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Unique Speciality Chemicals

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**“Shubham Karoti Kalyanam Aarogyam Dhanasampada,
Shatrubuddhi Vinashaya Deep Jyotir Namostute”**

We pay our salutation to the light which brings auspiciousness, prosperity, good health, abundance of wealth and destruction of the intellect's enemy.

It is believed that the lamp is the symbol of knowledge, it drives away the darkness of ignorance from the mind and illuminates it with positivity. We salute to such knowledge that brings bliss and prosperity to our lives.

A lamp can be of use to light several lamps to create a multifold increase in the light without losing its strength. Similarly, we share our knowledge and intellect with others from platforms like Society for Surface Protective Coatings India. I extend my best compliments and appreciations to all those who have supported us in making “New Vistas in Surface Engineering and Corrosion” a grand success. It was a memorable event that shall be cherished for times to come and not to forget the big announcement made by our Chairman Prof. A. S. Khanna for allocating his Endowment Fund, for Excellence in Surface Engineering and Corrosion Protection, Promoting Research in Motor Neuron Disease, Spreading Indian Heritage & Culture and last but not the least Primary Education Fund for the underprivileged Children.

To share is to care is the foundation of personal, social and professional advancement. Society for Surface Protective Coatings India as an institution is proud to build a tradition of sharing through our seminars, conferences and news bulletins which enables the members to grow personally and professionally.

I once again urge our members to take advantages of the upcoming workshops and events on time to time basis and mail us your technical papers, articles, and news related to Industry.

Request the members to come forward with your innovative ideas to take this forum ahead. You may log in to our website for updated information on SSPC India and its events, <http://www.sspcindia.org/>

Once again thanking you for your support and cooperation.

Happy New year to one and all.

Neerav Thacker

Unique Speciality Chemicals
Secretary SSPC India.

For Correspondence Contact : Chairman / Secretary : SSPC India Chapter

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Caltech Engineering Services



Abrasion-Tester



Digital Rotary Viscometer



Automatic Film Applicator



Karl Fischer Titration Tester



Automatic Closed Cup Flash Point Tester



Portable pH Meter



Pull off Adhesion Tester



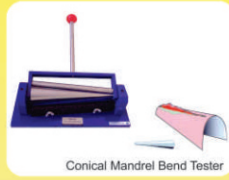
Intelligent Tri-Glossmeter



Linear Rubbing and Alcohol Abraser



Paint Inspection Gauge (P.I.G)



Conical Mandrel Bend Tester



Surface Roughness Tester



Digital Shore Hardness Meter



Digital Adhesion Tester



Cathodic Disbondment Tester



DFT Gauge



Corrosion Meter



Rebar Corrosion Meter



Half Cell



Gloss Meter



Intelligent Gloss Meter



Pantone Formula Guide



Holiday Detector



Paint Adhesion Kit



Cross hatch Cutter Kit



RAL K5 Formula Guide



Rapid Chloride Permeability Tester



Sound-level-meter

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New Organising Committee Member of SSPC India

During AGM Meeting of SSPC India Held at the Acres Club, Chembur on April 21st, 2017, new organizing committee have been formulated keeping members from industries in balanced manner.

The Name of the new organizing committee member are

Chairman	
Prof. A. S. Khanna	IIT Bombay, Mumbai
Vice Chairman	
Mr. Amrit Rekhi	Kansai Nerolac Paints Ltd., Mumbai
Mr. S. Ravichandran	Berger Paints, Kolkata
Mr. Jaideep Sen	Asian Paints PPG .Pvt. Ltd., Mumbai
Mr. Dharendra Singh	Akzo Nobel Coatings India, Bangalore
Secretary	
Mr. Neerav Thacker	Unique Speciality Chemicals, Mumbai
Treasurer	
Mr. K. J. Aiyengar	Sherwin Williams, Mumbai
Members	
Mr. N. H. Jani	Ajanta Surface Treatment Pvt. Ltd.
Mr. H.S. Shankar	Clean Coat
Mr. Ajay Sagar	J. K. Surface Coating
Mr. P. Hari Kumar	Carboline India
Mr. Sanjay Chowdhury	Shalimar Paints
Mr. Ishan Raveshia	Voxco Pigments and Chemicals Pvt. Ltd
Mr. Harris Koilpillai	Voxco Pigments and Chemicals Pvt. Ltd
Mr. Santosh Kumar	OCS Services
Mr. Ramashankar Mishra - Asian Paints	Asian Paints
Mr. Hemant Moghe	Kansai Nerolac Paints Ltd.
Mr. Praveen Mahajaan	Berger Paints
Mr. Sujit Sinha	Grauer & Weil (India)
Mr. Prasad S Talvelkar	Hempel Paints (India)
Mr. S. Mahadevan	Metcon Coatings & Chemicals
Mr. Vijay Bhamburkar	Shivshakti Paints
Mr. Kishore Jere	Kansai Nerolac Paints Ltd., Pune
Dr. Nirav I. Jamnapara	FCIPT, Gujarat
Prof. A. Subrahmanyam	IIT Madras
Dr. Ramanuj Narayan	IICT, Hyderabad
Dr. B.B. Jha	CSIR-CGCRI, kolkata
Dr. Swarnendu Bikas Kar	Behr Process Paints India Pvt. Ltd.
Mr. Manoj Patil	Demech Chemicals
Mr. Shovan Das	Jotun Paints
Mr. Ajay Sunke	ASSETReifurb Engineers

