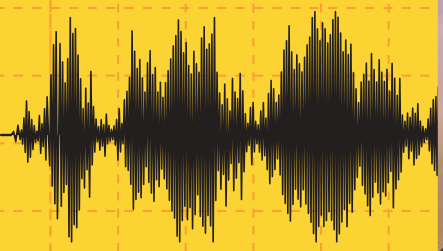
MS LIFE 600+ STEEL BARS

STRENGTH + SAFETY

MS LIFE 600+

The Earthquake Resistant
PRIMARY STEEL



Infrastructure development is the backbone of nation's growth. A major contribution to India's infrastructure has come from growth in the construction of residential/ commercial buildings and high rise steel is the key material used in India's predominantly RCC construction. Thermo mechanically treated rebars (TMT rebars) impart strength and ductility to RCC structure to withstand various kinds of loads impacting a building. In the demand for making such buildings safer, builders as well as individuals are focusing more on the quality of material used. These days a lot of focus is given in designing structures that have high earthquake resistance. TMT bars can have high resistance to Seismic loads due to its higher UTS/YS ratio. In view of these requirements, MS Agarwal Foundries took initiative in this direction and developed the seismic resistant MS Life 600+ grade / quality TMT rebars. These rebars are produced as per Indian standard IS: 1786:2008. Developing this product, due consideration was given to the cost effective alloy design and optimization of process parameters within Factory capability of MS LIFE 600+. Chemistry design and cooling parameters were major technological intervention that was judiciously used for achieving high UTS/YS ratio >1.18) in earthquake resistant TMT- Rebar.

TMT REBAR PRODUCTION

MS LIFE 600+ TMT Rebar Factory at Toopran, Medchal uses world class equipment supplied from Germany. This factory produces high strength rebars conforming to BIS 1786:2008 Fe 500, Fe 550 & 600 grade, EQR & CRS quality. TMT production at Toopran uses the superior and clean steel billets produced at the company's Mantralayam Plant through the BF + DRI > EAF > LRF > Concast route with highly controlled steel chemistry & very low levels of sulphur and phosphorus (less than 0.035%). MSAF Toopran factory uses superior HYQST (High Yield Quenching & Self Tempering) TMT technology for production of high grade TMT rebars. HYQST technology produces rebars with high strength, high ductility, high bendability and high weldability surpassing the requirements of Fe 500, Fe 550 & 600 CRS rebars. The factory uses Zero pollution ESP Bag filter technology and omits zero pollution . The Company also planted trees to encourage green pollution free environment and safeguard the lives of surrounding people.

RESEARCH & DEVELOPMENT

With the proper control of alloy design & final quenching temperature leads to optimum strength with high UTS/YS ratio. The key to this success is a thorough understanding of the metallurgy involved, particularly the proper use of alloy designing final quenching temperature. This helped in identifying the chemistry and process parameters that can result in the desired product (with specified UTS/YS Ratio >1.18). Considering the practical problem of processing material in high speed factory at a Finishing quenching temperature shall be 900°C, it is decided to further fine tune the chemistry so that commercial production can be started without adversely affecting the productivity of factory at economical price.

Achieving such high UTS/YS ratio and elongation is a challenge requiring optimization of steel chemistry and process parameters. Based on extensive literature survey revealed that, cooling of TMT within narrow temperature range is one of the optimal and economic solutions to get optimum UTS/YS ratio in rebars. MSAF, with its strong research expertise and advanced steel processing facilities has developed the earth quake resistance bars in different diameters.

This has been possible through proper alloying and micro structural engineering through repeated trials done at MSAF & their associated units.

UTILIZATION RATIO (UTS / YS) SHOULD BE ABOVE 1.15

TMT bars have high resistance to Seismic loads due to its higher UTS/YS ratio. Chemistry design and cooling parameters were major technological intervention that was judiciously used for achieving high UTS/YS ratio >1.18) in earthquake resistant TMT Rebar.

Throwing more light on the importance of using earthquake resistant steel in construction is the fact

that the majority of buildings in India successfully weathered the impact of Nepal earthquake.

According to industry experts, the key differentiating factor between India and Nepal was the use of high-quality TMT bars. Despite India being bracketed under Seismic Zones III, IV & V, the awareness to use earthquake-resistant materials in construction only grew after the tragic Latur earthquake in 1993. TMT Steel Bars have become the gold standard when it comes to earthquake-resistant construction in the country.

SEISMIC PERFORMANCE

High quality TMT bars exhibit high: Strength, Workability, Elongation, Ductility.

