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TATA STEEL
#WeAlsoMakeTomorrow

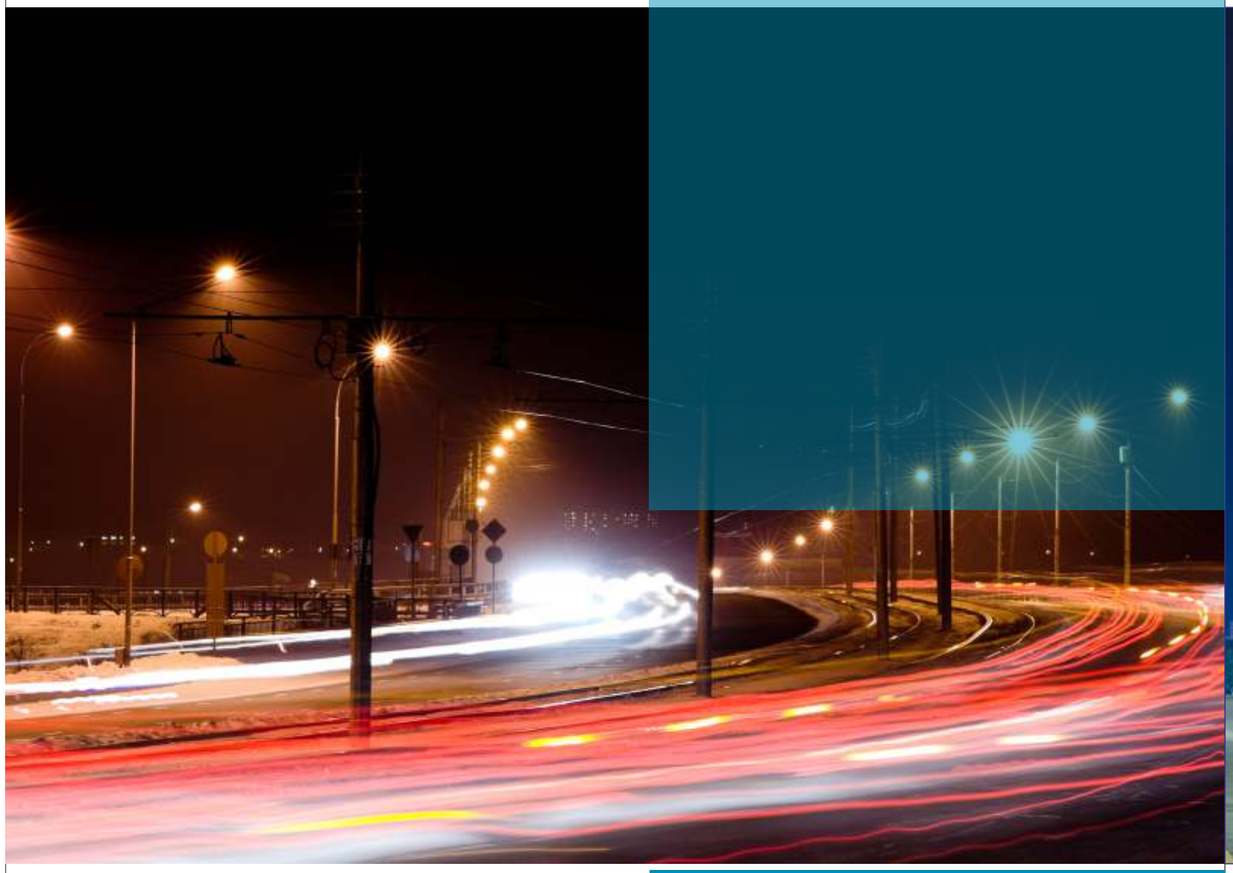
TATA

ADDING **NEW LIGHT** TO URBAN INFRASTRUCTURE

FRP COMPOSITE POLES

NEW MATERIALS BUSINESS
An Initiative of **Tata Steel**

INTRODUCTION



A springboard into the exciting world of advanced materials, Tata Steel's New Materials Business (NMB) aims to take advantage of the increasing potential of new and emerging materials in many areas such as infrastructure, process industries, railways and automotive sectors.