New Vistas In Surface Engineering & Corrosion Protection Strategies

By Dr. Narayan Rajagoplan, 26th Ph.D Student



While it had been a year of planning and sharing of ideas for a reunion, it all came together on September 15-16, 2017, when most of Prof. Khanna's Ph.D students all around the world eagerly gathered on the occasion of his 65th birthday. We wanted to have all the graduated Ph.D. students under one roof to celebrate this special and momentous day. It was awe-inspiring sight to see fellow academicians, industry partners, students, friends and family reunite for the celebration. Prof. Khanna has played the role of a guide, mentor and a helpful

teacher for all of them throughout his extensive and long illustrious career.

The event was organized by his current batch of students held at Hotel Rodas, Hiranandani, Powai. The magnificent affair was aired in the form of a One and a half day conference program named as **International Conference on New Vistas in Surface Engineering and Corrosion Protection Strategies**. The



talks and presentation consisted of eminent personalities from different areas of research, faculties and people from top industrial sectors enthralled the audience with their recent development and informative speeches. This session also proved to be a highly interactive one for his students as they were given an opportunity to present their PhD journeys. It was heart-rending to hear about their learnings and how each one of them have been moulded into under Prof Khanna's supervision throughout their course.

The first session of the symposium covered the area of research entitled



Surface Engineering Past & Future. The second session for the day was Industrial Coatings for Corrosion Protection. And the final session was on Smart Coatings. All the talks were refreshing, crisp and interactive.

The end of first day of the event was an ice breaker party - an informal birthday celebration starting with an impromptu game for the students. Each student was given a word that describes them the best. Few examples of recognitions were the most talkative, the naughtiest, etc. It is games like these that not only uplift the evening but also added to the memory lanes.



A gold-plated medal having photos of all 27 students and prof Khanna was then felicitated to all his students.

The evening was on name of Prof. Khanna with the cake cutting ceremony in presence of his family, his close friends, eminent personalities from academics and industry partners. It was obviously an emotional ride with his son and daughter-in-law present, along with so many well-wishers, but it was our immense pleasure to honour a person of that stature with a grand and well deserved commemoration.



During the evening gala function, Prof. Khanna made a very touching announcement. He announced the formation of Endowment Fund on Surface Engineering & Corrosion Protection from the superannuation fund he received on his retirement. He constituted several Awards, details of which is given in the table below.

The morning session on the final day was Oil & Gas sector. And the last session for the program culminated with miscellaneous topics and thereafter with a grand lunch. Prof. Khanna gave his concluding remarks showing some examples of the research he had been doing so far in his career. The number of students and collaborators was astonishing and it goes to show us young aspiring students what can be achieved through hard work and collaboration with people from all over the world.

