ZHEJIANG JIULI TYHOO COATING TECHNOLOGY CO., LTD.

Supply safe and reliable coating products and services for global industrial equipment.

Address: Zhenan, Shuanglin Town, Huizhou City, Zhejiang Province
Zip code: 311328
Tel: 0086-572-2539127
Fax: 0086-572-2539879

All rights reserved: Jiuli Tyhoo Coating Technology Co., Ltd.
Supply safe and reliable coating products and services for global industrial equipment.
COMPANY PROFILE

The company was founded in 2014, a joint venture company between China’s largest stainless steel pipe manufacturer - Zhejiang Jiuli Hi-Tech Metals Co., Ltd and Tyhoo Industries who has more than 20 years experience in oil and gas industry anticorrosion field production management technology. The company is a technology-oriented enterprise specialized in the oil and gas pipeline coating, anticorrosive technology research and technical service of pipeline integrity research.

Quality policy: Serving customers, contributing to the society and developing Jiuli Tyhoo on basis of mature technology and reliable product quality.

HSE policy: Human-oriented, safety first, cleaner production.

ANNUAL COATING CAPACITY
1 MILLION SQUARE METERS

3LPE/PP COATING ON STAINLESS STEEL PIPE

3LPE/PP coating on stainless steel pipe is an isolating coating applied onto the external surface of stainless steel pipe. The coatings consist three layers: FBE as primer, adhesive as middle layer, PE/PP as outer layer. Purpose of the coating is to suppress or reduces chemical corrosion and electrochemical corrosion during using of the steel pipe, to extend the service life of steel pipe.

Currently widely used in large industrial and mining areas and important energy industry, such as transporting oil, gas or other corrosive gas and liquid delivery, etc. above ground, buried, and undersea.

At the same time did appropriate modification to the external anti-corrosion material and make the external anticorrosive coating has good adhesion and a certain mechanical strength and convenient application in the construction.

APPLICABLE STANDARD

The company’s FBE and 3PP/3PE coating quality is able to meet international standards i.e. ASTM, CAN/CSA, DIN, ISO and Shell DEP.

CAN/CSA-Z245.20, CAN/CSA-Z245.21
ISO22809-1, OBT Z2357-2009
DIN 30670, DIN 30678
DEP 31.40.30.31-Gen, AS HZS 3862
NACE RP 0341
PROCESSING FLOWCHART

Regarding the poor adhesion of FBE powder with stainless steel surface from conventional coating process.

We have improved made improvements in three aspects: surface blasting, pretreatment, powder materials.

Traditional anticorrosion technology uses steel shot to produce a covalized profile on steel pipe surface, which although can meet the requirement of surface profile depth, but has poor improvement on adhesion of FBE on pipesurface.

We use special abrasive which produces sharp peaks on pipe surface to effectively improve the adhesion of FBE on surface of steel pipe.

For the high Tg FBE powder with relatively poor adhesion, used a special pretreatment process after blasting to greatly improve the poor bonding between powder and stainless steel.

Fundamentally improved the adhesion between powder and stainless steel surface with cooperating developed new type FBE powder.

PRODUCT SPECIFICATION

Applicable pipe diameter Φ 88.9 - 1219 mm, pipe length within 8 - 12 m.
### RAW MATERIAL INSPECTION

#### FBE Inspection
- **Density and Gel Time**
  - Requirements: Within +/-0.05 with the data from manufacturer
- **Water Content**
  - Requirement: 0.1% or less

#### Adhesive Test
- **Elongation at Break**
  - Typical values: Specification requirement

#### PE/PP Test
- **Density**
  - Typical values: Specification requirement
- **Elongation at Break**
  - Typical values: Specification requirement
- **Tensile Strength**
  - Typical values: Specification requirement
- **Water Content**
  - Typical values: Specification requirement

### SURFACE PRETREATMENT

#### Medium Frequency Preheating (preheated to 40 ~ 70 °C)

#### Blast Cleaning

#### Surface Inspection
- **Surface Profile**
  - Requirements: Usually between 50 ~ 100 microns but may change slightly according to the project requirement.
- **Salt Contamination**
  - Requirement: 20 mg/m² or less
- **Surface Cleanliness**
  - Requirement: Sa 2.5
WATER WASHING

MEDIUM FREQUENCY HEATING

ADHESIVE, PE/PP APPLICATION

Measure the bonding performance between epoxy powder, adhesive and PE/PP with automatic peel strength test machine.

