

巨石直接纱产品在建筑设施领域中的应用

The Application of Jushi Direct Roving in Construction Industry



巨石集团研发中心 费其锋
Jeff Fei, Jushi R&D Center



内容提要 Outline

1

巨石集团简介
Jushi Group Profile

2

玻璃钢在建筑应用领域的典型案例及要求
Introduction of FRP for Construction Application

3

巨石在建筑应用领域的研发进展
Jushi's Study on Construction Application

4

巨石在建筑应用领域的典型直接纱产品介绍
Jushi Typical Products for construction Industry



巨石集团简介 Jushi Group Profile

- The world's largest fiberglass manufacturer, Annual capacity over 1,000,000 tons.
- Total assets of USD2.9 billion , 8,000 employees.
- Five production bases (Tongxiang, Jiujiang, Chengdu, South Africa, Egypt)
- Market Share



Global 1/5



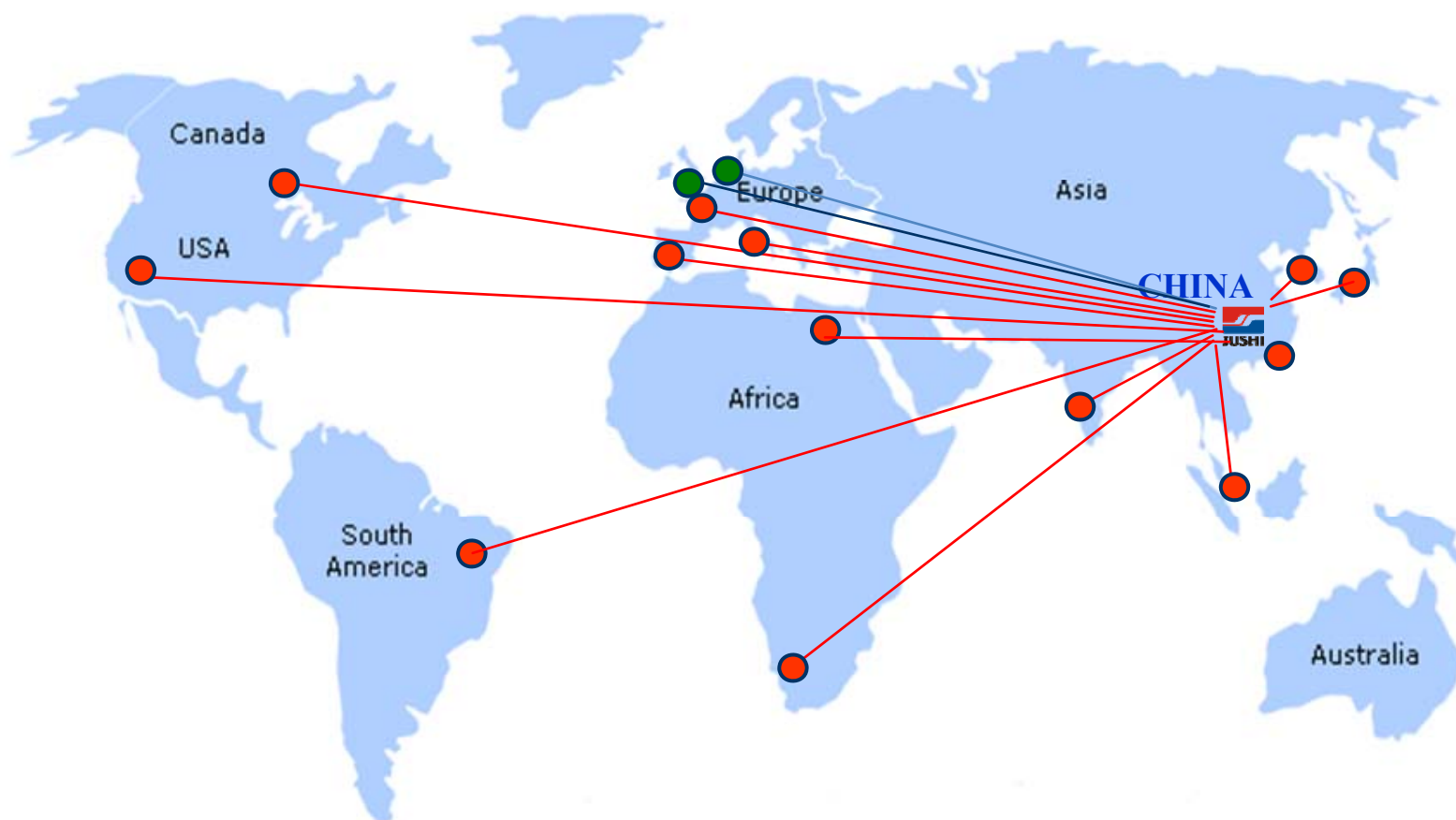
Domestic 1/3





巨石集团简介 Jushi Group Profile

Marketing Network



Headquarters



Overseas subsidiary



Exclusive distributor



内容提要 Outline

1

巨石集团简介
Jushi Group Profile

2

玻璃钢在建筑应用领域的典型案例及要求
Introduction of FRP for Construction Application

3

巨石在建筑应用领域的研发进展
Jushi's Study on Construction Application

4

巨石在建筑应用领域的典型直接纱产品介绍
Jushi Typical Products for construction Industry



玻璃钢在建筑设施方面的应用

Introduction of FRP for Construction Application

门窗、格栅



高强度、耐候性好

Process: Pultrusion, UP or
PU resin system

桥梁、采掘设施



高机械性能、耐化学腐蚀

Process: Pultrusion, UP or
EP or PU resin system

电力、高铁设施



优异的电绝缘性能、耐化学腐蚀、机械性能高

Process: Pultrusion, UP or
EP or PU resin system



玻璃钢在建筑设施方面的应用

Introduction of FRP for Construction Application

水处理管道



脱硫烟道、化工储罐



CNG气瓶、油气管道



一定的耐压强度

Process: Filament Winding,
UP resin system

优秀的耐化学腐蚀性能

Process: Filament Winding,
UP or VE resin system

耐高压、疲劳性能好、
化学腐蚀性好

Process: Filament
Winding, EP resin system



玻璃钢在建筑设施方面的应用

Introduction of FRP for Construction Application

建筑领域用玻璃钢材料的发展要求

- **高性能**：更高机械强度、更优异的耐化学腐蚀性能、更好的长期疲劳性能
- **成型工艺多样化**：根据制品应用的不同，产品的成型工艺不断发展，目前主要以缠绕、拉挤工艺为主
- **树脂体系多样化**：根据性能要求的不同，目前应用的树脂体系主要包含UP、VE、EP、PU等几种