Details of the awards constituted under the fund*

1. Awards for Surface Engineering & Corrosion Protection

Sr. No.	Award Name	Selection process	Award Money
1	Annual Lecture on Surface Engg. New research, process or Technology	Write up selected by a panel of experts	Rs. 1 Lakh
2	Annual Lecture on Corrosion, New research, process or Technology	--- do ---	Rs. 1 lakh
3	Best Award to Teaching Faculty in Corrosion & Surface Engg.	Based upon the methodology of Teaching Course Content & Style	Rs. 51,000
4	4 Ph.d Awards to be given to Ph.D students after second year of their completion of work	Based upon their output of two years and final outcome in the form of a new product, formulation, exciting result	Rs. 25,000 each
5	4 M.Tech Awards	Based upon their excellent results of M.Tech and their future plans especially if pursuing Ph.D or industry Job.	Rs. 20,000 each
6	2 Awards for Young Scientists from Research Institutes/Industrial Research Houses	Based upon a thorough research analysis	Rs. 31,000 each
2.	Sushil Khanna Award for Medical Research in Motor Neuron Disease		Rs. 1 lakh
3.	L. R. Khanna Award on any individual/NGO promoting Indian Culture, values, and training 01		Rs. 1 lakh
4.	School Kids (10) – Primary Education Merit-Cum-one time Scholarship		Rs. 1 lakh
	Total		Rs. 7.93 lakhs
	Administrative expenses		Rs. 2.07 lakhs
	Total		Rs. 10 lakhs

*procedure for selection of the awardees is mentioned in Annexure-2 of this document * The*

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4 Day Certification Course On Paint Coating Inspection & Quality Control (Level -1&2) On Nov. 1-4, 2017 Conducted By SSPC India at IIT Bombay.



Next 4 Day Certification Course (Level 1 & 2) On Paint Coating Inspection & Quality Control Scheduled On January 2018

COURSE CONTENT:

LEVEL1:

1. Fundamental knowledge of Corrosion 2. Basic of paint coatings and chemistry of various kinds of paints, resins, and formulations, their relation to corrosion protection. 3. Conventional and advanced coating systems. 4. Surface preparation methods with latest standards and specification. 5. Paint Application techniques and best application practice mantras. 6. Reasons for Paint Failure and its Mechanism. 7. Paint repair and rehabilitation – maintenance Coatings. 8. How to write paint specifications. 9. Safety aspects in paint coating application

Practical Training: One day practical training on Surface preparation, Paint application & Paint testing.

LEVEL2:

1. Integrity Management & Coatings for

Underground Pipelines. 2. Coatings for concrete structures. 3. Corrosion Problems in Chemical Industries. 4. Coatings for Offshore structures, refineries & Chemical Plants

COURSE FEE : For level 1: [3 days]:Rs 23,000+18% GST. This includes Course Kit, Lecture notes, Tea/Coffee and Lunch during Sessions.

For level 1+2 [4 days]: Rs. 26,000 + 18% GST. This includes Course Kit, Lecture notes, Tea/Coffee and Lunch during Sessions.

ACCOMODATION : Participants are requested to make their own arrangements for accommodation.

REGISTRATION: Please book your seat by registering with sspcindia@gmail.com (022-2166 1249) at the earliest along with the Cheque/Draft in favor of "SSPC INDIA". There are limited seats (30) and would be allotted on the first come first basis.

DONACARBO – CARBON FIBERS

Mr. Neerav Thacker

Unique Speciality Chemicals, Mumbai

Donacarbo is the very unique coal tar pitch based carbon fiber only produced by Osaka Gas Chemicals Co., Ltd. The curled structure of DONACARBO is applicable in a wide variety of applications such as heat insulation, reinforcement for thermoplastic, thermosetting resin compounds, cement concrete, electric conduction, and so on. To meet with customer's needs, DONACARBO is available in various forms; needling-punch felt, chopped fiber, milled fiber, paper, and so on.

[Features of DONACARBO]

- Surpass in temperature resistance and oxidation resistance
- Very low coefficient of thermal expansion
- Light weight and High strength
- Electrical conductive (also available in low electrical conductive SL-Grade)
- Have excellent chemical resistance
- **High wear resistance**
- **Self-lubrication**
- Due to the curled-form, fibers intertwine in the composites, and there are many node points. Therefore, some of the final products are bulky, and can be expected high restitution.
- Biocompatible and have affinity for human body

RED: Advantage of GPCF (Pitch based carbon fiber for general purpose)

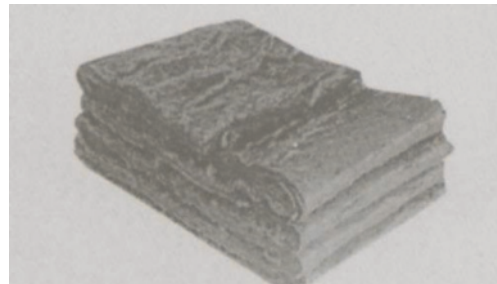
BLUE: Advantages of DONACARBO

[Various form to meet a wide range of application]

Chart 1

[Original Mat]

DONACARBO Mat is the blanket-shaped product that piled up DONACARBO original fiber.