The composites business of NMB focuses on Fibre Reinforced Polymer (FRP) composites with products mainly made of Glass Reinforced Polymer (GRP). FRP is a composite material comprising glass/carbon/other fibres, embedded in a polymer matrix. Its key benefits include light weight, corrosion resistance, high strength to weight ratio, and the it affords design freedom.

Through its New Materials Business, Tata Steel helps customers in a range of market segments gain operational efficiency and competitive advantage through use of composites. A number of technology and manufacturing partnerships, an extensive industry background and deep technical specialisation are helping Tata Steel develop engineered composites tailored for specific applications.

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WHY TATA FRP POLES?

The need for introducing safe, aesthetically pleasing and robust solutions for the lighting industry has inspired the New Materials Business (NMB) of Tata Steel Limited (TSL) to introduce Fibre Reinforced Polymer (FRP) poles that have become the preferred choice for many industries and end users.

TSL NMB has successfully supplied FRP poles for wide ranging applications, including highways, main roads, residential streets, sports fields, decorative lighting, area lighting, perimeter security, multiple parks and gardens, These FRP poles are not only used for their resistance to corrosion, but are preferred by architects, urban planners, infrastructure developers and city authorities for their aesthetic appearance, design flexibility, greater strength, ease of installation and inherent safety against accidental electrocution.

These FRP poles are crafted in our factory through a filament winding process with superior raw materials that incorporate important advantages such as **durability against harsh weather, electrical safety for pedestrians, aesthetic looks and significantly longer service life** than their wooden and metal counterparts.

KEY ADVANTAGES

CORROSION RESISTANT

Tata FRP poles can resist rusting and all types of corrosion above or below ground. They can withstand aggressive acidic or alkaline soil conditions and even remain unaffected in humid and salty coastal environment. They are chemically resistant and can be used for much longer than conventional metallic and wooden poles in harsh environmental scenario.

MAINTENANCE-FREE

Tata FRP poles can withstand extreme temperature fluctuations. Moreover, no corrosion or decay implies zero maintenance for these poles over their long lives.

SUITABLE IN ANY ENVIRONMENT

Tata FRP poles provide unmatched durability and life as they are engineered with high quality resin and fibres to suit the intended service environment ranging from coastal/ marine areas to chemical/industrial process plants, such as acid/alkali production, water and waste-water treatment, fertilizers, steel, cement and many more.

COLOUR

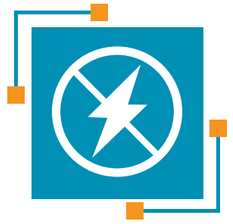
Tata FRP poles are coloured with selected pigmented resins, characterized by high and long-term UV resistance. The poles, depending on type, may be finished in matt or high gloss.

LIGHTWEIGHT

The weight of Tata FRP poles is almost 4 times lower than the weight of steel, thereby minimising costs of transportation and installation

LONGEVITY

Tata FRP poles are designed to be longer lasting than wood, concrete, steel and aluminium under similar climatic conditions.



NON-CONDUCTIVE

Tata FRP poles are non-conductive and hence eliminate the risk of accidental electric shocks.

PASSIVE SAFETY

Tata FRP poles are designed to minimise the harm to passengers in the event of impact and hence, fatalities due to road accidents can be avoided.

HIGH BENDING STRENGTH

Their specific laminate strength is higher than steel. FRP Poles can be designed to handle wind speeds of up to 180km/h making them suitable for withstanding cyclones or storms.

CHOICE

A range of choices of arms, base plates and decorative arrangements ensure that there is a product for almost every application. Designs can be customised to customer selection and requirement.

RESISTANT TO VANDALISM

Tata FRP poles' superior polyester gel coat and glass filament windings increase the impact strength substantially to withstand any acts of vandalism.

ANTI-GRAFFITI

The surface of the gel coating is resistant to chemical solvents (eg. acetone). Cleaning of graffiti paint through the use of a chemical solvent does not affect the layer of the gel coat surface and its colour.