内容提要 Outline

1

巨石集团简介

Jushi Group Profile

2

玻璃钢在建筑应用领域的典型案例及要求

Introduction of FRP for Construction Application

3

巨石在建筑应用领域的研发进展

Jushi's Study on Construction Application

4

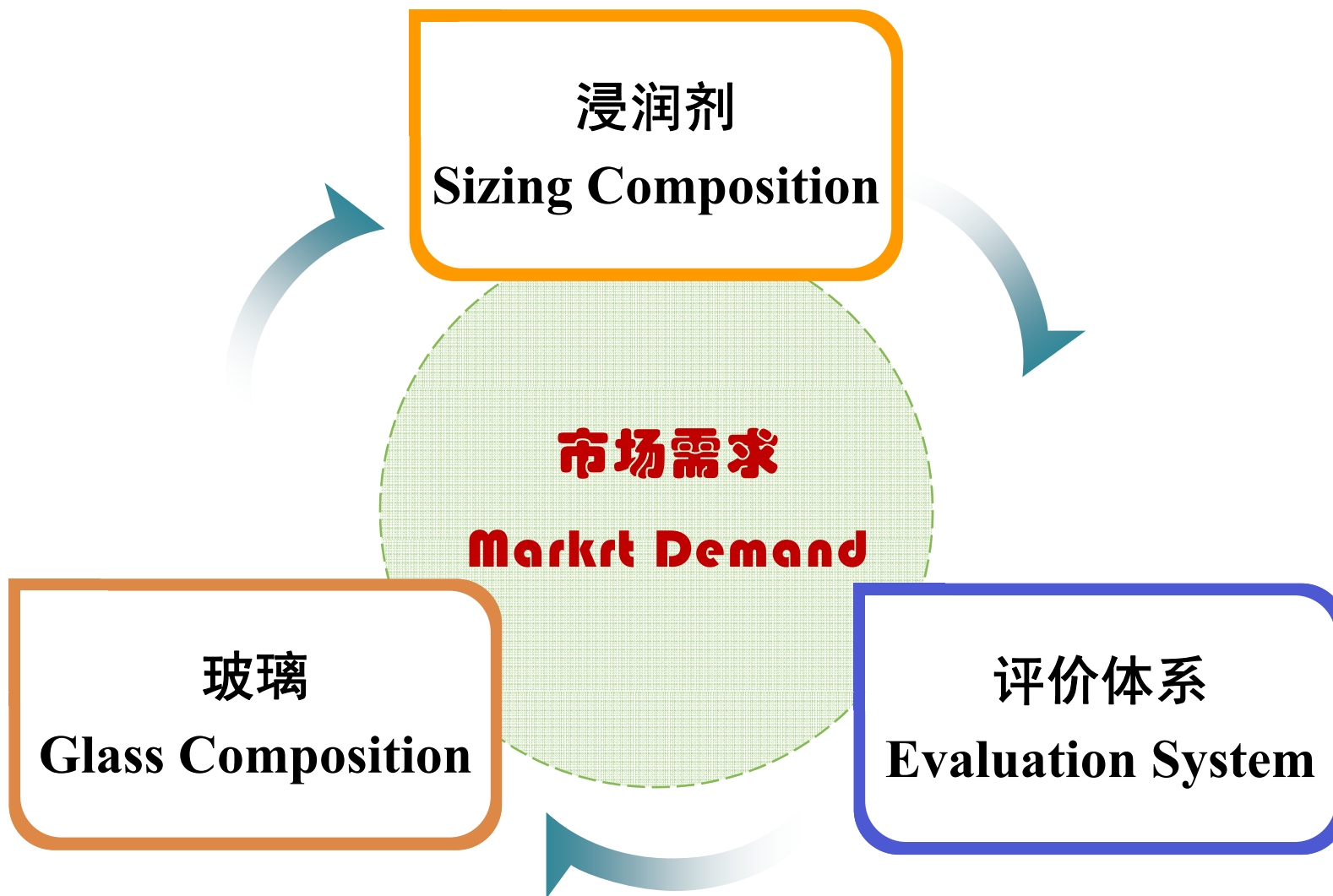
巨石在建筑应用领域的典型直接纱产品介绍

Jushi Typical Products for construction Industry



巨石在建筑设施应用方面的研究进展