Typical fiber properties DONACARBO

Fiber grade/ product code		SL-grade	S-grade	S-grade	SC-grade	SG-grade
Diameter (μm)		N/A	S-210	S-310	N/A	N/A
Tensile modulus (GPa)		18	40	35	N/A	N/A
Elongation (%)		2.2	2.0	1.8	N/A	N/A
Element (mass %)	C	93.2	97.1	97.1	99.1	99.6
	H	2.4	0.3	0.3	0.2	0.2
	N	0.9	0.5	0.5	0.3	0.1
Apparent density (g/cm ³) ^{*1}		1.6	1.6	1.6	1.6	1.6
Volume resistivity (Ω·cm)		1x10 ¹⁰ P	9x10 ¹⁰ P	9x10 ¹⁰ P	4x10 ¹⁰ P	3x10 ¹⁰ P
Oxidation starting point (°C) ^{*2}		470	520	520	630	730
Maximum moisture absorption		6	9	9	Nil	Nil

* Tensile strength : > 588MPa (S-210, S-310)

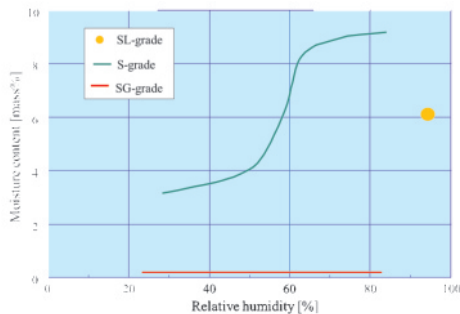
*1 Measurement method ; liquid displacement method (n-butanol)

*2 The temperature corresponds to the 5% weight loss measured by TG-DTA with air flow of 100ml/min., and ramp rate of 5 $\bar{0}$ /min.

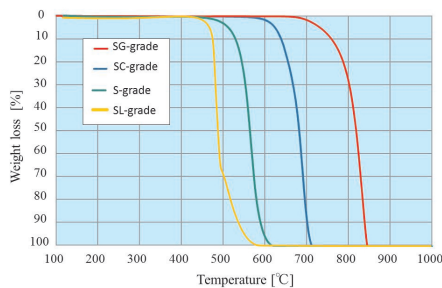
Chemical Stability

Chemicals	Time hou	Concentration %	Temperature °C	Stability	
				S-grade	SG-grade
HCl	150	35	60	O	O
	96	36	70	O	N/A
	312	36	70	O	N/A
HNO ₃	150	30	RT	△	O
	48	61	70	△	N/A
	120	61	70	X	N/A
	150	61	60	X	O
CrO ₃	150	35	RT	O	O
	150	50	RT	O	O
NaOH	150	50	40	O	O
HF	2	6	RT	O	N/A

Moisture adsorption (Measured example)



Oxidation resistance (Measured example)



Measured by TG-GTA with air flow of 100ml/min., and ramp rate of 5°C/min.

[Product Code]

SG-241...Product code of Original fiber, Felt, Chopped fiber, Milled fiber, and Paper

SG...Basic quality

SL: Carbon grade; lightly carbonized compared to S-grade

S: Carbon grade

SC: Graphite grade; lightly graphitized compared to SG-grade (Code name 「SG-244A」 was used as SC grade previously and now it's renamed to 「SC-244」)

SG : Graphite grade

LFP: High bulk density felt

2...Diameter

2 = 13μm 3 = 18μm

4...Product name

1: Original fiber · 2: Felt · 3: Chopped fiber · 4: Milled fiber · 5: Paper

1...Other identification marks (Arabic numerals and/or alphabets)

DCL-0750N...Product code of DCL (Dona Cool Light)

07...Bulk density (kg/m³): 7 · 10 · 12

50...Thickness (mm): 15 ~ 80

N...The table below shows only the main product.

	DONACARBO fiber grade	Other ingredients	Treatment of a width direction edge	Flame resistant sheet
None	SL	Polyester fiber	Slit cutting	Non
S	SL	Polyester fiber	Slit cutting	One side sheeted
N	SL	Polyester fiber	Slit cutting	One side sheeted

DON-1*-**** ...Product code of Rigid insulation is shown in another Donacarbo information.

