Spray Polyurea Elastomer Technology Used in Infrastructure’s Construction in CHINA

Weibo Huang
Qingdao University of Technology
Qingdao, CHINA
1. Biography
2. Cooperated with PDA Since 2002
3. Edited the 1st Monograph on Polyurea
4. Promoted Polyurea Worldwide
5. Focused on China Infrastructure’s Construction
6. PDA and Polyurea
7. Latest R & D
Biography

- Born in Aug. 8, 1963
- Ph. D, Professor
- Began on Polyurea in 1995
- Joined PDA in 2002
- Edited the monograph on polyurea in 2005
- Confirmed the 1st book on polyurea in the 7th PDA Annual Conference, 2006
- More than 220 papers, 36 patent rights and 6 books were published
- China Outstanding Coating Experts in 2009
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3 Times International Director of PDA
PDA Board of Directors 2002～2005
PDA Board of Directors 2009～2011
Published in 2005

Revised in 2020

Chemical Industry Press
The Releasing Ceremony in 2005
The 1st Monograph on Polyurea Confirmed by PDA in 2006
The 1st Monograph on Polyurea Confirmed by PDA in 2006
Welcome to PDA

The Polyurea Development Association (PDA) is the trade association for the global polyurea industry and is dedicated specifically to the polyurea technology. PDA provides resources, education, support and a global network to the polyurea industry through volunteers from leading companies involved in all aspects of polyurea. It is the mission of PDA to promote market awareness, understanding and acceptance of polyurea technology through the development of education programs, product standards, safety and environmental end use recommendations. [more info]

Featured Member:
Beijing Oriental Yuhong Waterproof Technology Co., Ltd.

Find a Contractor:
A contractor who successfully completed a PDA Director Spray Course

Upcoming Events:
PDA Webinar, “Light Stable Polyaspartic Coatings for Construction Applications – Chemistry, Attributes, Uses and Case History”
Date: 11/3/2009
[More Info]
PDA 2010 Annual Conference
Date: 4/13/2010
[More Info]

Alliances:
Polyurea Development Association China
Polyurea Development Association Europe

Polyurea Technology is found in a wide variety of industries ranging from raw materials suppliers and distributors, to contractors. Other membership categories include architects, independent sales representatives. Polyurea is defined by the reaction product of an isocyanate component and an or aliphatic in nature. It can be monomer, polymer, or an oligomer, or polyisocyanate, can be made of an amine-
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Progress and Prospect of Spray Polyurea Elastomer Technology in CHINA

Biloxi, MS, USA, 8/3-2005
That Was Polyurea Loves Sports then, This Is Polyurea Loves Olympic Games Now!

Vienna, Austria, 21/11-2008
The 11th PDA Annual Conference

Orlando, FL, 13/4-2010
SSPC 2012 Annual Conference

Tampa, FL, 2/2-2012
PDA---EU 2012 Annual Conference

Polyurea Great Wall

Beijing-Shanghai High Speed Railway
Polyurea Protective Project

Hua Huang & Ping Lu
Qingdao University, Qingdao, CHINA

Istanbul, Turkey
14/11-2012
2009 Japan-China Polyurea Forum
Pakistan Coating Show 2017

Lahore, Jan. 18, 2017

巴基斯坦, 拉合尔
The 8th International Conference on Key Engineering Materials

Osaka, Japan

Mar. 18, 2018
Minsk, Belarus
April 25, 2019
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Polyurea was born in US, developing in CHINA

2006, Beijing National Theater, 60,000 sm
2007, Beijing-Tianjin Intercity Railway, 1,000,000 sm
2008, Beijing Olympic Games, 300,000 sm
2009, Beijing-Shanghai High Speed Railway, 12,000,000 sm
2010, Shanghai Expo, 100,000 sm
Hengshan Reservoir, 3,000 sm
2011, Qingdao Sea Bridge, 3,000 sm
Shenzhen T3 Terminal, 300,000sm
2012, Jinan National Games, 160,000 sm
2012, Jinping Hydropower Dam, 39,000 sm
Polyurea was born in US, developing in CHINA

2013, Hong Kong-Zhuhai-Macau Bridge, 30,000 sm
2014, Zhuhai Changlong Water Park, 400,000, sm
2015, South to North Water Diversion, 100,000 sm
Xiluodu Hydropower Spillway, 1,700, sm
2016, Zhanjiang Dong Island Bridge, 60,000 sm
Shenyang 7 Star Water Park, 60,000 sm
2017, Lanzhou West Dinosaur Park, 20,000, sm
2018, China Marine Rescue Center, 1,000 sm
2019, Nanyang Pumped Storage Power Station, 100,000 sm
2019, The Parade Float of The 70th Anniversary of The Founding of PR.CHINA, 6,000 sm
Basketball Playground of MCRI
550 sm, 2000
Audience Stand of Dalian Polar Zoo
5,000 sm, 2001
Tennis Court of Qingdao University of Technology
450 sm, 2003
Beijing National Theater
60,000 sm, 2006
Beijing-Tianjin Intercity Railway
114.5Km, 1,000,000 sm, 2007
Audience Stand of Beijing 2008 Olympic Games
300,000 sm, 2008
Beijing-Shanghai High Speed Railway
1318Km, 12,000,000 sm, 2009
Beijing-Shanghai High Speed Railway Summer Training at 40°C, 2009
Beijing-Shanghai High Speed Railway
Winter Training at -10°C, 2009
2010, Hengshan Reservoir Dam