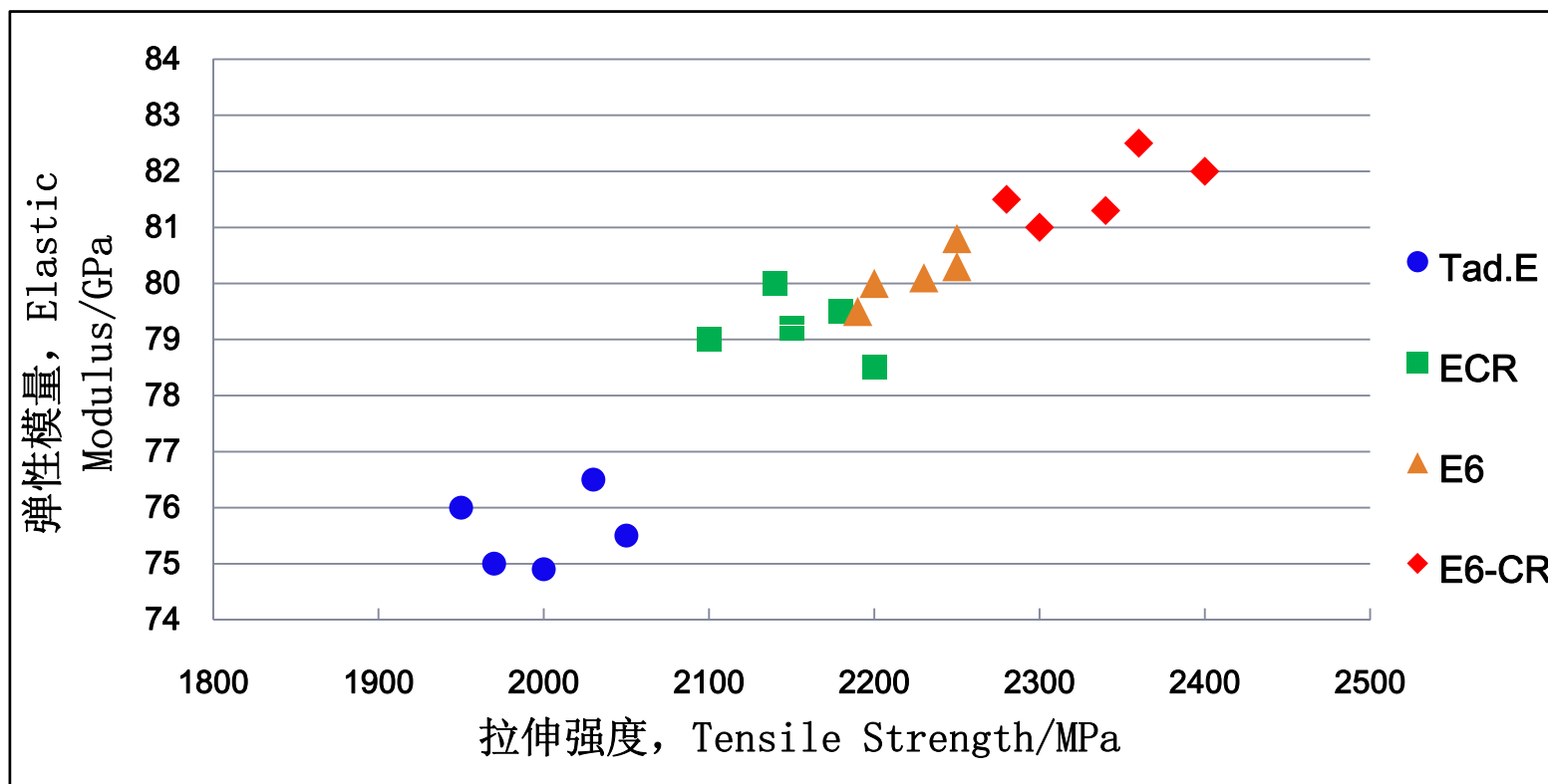
Jushi's Study on Construction Application





巨石在建筑设施应用方面的研究进展 Jushi's Study on Construction Application

- 玻璃方面，推出了**E6CR**玻璃，机械性能更好



注:采用ASTM2343标准测试浸渍纱的机械性能。

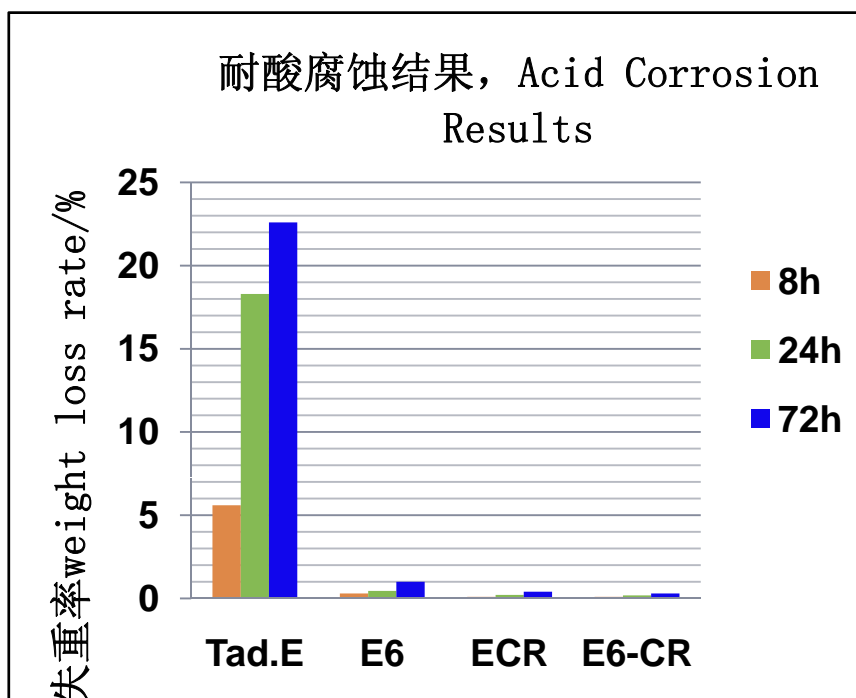
The mechanical properties of impregnated yarn are tested by ASTM2343 standard.