Comparison between FRP Poles and Metal Poles

Features	FRP Poles	Metal Poles
Strength (Tensile)	400-500 MPa	410 Mpa
Weight	Low- Lightweight	High- Four times as heavy as FRP
Design Life	Very Long	Moderate
Service Environment	Suitable in any environment; Ideally suited to harsh industrial & coastal environments	Unsuitable for harsh environments
Corrosion	Corrosion resistant	Gets corroded; Requires frequent rust removal and repainting
Aesthetics	Excellent - Can be tailored to customer's requirements	Average
Joints	Without any joint	At multiple locations along its length
Painting	Coloured pigmentation with UV Resistance	Manual painting of the outer surface only
In-service Painting	Not required	Frequent painting required
Transportation Cost	Low	High
Installation Cost	Low; can be installed by one workman	High; Will either require cranes or multiple workmen
Relocation cost	Low	High
Maintenance Cost over lifetime	Zero	Significant
Electrical Conductivity	Non-conductor; no risk of electrocution of pedestrians	Conductive; high risk of electrocution
Earthing	Not required	Frequently required because of rusting
Environment Friendliness	Eco-friendly	High environmental impact

TECHNICAL SPECIFICATIONS

Tata FRP poles are manufactured with utmost precision and are compliant with relevant national and international standards. In addition to internal load testing, our poles are tested at and certified by NABL accredited laboratories for physical and mechanical properties outlined in ASTM standards.

Applicable Standards

Details	Units
IS 2713-1980	Specs for tubular street light poles for overhead power lines
IS 875 (Part 3) 1987	Code of Practice for Design Loads for Buildings & structures- Wind Load
IS 6746	Polyester Resin System
ANSI C 136.20 1990	Glass Reinforced Plastics (FRP) for Lighting Poles
ASTM D 4923-01	Standard Specs for Reinforced Thermosetting Plastic Poles
AASHTO LTS-4	Standard specifications for structural supports for highway signs, luminaries and traffic signals

Details	Units	Test Methods
Glass Content	55 - 60%	ASTM D 2584
Tensile Strength	200 (+/- 50) MPa	ASTM D 638
Flexural Strength	250 (+/-50) MPa	ASTM D 790
Compressive Strength	200 (+/- 50) MPa	ASTM D 695
Yield Strength	250 (+/- 50) MPa	ASTM D 638
Modulus of Elasticity	1500 MPa - 2500 MPa	ASTM D 638
Water absorption	<0.3%	ASTM D 570

Moreover, Tata FRP poles are fire resistant as fire retardant resin is used for their manufacture. Our poles do not contain chlorine (or any halogen) or other toxic materials in excess of trace levels and are always well below safe OSHA (or equivalent) limits. When subjected to two consecutive 60 second flame applications, they will self-extinguish after the last flame application

APPLICATIONS AND PRODUCTS RANGE

Applications

Tata FRP poles are ideal for street light poles as well as in other application areas as detailed below:

- Street light poles (cylindrical, conical and decorative poles)
- Poles for perimeter security (with lights and CCTV)
- Smart poles with sensors and embedded functionality
- Poles with solar panels
- Telecom poles
- Distribution and transmission poles