Focusing on the earthquake resistant properties, elongation and ductility of TMT bars play a crucial role as high energy is generated on a structure during an earthquake and to retain structural integrity it is essential that a ductile material absorbs this energy without breaking itself.

Earthquake Resistant Structure

TMT bars owe their excellent ductility and elongation characteristics to their structure. The bars possess a strong external martensite surface and a soft ferrite-pearlite core. Irrespective of the manufacturing process, these characteristics remain unchanged. During an earthquake, the core of the steel bar allows the action of mild tilting and the exterior surface bringing it back to its original position. Adding to this ductility, the elongation property ensures inelastic strains are better accommodated during seismic activity and also aftershocks.

MS LIFE 600+ TMT EQR REBARS

The Hidden Strength Of Modern India

From highrises to flyovers, bridges, dams, railway stations, ports and airports, MSAF TMT-EQR Rebars are strengthening modern India from deep within.

MS Agarwal Foundries Pvt Ltd, South India's largest and most trusted steel maker, produces Earthquake Resistant (EQR) TMT (thermo-mechanically treated) rebars for use in construction in seismic zones and other areas where the possibility of earthquakes exist.

MS LIFE 600+ TMT - EQR rebars produced from MSAF Factory, Toopran are superior elastic energy absorbing bars that are supplied in straight and bend form. All MS LIFE 600+ TMT-EQR bars fully conform to revised IS 1786-2008 grade D (ductile) specirications.

MS LIFE 600+ TMT-EQR rebars are characterized by higher UTS/YS ratio due to which they are capable of absorbing more energy if pressure loaded beyond yield point due to sudden natural occurrences such as an earthquake, tsunami, etc. The desired UTS/YS ratio of grade Fe 500 shall be 1.12 (minimum).

Further the percentage elongation of MS LIFE 600+ TMT-EQR rebars is enhanced to minimum 18% with a word UTS/YV shall be UTS/YS. These enhanced attributes enables the material to withstand and absorb sudden loads encountered during earthquakes, cyclones, tsunami, etc, thus providing higher safety to structures.

FEATURES OF MS LIFE 600+ TMT-EQR REBARS

Bond Strength

The bond strength of all MS LIFE 600+ TMT-EQR bars has been tested and meets IS 1786-2008 norms. This not only enhances the quality of the product but also increases its lifespan.

Weldability

MS LIFE 600+ TMT-EQR bars are perfectly weldable by normal process of welding with suitable electrodes. They are also weldable without preheating preferably with low hydrogen electrode.

Bendability

MS LIFE 600+ TMT-EQR bars have lower bend diameter compared to specific bend diameters as per IS 1786- 2008, Grade D specifications. This allows easier bending with less effort and thus facilities easier onsite works.

Fire Resistance

MS LIFE 600+ TMT-EQR bars are able to withstand Ore hazards when enclosed in concrete up to 600°C, whereas ordinary TMT starts losing its mechanical properties from 250°C.