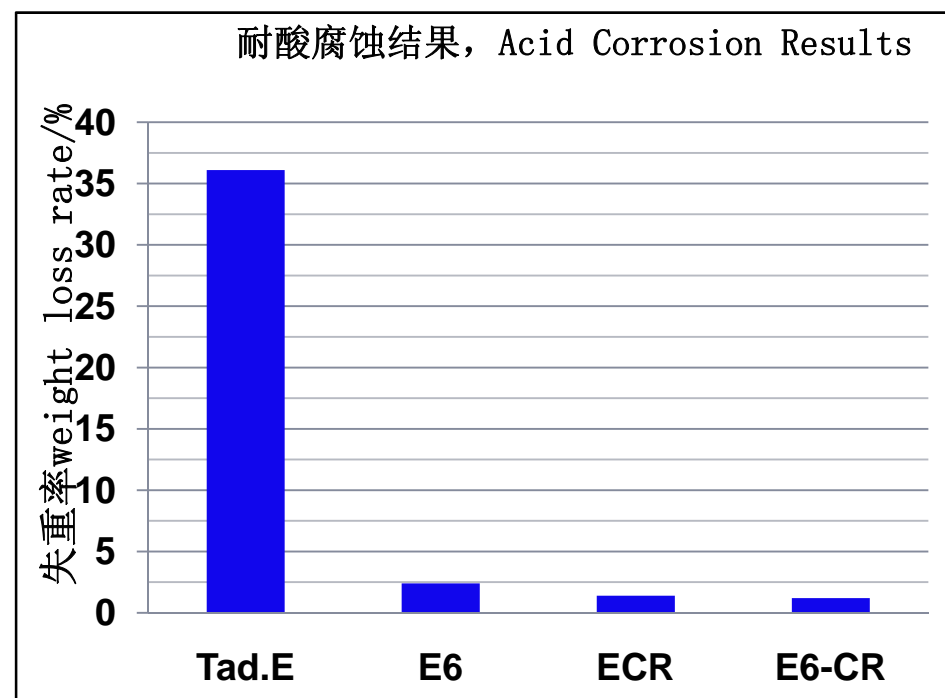
巨石在建筑设施应用方面的研究进展

Jushi's Study on Construction Application

■ E6CR玻璃耐腐蚀性能更优，特别是耐酸性能



(1).23°C, 10% HCl, different soak time



(2) 96°C, 10% H₂SO₄, soak time 24h.

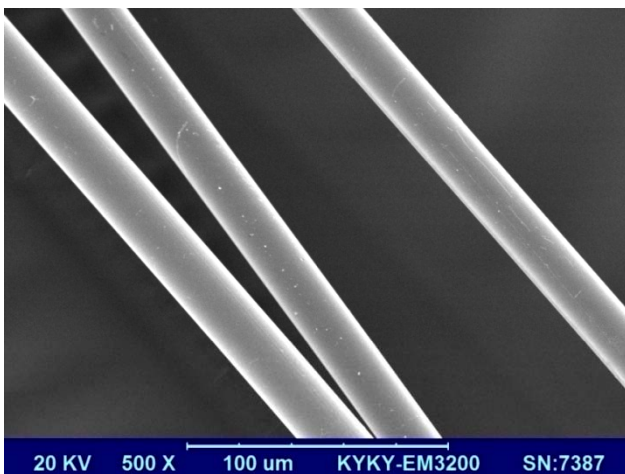
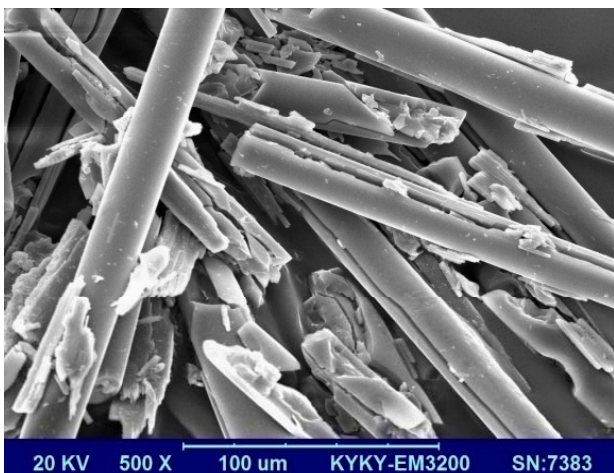


巨石在建筑设施应用方面的研究进展

Jushi's Study on Construction Application

传统E玻璃纤维和E6-CR玻璃纤维的硫酸试验显微图

Micrographs of acid corrosion resistance of E-glass and E6-CR glass



Tad.E

10% H₂SO₄浸泡1个月



E6-CR

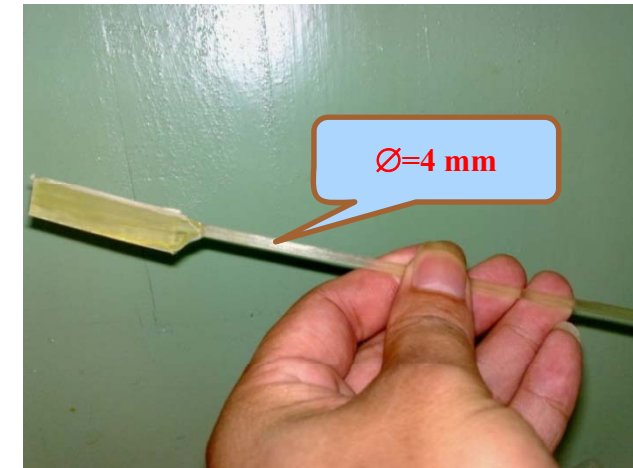
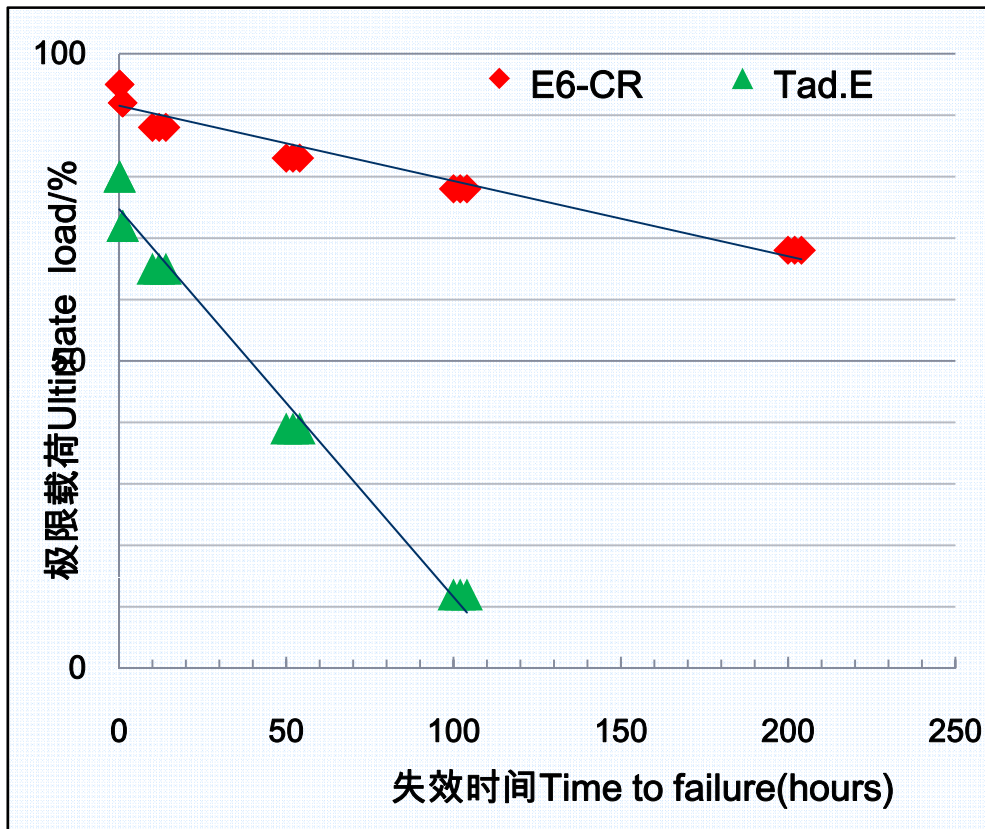