Product Range

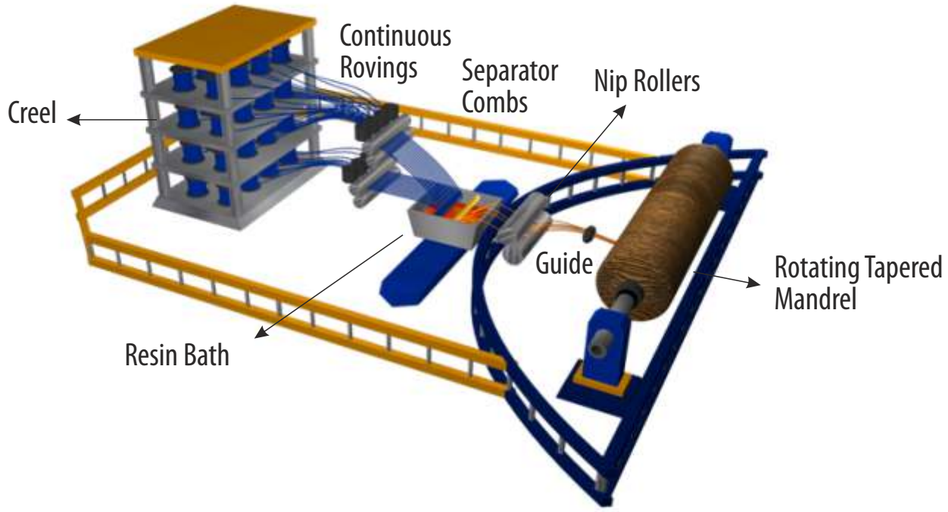
Pole Type	Height Above Ground (m)	Dimension (mm)			Buried Portion for Embedded Poles (m)	Base Plate for Anchored Poles	Bracket Length, L (mm)	
		Top ID	Bottom ID	Thickness			Single Arm	Double Arm
A.Conical (Embedded) B.Conical + Flange (Anchored)	3	70	94	5	0.4	FRP Base Plates for poles up to 7 m height	A. L < 500 B. 500 < L < 1000 C. 1000 < L < 1200	
	4	70	102	5	0.5			
	5	70	110	5	0.5			
	6	85	163	6	0.5			
	7	85	176	6	0.65			
	8	85	201	7	0.75	MS Base Plates, wrapped with FRP, if required, for 7 -12 m high poles		
	9	85	216	7	1.2			
	10	85	230	8	1.5			
	11	85	245	9	2			
	12	85	260	9	2			

Note:
1. FRP Poles are jointless and available in both cylindrical and conical shapes.
2. Translucent & decorative poles can be designed & manufactured to suit customers' requirements.
3. Poles with decorative base covers are also available.

DESIGN AND MANUFACTURING DETAILS

Manufacturing Process

Tata FRP poles are manufactured using a Filament Winding process to achieve optimum results for strength and rigidity. Glass roving is passed through a bath of resin in a continuous manner and applied with uniform tension onto a rotating mandrel, resulting in a glass to resin ratio of 60:40. The surface is seamless, smooth and tapered. The glass resin can be tailored to meet customers' specifications or application needs.



1

FINISHING COAT POLES

These come with an aesthetically superior finish, through at least two layers of polyurethane varnish. The poles are free from any surface defects. This defect-free PU surface renders our poles weatherproof, UV and flame-resistant, along with an impact-resistant surface. A gel coat may also be provided if so desired by the customer.

2

MECHANICAL PROPERTIES

A standard pole supporting a luminaire with a wind surface of 0.20m^2 may not have a pole top deflection of more than 5% of its height above ground when subjected to a basic wind pressure of 500 Pa. A safety factor of 2.5 times the total maximum wind load is applicable.

3

QUALITY SYSTEM

Tata FRP poles are manufactured in accordance with ASTM D4923-01 under the ISO 9002 quality system.

4

ACCESS OPENING

If an access opening is required, the cut-out is covered by an access door-cover manufactured from glass filled nylon impregnated in the same colour as that of the surface coat. It is secured to the pole by two stainless steel Allen-head captive screws into M4 brass inserts embedded in the pole.