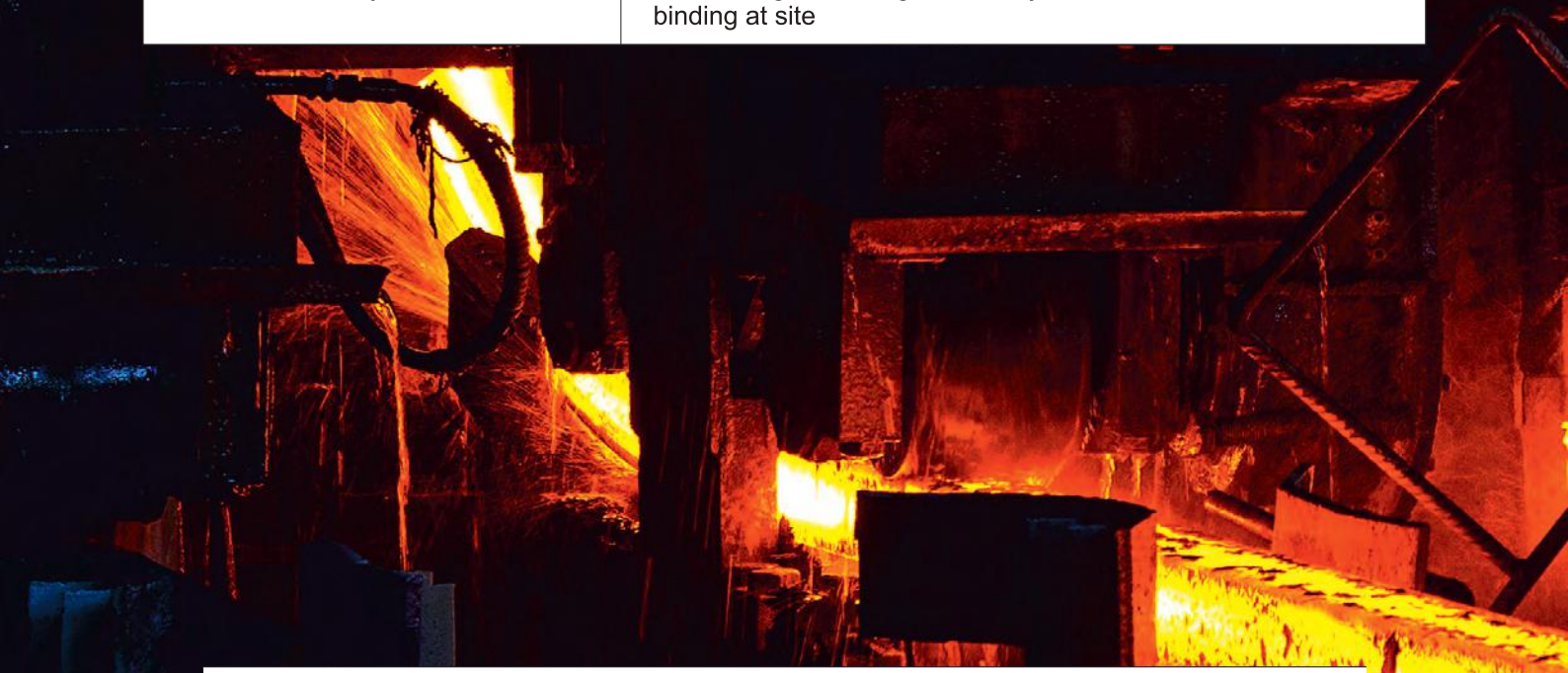
Corrosion Resistance

MS LIFE 600+ TMT-EQR is also available in corrosion-resistant variety (HCR) with modified chemical composition to give enhance resistance to seismic and corrosive atmospheric condition.

QUENCHING PROCESS: WE USE RO WATER FOR QUENCHING PROCESS TO GET BEST FINISH. FOR THIS WE HAVE INTERNAL RAIN WATER STORAGE TANK AS WELL AS RO RECYCLING UNIT IN ALL THE FACTORIES

PRODUCT CHARACTERISTICS OF MS LIFE 600+ TMT-EQR REBARS

ATTRIBUTES	ADVANTAGES
High UTS/YS Ratio	Higher energy absorption capacity with increased elastic zone
High total elongation	Enhances absorption capacity of material plasticity
High uniform elongation	Enhances better bending property (Ductility)
Low variation in yield stress	Avoids localized shear failures
Higher tensile strength	Enhances maximum load bearing capacity
Uniform Ferrite – Pearlite core / composite martensite rim	Enhances better fire resistance capability with Uniform martensite rim.
Higher fatigue resistance	Capability to withstand higher dynamic/ sismic loads
Superior rib structure	Provides higher bonding strength between the bar and concrete
Better weld-ability	Produces good strength of weld joints, can eliminate manual binding at site