巨石在建筑设施应用方面的研究进展

Jushi's Study on Construction Application

E玻璃纤维和E6-CR玻璃纤维的应力腐蚀试验对比

Stress corrosion property of E6-CR fiberglass





巨石在建筑设施应用方面的研究进展

Jushi's Study on Construction Application

- 浸润剂方面，推出了适合拉挤或者缠绕工艺，可增强不同树脂体系的品种

适合拉挤工艺

□ 不饱和聚酯、聚氨酯等多种树脂通用型浸润剂 **312T**

主要应用于拉挤型材、抽油杆、高铁枕木

□ 环氧专用型浸润剂 **310**

主要应用于电绝缘领域

适合缠绕工艺

□ 不饱和聚酯、乙烯基酯等多种树脂通用型浸润剂 **386T**

主要应用于水处理管道、防腐领域

□ 环氧专用型浸润剂 **308**

主要应用于高压气瓶、输油管道



巨石在建筑设施应用方面的研究进展

Jushi's Study on Construction Application

■ 测试评价体系方面—拉挤实验室

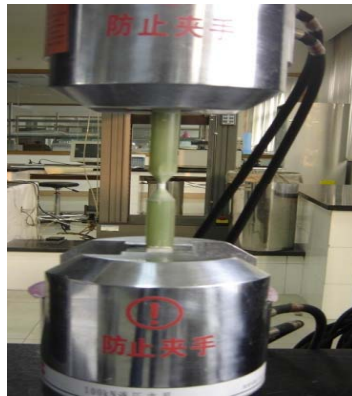




巨石在建筑设施应用方面的研究进展

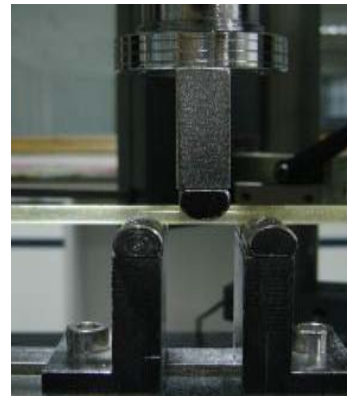
Jushi's Study on Construction Application

拉挤制品测试项目



拉伸

Tensile Strength



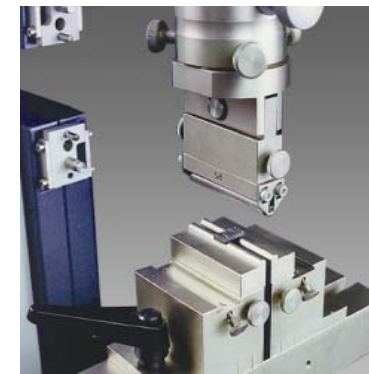
弯曲

Flexural Strength



压缩

Compressive Strength



剪切

Shear Strength



吸红测试



泄露电流



耐压测试 (交流电压)



巨石在建筑设施应用方面的研究进展

Jushi's Study on Construction Application

■ 测试评价体系方面—缠绕实验室





巨石在建筑设施应用方面的研究进展

Jushi's Study on Construction Application

- 轴向拉伸强度 ATS
ASTM D2105
- 爆破性能
Short-time hydraulic pressure
ASTM D1599
- 疲劳性能
Cyclic pressure strength
ASTM D2992
- 长期静水压测试
Time-to-Failure under constant
pressure
ASTM D1598