5

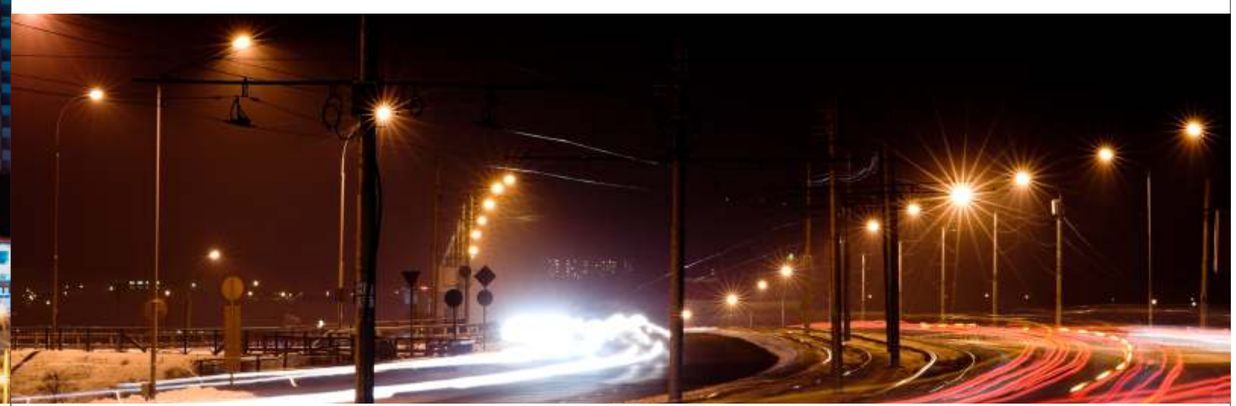
CABLE ENTRY

Cable entry with a minimum diameter of 34mm is provided at a minimum depth of 400mm below the ground surface.

6

BASE PLATE

Anchor Type base plate mounted poles have either a hot dipped galvanised or a fibreglass coated MS flange plate or a full FRP base plate that can be bolted to a foundation which is designed to withstand the forces the pole will experience when in service.

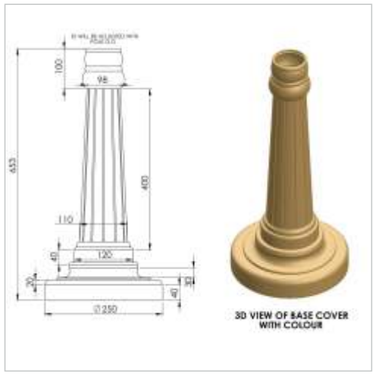


DESIGNER POLES

While Tata Steel offers some standard sizes and designs, poles with customised designs can also be manufactured. This is because FRP as material offers the freedom and flexibility to develop a varied range of designer poles with design options for the pole arms, decorative pole bases and the pole itself.

Tata Steel's New Materials Business has launched innovative **FRP translucent poles**. These can be fitted with LED lights along their length. The lights are available in many colours and can be controlled from mobile handsets through an APP. The flexibility allows users to change the lighting to suit the theme of specific events. Like normal FRP poles, these can also be made in a range of shapes and sizes. The poles along with gazebos, benches, fencing and a range of street furniture including FRP modular toilets, security cabins and bus shelters comprise Tata Steel's innovative contribution to urban infrastructure.