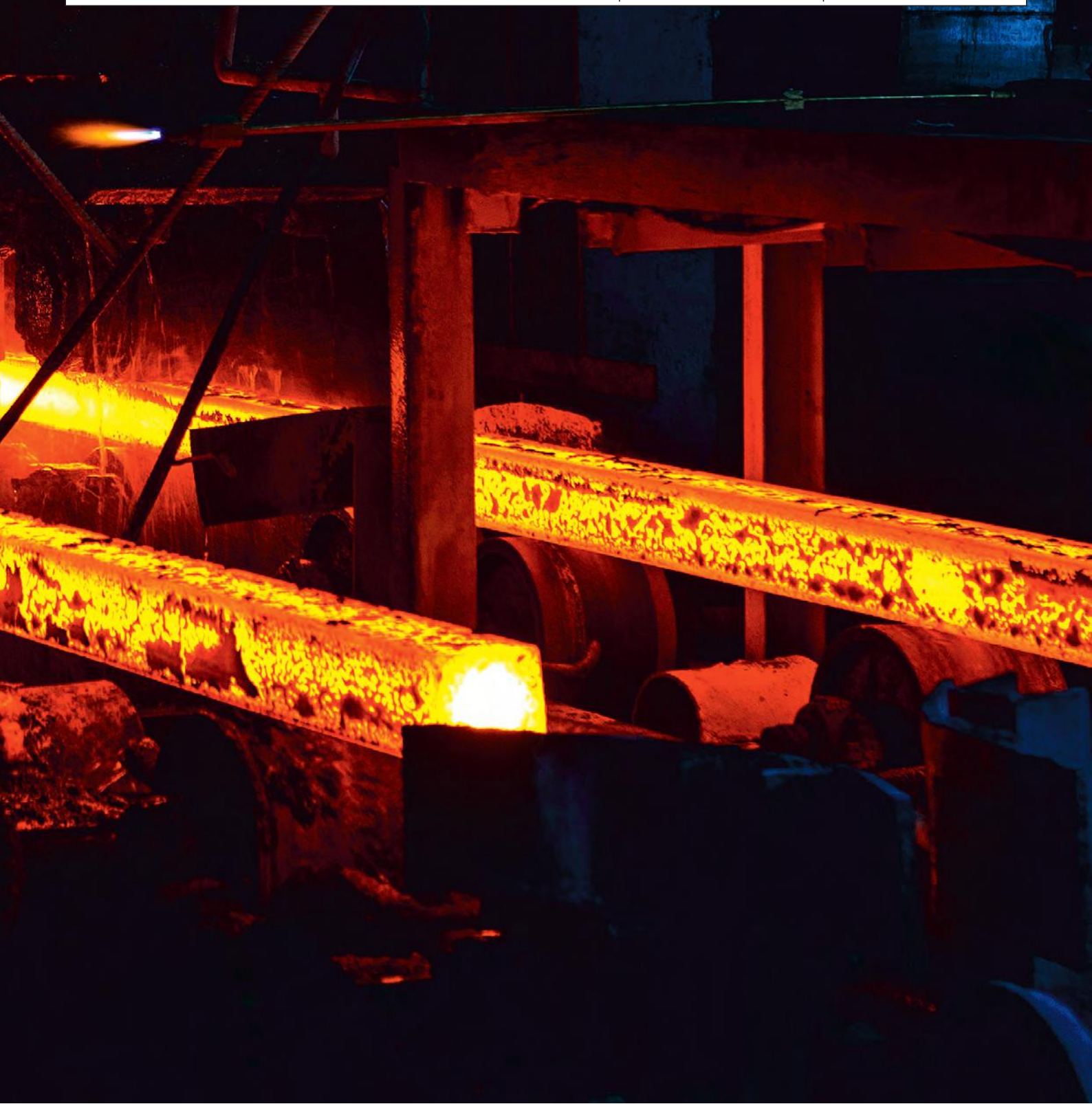
OBSERVED RUNNING MASS/METER

Specic	Weight	BIS Range Tolerance	MS LIFE 600+ Range Tolerance
Size (mm)	(Kg/Mtr)	(Kg\Mtr)	(Kg\Mtr)
		(Min) (Max)	(Min) (Max)
8	0.395	0.367 - 0.423	0.367 - 0.395
10	0.617	0.574 - 0.660	0.574 - 0.617
12	0.888	0.844 - 0.932	0.844 - 0.888
16	1.580	1.500 - 1.659	1.500 - 1.580
20	2.470	2.396 - 2.544	2.396 - 2.470
25	3.850	3.735 - 4.975	3.735 - 3.850
28	4.830	4.685 - 4.975	4.685 - 4.830
32	6.310	6.120 - 6.499	6.120 - 6.310

Dimensional Tolerance: As per IS: 1786-2008 specification

Mechanical Properties of MS LIFE 600+ TMT - EQR REBARS

Parameter	IS : 1786-2008 Fe 600	MS LIFE 600+
Yield Strength (YS), Mpa (Minimum)	600	600
Yield Strength (YS), Mpa (Maximum)	-	-
Ultimate Tensile Strength (UTS), Mpa (Minimum)	660	708
UTS/YV ratio (Minimum)	1.1	1.18
Total Elongation (Minimum) (GL = 5.65 Ao) A	10.0	18.0
Elongation at Maximum force (%)	10.3	18.4



CHEMISTRY MS LIFE 600+ TMT-EQR REBARS (LADLE ANALYSIS IN %)			
Element	**IS: 1786-2008**	**IS: 1786-2008**	**MSAF-EQR TMT**
	Fe-550	Fe-600	Fe-600+
Carbon(c) (maximum)	0.30	0.30	0.25
Sulphur (s) (maximum)	0.055	0.040	0.040
Phosphorus (p) (maximum)	0.050	0.040	0.040
S+P (maximum)	0.100	0.075	0.075