内容提要 Outline

1

巨石集团简介
Jushi Group Profile

2

玻璃钢在建筑应用领域的典型案例及要求
Introduction of FRP for Construction Application

3

巨石在建筑应用领域的研发进展
Jushi's Study on Construction Application

4

巨石在建筑应用领域的典型直接纱产品介绍
Jushi Typical Products for construction Industry



巨石典型直接纱产品介绍

Jushi Typical Products for construction Industry

■ 高性能通用型拉挤用纱 E6CR-312T

□ 优异的耐腐蚀性能

Excellent Corrosion resistance

□ 与多种树脂相容

Multi-compatible

□ 浸透快速而完全

Fast Wet-out

□ 拉伸、弯曲、剪切性能大幅提高

Excellent Mechanical Properties

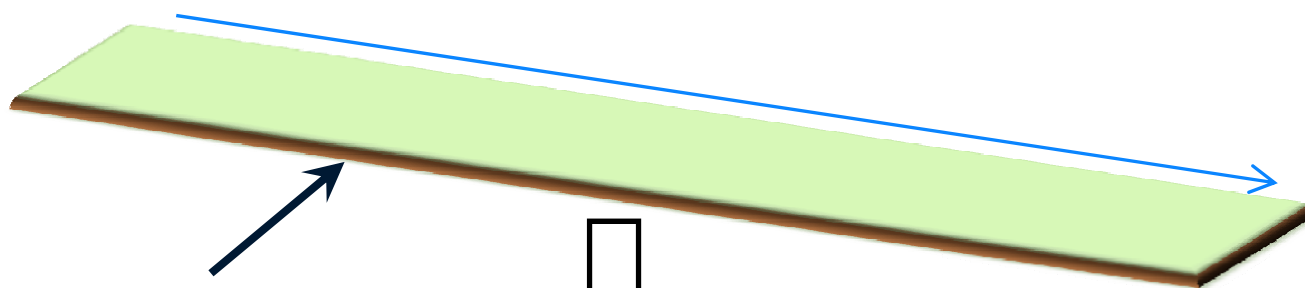
▶ 产品规格 *Identification*

玻璃类型 <i>Glass</i>	E6CR				
浸润剂 <i>sizing</i>	硅烷 <i>Silane</i>				
线密度 <i>yield</i> (Tex)	2400	4400	8820	9600	17600
纤维直径 \varnothing (mm)	24	23	30	31	30



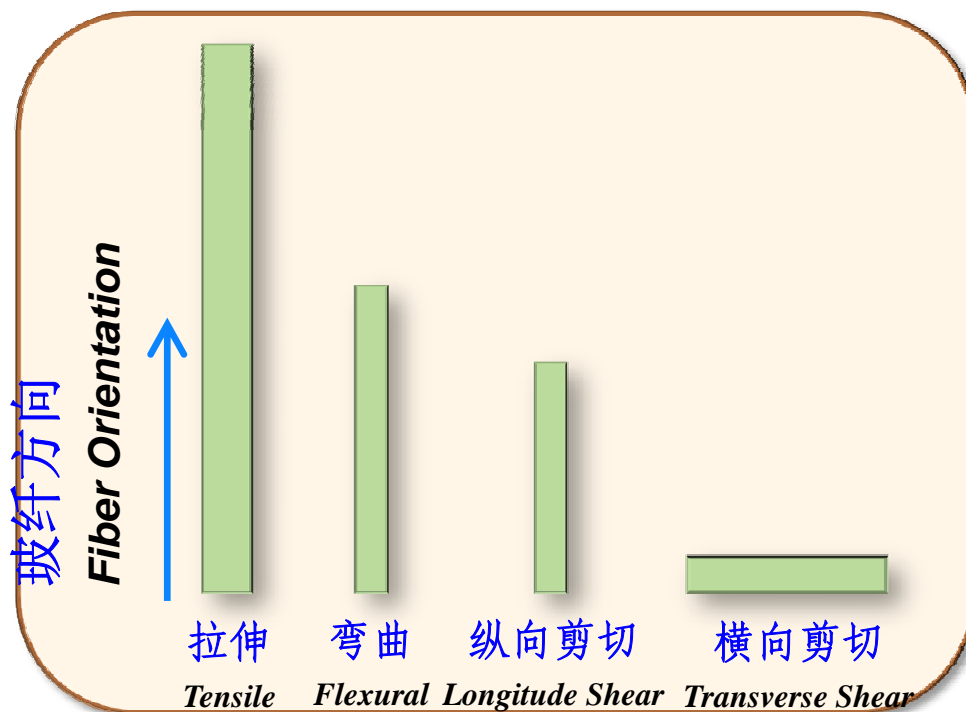
巨石典型直接纱产品介绍

Jushi Typical Products for construction Industry



测试用拉挤片材

Pultruded Plate for Testing



Notes:

Resin: UP R36 from Ashland

Filler: CaCO₃

Sheet size: 50 mm X 4 mm

Test Standards: ASTM 2344/ISO 527-4

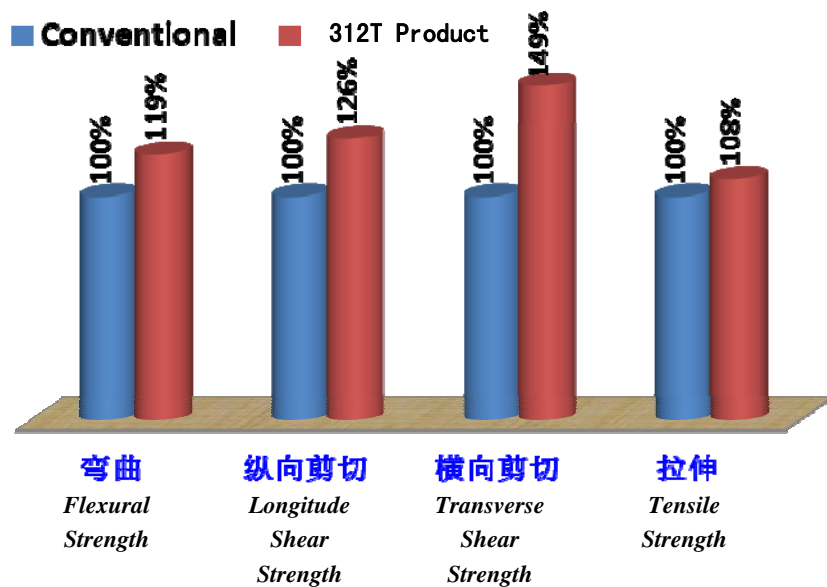


巨石典型直接纱产品介绍

Jushi Typical Products for construction Industry

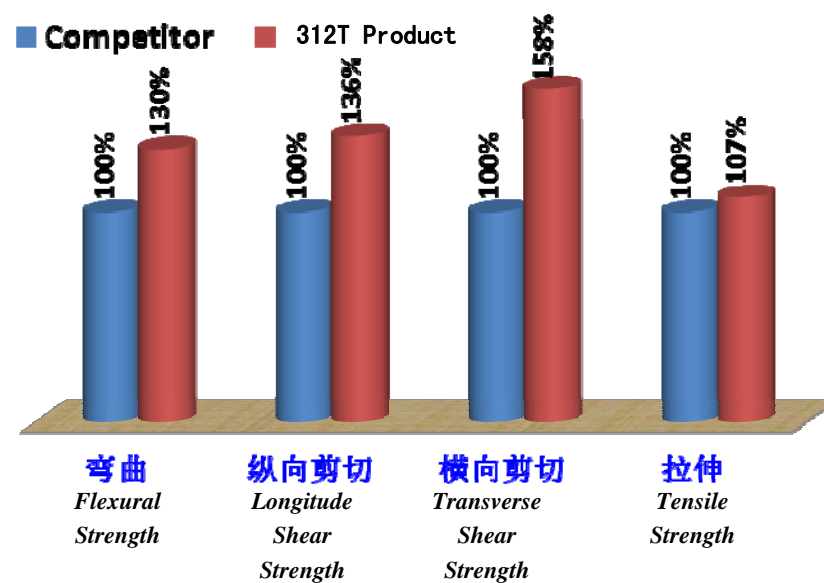
与常规产品对比

Comparison with conventional



与竞争对手产品对比

Comparison with Competitor



裂缝 (Split)

破坏方式对比



312T



巨石典型直接纱产品介绍

Jushi Typical Products for construction Industry

■ 环氧绝缘棒拉挤用纱 E6CR-310

□ 优异的耐酸腐蚀性能

Excellent Corrosion resistance

□ 环氧树脂专用

Epoxy Compatible

□ 抗吸湿性好、毛羽少

Low Moisture Absorption, Low Fuzz

□ 电性能、机械性能优异

Excellent Electric and Mechanical Properties

▶ 产品规格 *Identification*

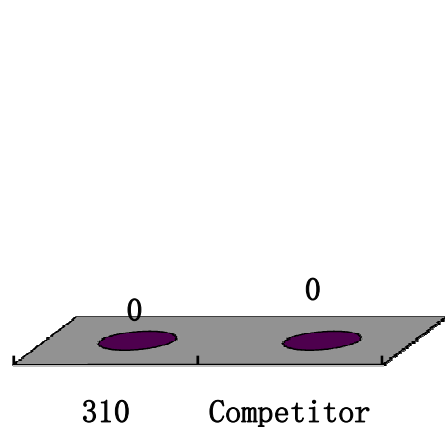
玻璃类型 <i>Glass</i>	E6CR		
浸润剂 <i>sizing</i>	硅烷 <i>Silane</i>		
线密度 <i>yield</i> (Tex)	2400	4800	9600
纤维直径 \varnothing (mm)	24	24	31



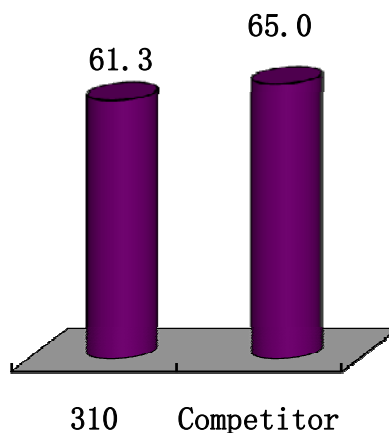
巨石典型直接纱产品介绍

Jushi Typical Products for construction Industry

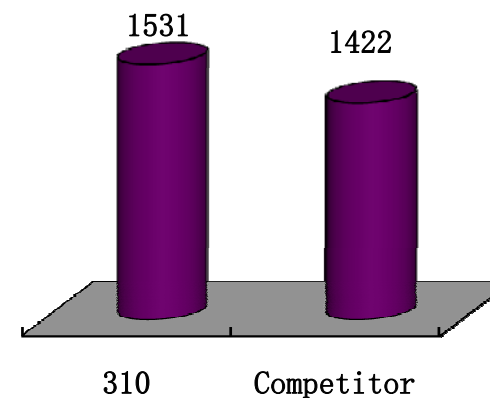
Epoxy, \varnothing 18mm Rod Comparative Testing Result



Dye Penetration Test
(单位: 个)



Breakdown Voltage Test
(单位: kV)



Tensile Strength Test
(单位: MPa)



