	826.735
7	115	334.648	9	140	454.409	9	75	848.230
9	190	334.828	8	110	456.959	10	90	872.665
8	150	335.103	10	170	461.999	10	85	923.998
10	230	341.477	9	135	471.239	10	80	981.748
9	185	343.877	10	165	475.999	10	75	1047.198
8	145	346.658	8	105	478.719			
10	225	349.066	7	80	481.056			
7	110	349.859	9	130	489.363			
6	80	353.429	10	160	490.874			

Frequently Asked Questions

1. What is a weld-mesh?

Ans. Weld mesh is a prefabricated reinforcement consisting of parallel series of wires or rebars welded together in square or rectangular grids.

2. Is Sm@rtFAB a rebar mesh?

Ans. No. It is a welded wire fabric.

3. What is the difference between welded wire fabric and welded wire mesh?

Ans. Welded wire fabric (WWF), welded wire reinforcement (WWR), welded wire mesh and wire weld-mesh are interchangeably used terms for prefabricated reinforcement meshes manufactured using wires.

4. Is welded wire mesh preferable over welded rebar mesh?

Ans. Yes.

a. Wires are available in a range of diameters, while rebars are available in a few discrete sections. So, wire mesh presents greater design options and helps optimize steel consumption.

b. Welding on rebars is not recommended. TMT rebars consist of a hard outer 'tempered martensite' layer for strength and a soft inner 'ferrite-pearlite' core for ductility. Welding is likely to adversely affect the outer layer, thus compromising strength at weld spots.

5. Is it true that welded wire fabric is a new product for the construction industry?

Ans. No.

On the contrary, over a hundred years ago in 1901, patent papers were filed by US inventor John Perry for a machine that could weld together wires in sheet form. In 1908, the first major application of wire reinforcement was seen in the construction of the Long Island Parkway. Between 1910 and 1915, stretches of pavements in California and Maryland in USA were made using welded wire fabric.

WWF has been used in floor slabs of several skyscrapers dotting New York's skyline, including the iconic Empire States Building. WWF also played a key role in reconstruction of Europe post World War II.

6. Is WWF a new solution for the Indian construction industry?

Ans. While WWF has been used across the globe for a number of years, it is a comparatively new solution for the Indian construction industry.

7. What is the reason for lower adoption of welded wire meshes in India?

Ans. Some of the key reasons have been unfavorable taxation in pre-GST era, availability of cheap real estate and low labor rates.

However, with introduction of GST, welded wire mesh is taxed at the same rate as rebar meshes manually assembled at site. Moreover, with real estate rates rising, developers are looking for solutions to reduce project construction period. Labor intensive on-site processes are suboptimal and consume time. Moreover, availability of cheap and skilled labor is also fast becoming a constraint at project sites.

8. How is Sm@rtFAB different from locally available welded wire meshes?

Ans. Sm@rtFAB is a pioneering solution for Indian Construction Industry.

a. It is the only WWF solution to be offered by any integrated steel producer in India. It is manufactured using wires drawn from Tata Steel's wire rods only and manufactured at steel processing centers of Tata Steel.

b. Sm@rtFAB is a welded fabric of ribbed wires. Ribbing provides additional mechanical anchorage for better bonding with concrete.

9. How is lapping provided for WWF?

Ans. As per IS 456 Clause-26.2.5.1 (f) – Laps shall not be less than 'spacing of cross wires plus 100 mm'

10. What is the depth of welding provided?

Ans. Depth of the weld shall be one third of diameter of wires.

11. How can mesh reinforcement of thin wires (5-7 mm) be strong enough to take RCC loads? How can the spacing of the mesh be so small at 75 – 100 mm? How will the steel bond to concrete?

Ans. IS 456 does not specify any minimum rebar diameter for slabs or walls. In fact, it is the total cross-sectional area per running metre that determines the tensile strength of the composite RCC.

Because manual rebar tying requires effort, the traditional practice is to tie higher diameter rebars at larger spacings to reduce the number of joints. Welded Wire Reinforcement is produced by multi-spot welding by machines, and can handle more number of thinner wires at closer spacings. 75mm spacing or higher is enough to allow smooth flow of concrete aggregates (typically 20-25mm size) and ensure sufficient bonding. Closer spacings provide a more homogeneous and quicker stress transfer to concrete with much smaller crack widths.

12. What are effects of welding on wires? Are there any changes in chemistry?

Ans. Electric arc fusion welding is done without any foreign elements. It changes the state of joints from solid to liquid and then again solidifies them together. Hence, chemistry of rods is not affected.

13. During spot welding, the cross-section of the wires reduces at the junction. How can the mesh take the full stress of the loads with reduced cross-section?

Ans. The cross-section of the wires does not reduce at the junction, but in fact, it almost doubles at the junction. The two intersecting wires get fused (liquefied) into each other forming the weld nugget, which has much larger cross-section than the original wires. Hence during a tensile test with a cross-wire weld in between, generally failure occurs some distance away from the junction and not at the junction itself. Further, IS-1566 specifies that the tensile test specimen of WWF should include one or more cross-wire joints.

14. Does Sm@rtFAB comply to any IS Codes?

Ans. Yes, it complies with IS 1566 and IS 432-2.

15. How can one be certain of the quality of Sm@rtFAB WWF?

Ans. Each shipment is accompanied by test certificate and proper tags bearing Tata Steel and Sm@rtFAB logos. These welded wire fabrics carry the quality promise of Tata Steel.

TATA STEEL

 WeAlsoMakeTomorrow

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