OBSERVED RUNNING MASS/METER		
Grade	MS LIFE TMT Earth Quake Resistant	MS LIFE TMT HCR EQR Earth Quake
Application	RCC Construction in earthquake Prone Zone	RCC construction in corrosion as well as earthquake prone zone
Special Qualities	In additon to MS LIFE TMT, it posseses high combined properties of UTS/YS ratio. Higher elongation, uniform elongation and narrow range of YS.	MS LIFE TMT, HCR & MS LIFE, TMT EQR

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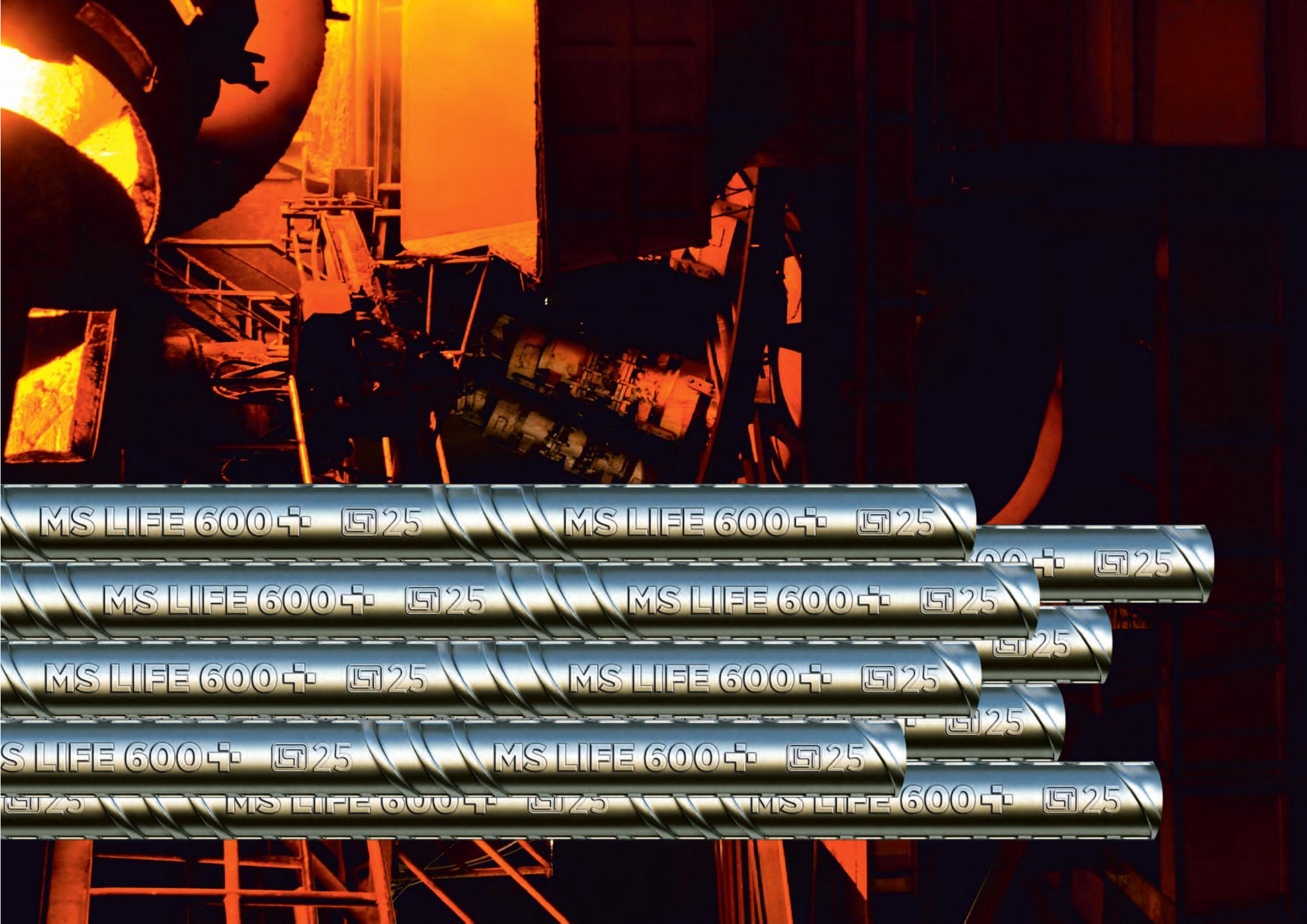
334. TS, India

Sponge Iron Factory
Survey No 167 & 169,
Madhavaram Village,
Mantralayam Taluk,
Kurnool (Dist) - 518533, AP,India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