3000 sm
Qingdao Bay Bridge, 3,000 sm, 2011
Jinping Hydropower Dam 39,000 sm, 2012
Shenzhen T3 Terminal, 300,000 sm, 2011
Shenzhen T3 Terminal, 300,000 sm, 2011
Jinan National Games, 160,000 sm, 2012
Hong Kong-Zhuhai-Macau Bridge Immersed Tunnel, 30,000 sm, 2013
Hong Kong-Zhuhai-Macau Bridge: Joint of Immersed Tunnel
Hong Kong-Zhuhai-Macau Bridge
Slope Concrete, 36,000 sm, 2013
Hong Kong Zhuhai-Macau Bridge

Slope Concrete
Zhuhai Changlong Water Park
40,000 sm, 2014
South to North Water Diversion,
1277Km, 100,000 sm, 2015
Xiluodu Spillway, 1,700 sm, 2015
Xiluodu Spillway, 1,700 sm, 2015
Shenyang 7 Star Water Park, 60,000 sm 2016
Zhanjiang Dong Island Bridge, 60,000 sm, 2016
Lanzhou West Dinosaur Park
20,000, sm, 2017
Jinjiang Waste Stone Mine Transfer to Refuse Landfill, 15,000 sm, 2018
Nanyang Pumped Storage Power Station
100,000 sm, 2019
The Parade Float of The 70th Anniversary of The Founding of PR.CHINA, 6,000 sm, 2019
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PDA Original Mission

PURE POLYUREA

as defined by the:

www.pda-online.org

TM
In the ensuing years, PDA has expanded its reach to include thick-film high performance elastomers as well as still being the leading voice of polyurea technology. By adding adjacent technologies like urethanes and hybrids that have similar uses, as well as related primers and topcoats, PDA has become a clearinghouse for applicators, formulators, raw material companies and others involved in our industry.
Polyurea Development Association Recognizes the China National Building Waterproof Association
Congratulations on the Registration of Our Polyurea Waterproof Branch Organization and First National Conference
Signing Ceremony of Agreement on Alliance Between PDA and CPA

2010-10-21
China National Waterproofing of Building (CNWB) signed agreement with PDA on Oct. 21, 2010. It established a sub-association called China Polyurea Association (CPA). CPA depends on this agreement and PDA direction changed to promote spray polyurethane and hybrid in China market, especially in Beijing-Shanghai High Speed Railway as well as many projects. Much more seriously, they definite spray polyurea waterproofing as below:
Spray Polyurea Waterproofing Coating is a reaction of part A and B. Part A is aromatic or aliphatic isocyanate or its pre-polymer. Part B is amine mixing compounds.

Note: 1. If part B consisted of amine resin and amine chain extenders, the final product is called pure polyurea.
2. If part B consisted of hydroxy resin and amine chain extenders, the final product is called polyurethane-urea, or semi-polyurea.
Either pure polyurea or polyurethane and hybrid are all called polyurea in China market.

In my opinion, PDA should learn from SSPC and PDA-EU to give polyurea industry a clear definition. And come back to focus on Pure Polyurea.
SSPC Definition

Polyurea: A polyurea coating is based upon an isocyanate component and a resin blend component composed of amine terminated raw materials.

Polyurea/Polyurethane Hybrid: A polyurea/polyurethane hybrid coating is based upon an isocyanate component and a resin blend component composed of blends of amine terminated and hydroxy terminated raw materials.
The cross-linking reaction takes place solely between the isocyanate and the amine-terminated compounds. Hydroxyl groups added through additives or pigment pastes should not have a significant influence on the cross-linking reaction.
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19 Years Outdoor Exposure

35,000 h QUV
Pure vs Fake Polyurea after 9 Years

19 Years Outdoor Exposure
Pure vs Fake Polyurea after 9 Years
Pure vs Fake Polyurea after 9 Years

19 Years Outdoor Exposure
<table>
<thead>
<tr>
<th>Brand</th>
<th>Tensile</th>
<th>Elongation</th>
<th>Tear</th>
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<tbody>
<tr>
<td>SPUA-102</td>
<td>12.2</td>
<td>350</td>
<td>50.6</td>
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<tr>
<td>SPUA-1002</td>
<td>16.5</td>
<td>400</td>
<td>65.4</td>
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<td>QTECH-190</td>
<td>22.8</td>
<td>450</td>
<td>75.5</td>
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<tr>
<td>QTECH-420</td>
<td>35.3</td>
<td>244</td>
<td>135.0</td>
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<td>24.1</td>
<td>162</td>
<td>140.0</td>
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<tr>
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</tr>
<tr>
<td>XXX-3</td>
<td>19.4</td>
<td>351</td>
<td>66.5</td>
</tr>
</tbody>
</table>
Blast Mitigation

100g TNT
Blast Mitigation

200g TNT

FBG201801-05
Blast Mitigation

- Blast Mitigation
- Bullet Proof
- Water Proof
- Bomb Proof
- All Proof!!

1mm
Blast Mitigation
Blast Mitigation
六、应用 —— 2
危险品罐体
运输车防护
Deformation 91 cm
Crack and Leakage

Deformation 4 cm
No leakage
Forklift 17 ton, speed 27Km/h
Impact energy 470,000J

Forklift 17 ton, speed 33Km/h
Impact energy 590,000J
Aliphatic Required

Chain Extenders
Thank You for Your Attention