巨石典型直接纱产品介绍

Jushi Typical Products for construction Industry

■ 环氧高压管道缠绕用纱 E6CR-308

□ 优异的耐酸腐蚀性能

Excellent Corrosion resistance

□ 环氧树脂专用

Epoxy Compatible

□ 优异的使用工艺性能

Excellent Processability

□ 优异的管道力学强度和疲劳性能

Excellent Mechanical and Fatigue Properties

▶ 产品规格 *Identification*

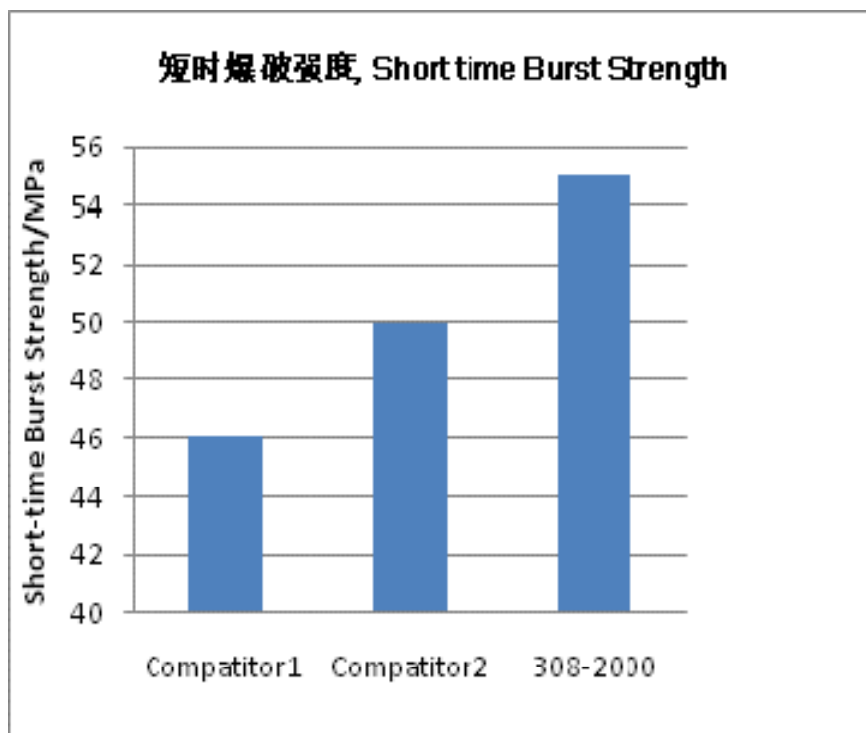
玻璃类型 <i>Glass</i>	E6CR			
浸润剂 <i>sizing</i>	硅烷 <i>Silane</i>			
线密度 <i>yield</i> (Tex)	1100	1200	2000	2400
纤维直径 \varnothing (mm)	16	17	21	17



巨石典型直接纱产品介绍

Jushi Typical Products for construction Industry

2"酸酐固化体系，设计压力16MPa



Per ASTM D1599

项目	循环次数(次)	测试条件
Competitor1	3600	在1.5倍工作压力，即24MPa，频率为25HZ，可持续的循环次数
Competitor2	5000	
308-2000	>5000	

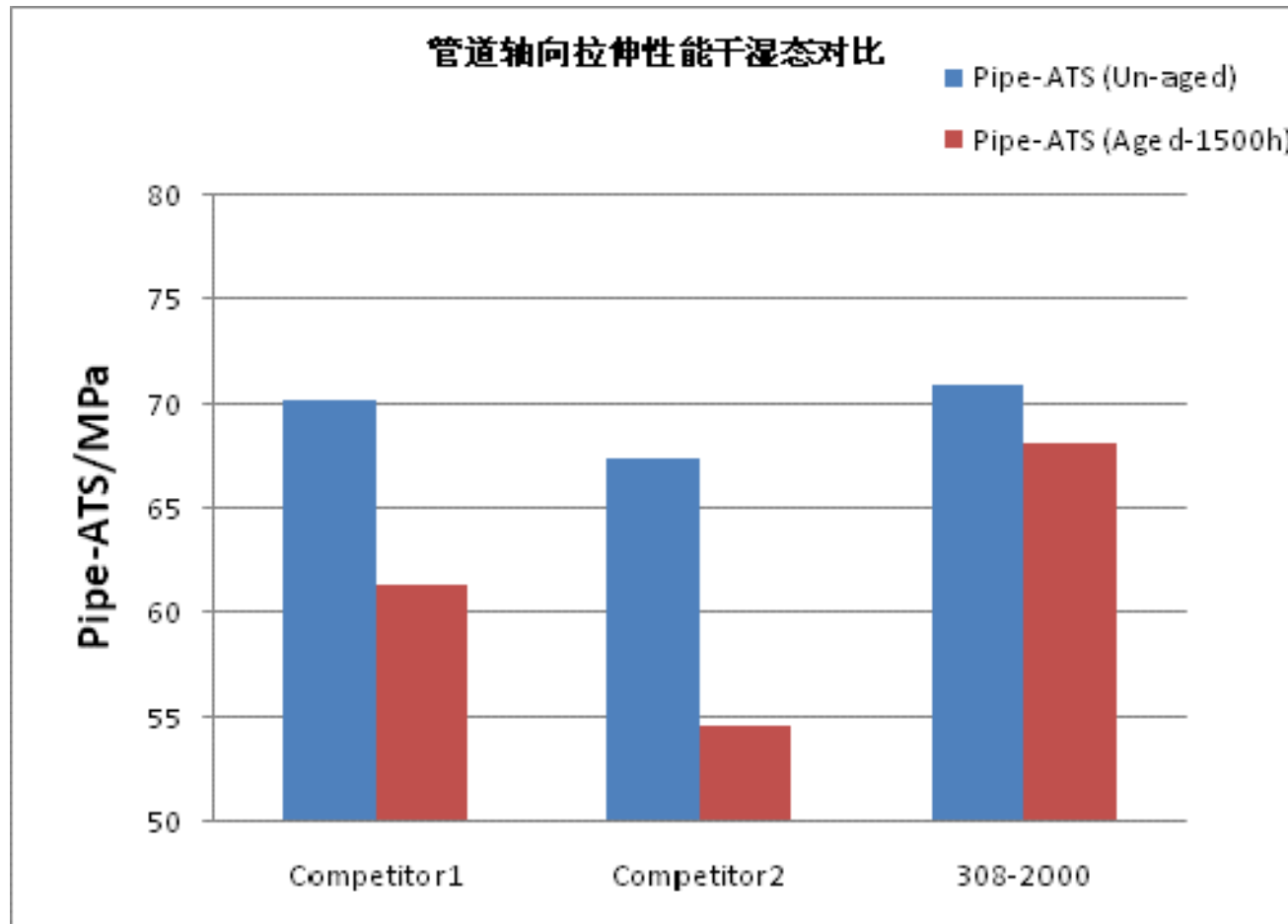
Per ASTM D2992



巨石典型直接纱产品介绍

Jushi Typical Products for construction Industry

4"胺固化体系



Per ASTM D2105 Boiling Water Temp. 93°C



巨石典型直接纱产品介绍

Jushi Typical Products for construction Industry

The products have been fully recognized by global customers, and has being supplied large quantities to the market.





Thank you for your attention

Email: feiqifeng@jushi.com

Mobile: +8613736478505