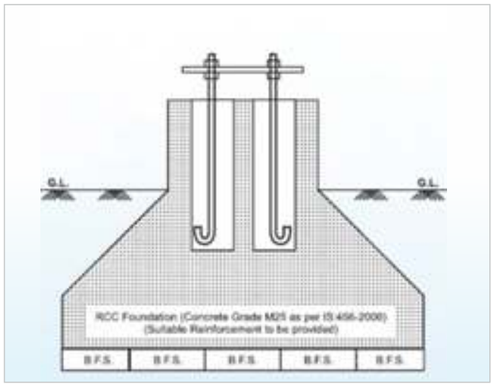
DECORATIVE FRP BASES



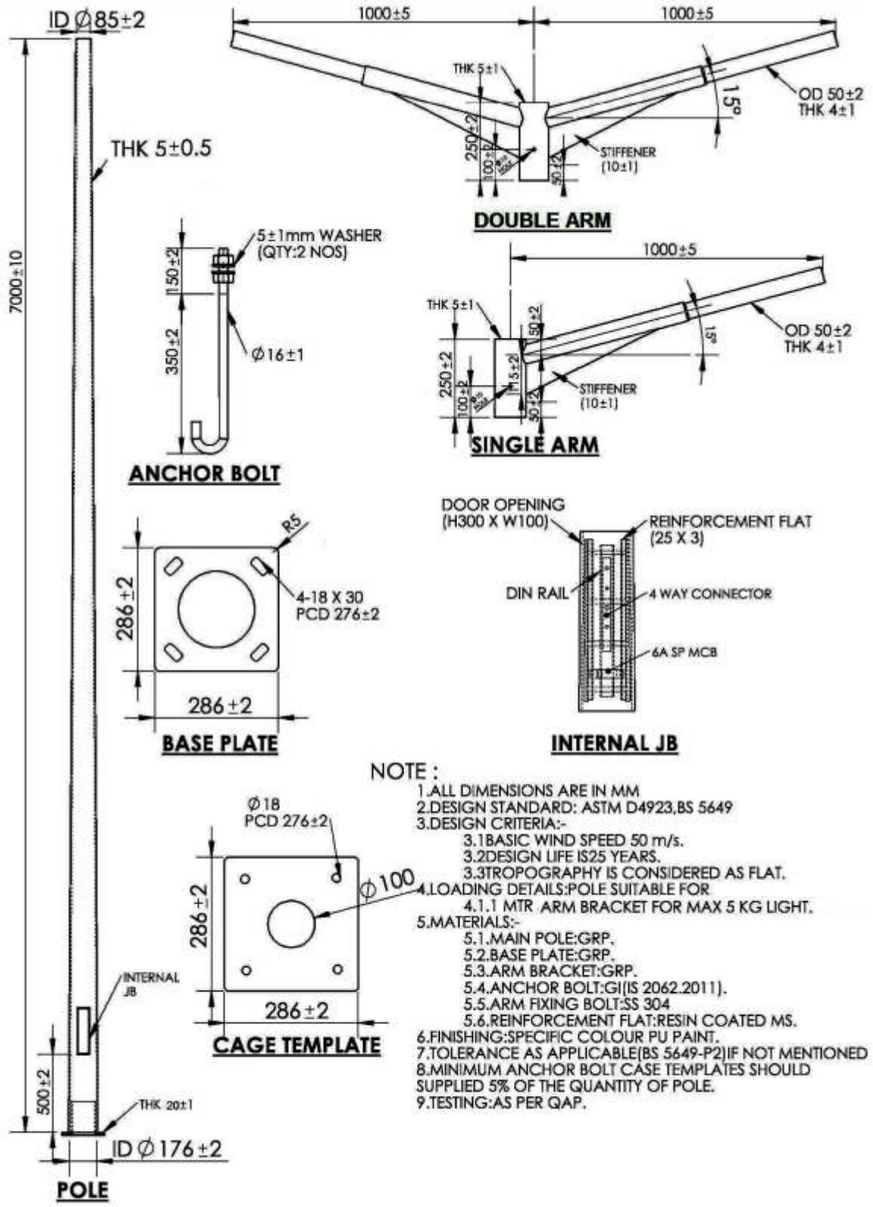
Aside decorative and designer poles, TSL NMB also offers decorative pole bases made of FRP. Available in many colours and customised designs and sizes, these bases offer added aesthetics. These can be used with new or existing poles, and can be tailored to reflect the theme and ambience of a city or an event. While used with existing poles, these can be fitted with both FRP and metallic poles. Like FRP poles, these come with UV and corrosion resistant properties, and a long service life.

INSTALLATION

Being lightweight, the poles can be installed quickly. The poles, available in both the embedded variety and with MS or FRP base plates, do not need any elaborate foundation.



DRAWING OF A TYPICAL CONICAL TATA FRP POLE



NOTE :

1. ALL DIMENSIONS ARE IN MM
2. DESIGN STANDARD: ASTM D4923,BS 5649
3. DESIGN CRITERIA:-
   - 3.1 BASIC WIND SPEED 50 m/s.
   - 3.2 DESIGN LIFE IS25 YEARS.
   - 3.3 TROPOGRAPHY IS CONSIDERED AS FLAT.
4. LOADING DETAILS:POLE SUITABLE FOR
   - 4.1.1 MTR .ARM BRACKET FOR MAX 5 KG LIGHT.
5. MATERIALS:-
   - 5.1. MAIN POLE:GRP.
   - 5.2. BASE PLATE:GRP.
   - 5.3. ARM BRACKET:GRP.
   - 5.4. ANCHOR BOLT:GI(IS 2062.2011).
   - 5.5. ARM FIXING BOLT:SS 304
   - 5.6. REINFORCEMENT FLAT:RESIN COATED MS.
6. FINISHING:SPECIFIC COLOUR PU PAINT.
7. TOLERANCE AS APPLICABLE(BS 5649-P2)IF NOT MENTIONED
8. MINIMUM ANCHOR BOLT CASE TEMPLATES SHOULD SUPPLIED 5% OF THE QUANTITY OF POLE.
9. TESTING:AS PER QAP.