Coating impact strength tested by impact test

<table>
<thead>
<tr>
<th>3LPP coating</th>
<th>3LPE coating</th>
</tr>
</thead>
<tbody>
<tr>
<td>$&gt;10.3\text{mm}$</td>
<td>$&gt;7.1\text{mm}$</td>
</tr>
</tbody>
</table>

FBE POWDER APPLICATION

- **Thickness**
  Thickness be precisely controlled within the range requested by customer.

- **Degree of Cure**
  DSC data from laboratory
  
<table>
<thead>
<tr>
<th>Curing Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>$&gt;95%$</td>
</tr>
</tbody>
</table>

WATER QUENCHING

COATING HOLIDAY DETECTION

High voltage (25kv) spark testing, to ensure free of holiday and excellent anti-corrosion performance.
COATING THICKNESS MEASUREMENT

Measure coating thickness with eddy current type stainless steel coating thickness meter to ensure the required coating thickness.

LABORATORY TESTS

POWDER COATING DSC TESTING

Test Tg and ΔH of powder and coating and coating curing degree to have a better control to the production process to achieve the ideal anti-corrosion effect.

CATHODIC DISBONDMENT TEST

With advanced cathodic disbonding test equipment, simulate various environmental conditions to test the coating effect of cathodic disbonding.

ABLE TO MEET REQUIREMENT OF STANDARDS SUCH AS ISO 21809, DIN30670, DIN30678, AS/NZS 3882, SHELL DEP 31.40.30.31, CAN/CSA Z245.20, CAN/CSA Z245.21, GBT 23257 and other major commonly used standards in China and abroad.

INDENTATION TEST

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Maximum Service Temperature Peel Strength (N/10 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23±2°C</td>
<td>0.4 mm</td>
</tr>
<tr>
<td>230°C</td>
<td>0.2 mm</td>
</tr>
<tr>
<td>115°C</td>
<td>0.2 mm</td>
</tr>
<tr>
<td>90°C</td>
<td>0.14 mm</td>
</tr>
</tbody>
</table>

MARKING

Check that the coating has no defects, conduct peel strength test, impact test, grind for cutback.

Cutback: Use special process to prepare cutback for 3L/PE/3LPP coating on stainless steel surface. Being able to produce an additional undamaged FBE toe at pipe end compared with traditional 3L/PE/3LPP coating to meet the special welding requirements of customer.
Qualification and Acceptance

Wide sales network of Jiuli with dedicated person to be in charge in each province, autonomous regions and cities of China.

The products of Jiuli have been widely exported to North America, Europe, Middle East, southeast Asia and other more than 50 countries. Each country has corresponding sales representative or agent, and has set branch company or representative offices in the Middle East and Europe, providing convenient service for the customers.

As the subsidiary company of Jiuli, Jiuli Tyhoo has provided our coating products and services to PDO, Groupement Reggane Gruen (GRN), Petrofac International, TouatGaz, Tecnicas Reunidas, Saipem, South Stream Transport, Petronas Gas Berhad (PGB), and other world-renowned companies.

Jiuli and Jiuli Tyhoo has obtained “National May 1 Labor award”, “National torch-plan key high-tech enterprise”, “New materials industry award in 2015 of Zhejiang division” and other related honors.

Health, Safety and Environment

Health
- Company attaches great importance to health and safety of employees, and has formulated a complete safety management system.
- When new employees joined the company, they will be trained with environmental, occupational health and safety, and can start work after being assessed. Each employee is distributed with a “Safe Operation Manual” for review.
- Company shall arrange medical examination for employees annually, and pay attention to humanity care.

Environment
- It’s our duty to protect the environment. Company strivestowards harmonious development of man, society and environment at the time of development.
- Wastewater: invested to build automatic sewage station to treat waste water. Not only improved the automatic control of system, reduced worker labor intensity, and improve the comprehensive water reuse rate and ensure wastewater after treatment meet the discharged standard.
- Hazardous solid waste: commission unit with qualification for regular treatment and avoid second pollution.
- In addition, the company attaches importance to energy conservation and emissions reduction work. The company uses electric heating to all production equipment to reduce emissions of greenhouse gases and harmful gas, to achieve the goal of energy conservation, emission reduction and consumption reduction.

Safety
- The leaders of each production unit shall sign the liability statement to strengthen the responsibility of safety management.
- Hold safety inspection monthly to eliminate safety risk timely.
- Company to hold annual emergency plan drill to prepare the staffs.