1...Surface treatment of rigid insulation

1: Untreated

2: Coated

3: Graphite sheeted

4: Cloth lining

5: T-coat

6: T-layer

E02-****...Product code of Carbon sheet

[DONACARBO FELT]

It is processed by needle-punching the original fiber homogeneously. Unlike paper shaped products, it's made by

100% carbon fiber without using any binders. It is available in different thickness and bulk densities.

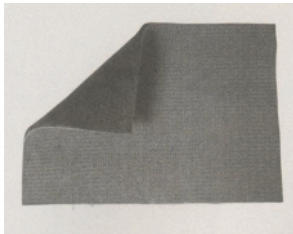
Specifications

Product code	Fiber Grade	Thickness (mm)	Unit mass (g/m ²)	Bulk-density (kg/m ³)
S-223	S	7	300	43
S-221	S	10	500	50
S-222	S	20	1000	50
SG-222	SG			
S-224	S	16	1000	63
LFP-105	S	5	500	100
LFP-110	S	10	500	100
LFP-205	SG	5	1000	100
LFP-210	SG	10	1000	100

Fiber Grade, S: Carbonized, SG: Graphitized

Applications

- High temperature applications: Insulation, Fire proof material
- Filter materials: High temperature, or chemical inertness
- Antistatic



[DONACARBO CHOP (Chopped fiber)]

Cutting the original staple fiber into 3mm ~10mm is called **DONACARBO CHOP**, which is untreated on the surface. It can be used in complex with powder, granules, liquid, resin, and rubber, while improving the mechanical property, conductivity, heat resistance, corrosion resistance, or abrasion resistance. The main property of its form improves the conductivity in the complex higher in adding small amount in comparison with the straight carbon fiber.

Specifications

Product code	Fiber grade	Diameter (μm)	Average length* (mm)	Aspect ratio
S-231	S	13	3.3	250
S-232	S	13	5.5	420
S-331	S	18	3.3	180
S-332	S	18	5.5	310

*The values are obtained by using a weighted arithmetic mean by weighting the fiber length. The values are not guaranteed.

Applications

- Additives in thermosetting resin
- For reinforcement
- Improvement of sliding performance

- Improvement of thermal resistance
- Corrosion resistance
- Additives in cement and mortar reinforcement
- Substitute material for asbestos
- For carbon/carbon composite fabrication
- Antistatic application



[DONACARBO MILLED (Milled fiber)]

DONACARBO MILLED is powder-like form, which is made by cutting the original fiber into less than 3 mm. It is completely dispersed to various materials, such as powder, pellet, liquid, and viscous resins, and show good electroconductivity, chemical resistance, and anti-corrosion. To meet a wide variety of applications, various fiber lengths are available in our product line.

Specifications

Product code	Fiber grade	Diameter (μm)	Average length* (mm)	Aspect ratio
S-2404N	S	13	0.04	3
S-249K	S	13	0.11	8
S-241	S	13	0.13	10
S-242	S	13	0.37	28
S-243	S	13	0.50	38
S-244	S	13	0.70	54
S-246	S	13	1.0	77
S-247	S	13	1.5	115
S-343	S	18	0.70	39
S-344	S	18	0.96	53
SC-2415	SC	13	0.20	15
SC-244	SC	13	0.70	54
SG-2404N	SG	13	0.04	3
SG-249	SG	13	0.11	8
SG-241	SG	13	0.13	10

Fiber Grade / S: Carbonized SC: Lightly graphitized SG: Graphitized

*The values of S-2404N and SG-2404N are obtained by using an arithmetic mean, and those of others are by a weighted arithmetic mean by weighting the fiber length. The values are not guaranteed.

Applications

- Additives in thermo-plastic and thermosetting resin
- For reinforcement
- Improvement of sliding performance
- Electrical properties
- Improvement thermal resistance
- Corrosion resistance
- Additives in conductive paints
- Friction materials for clutches and brakes



[DONACARBO PAPER]

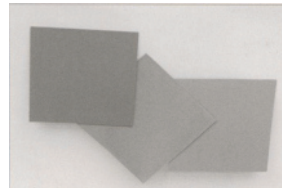
DONACARBO PAPER made by wet process has excellent electro conductivity and anti-corrosion properties. To meet a wide variety of applications, several products are available in different thickness, bulk densities and kinds of binders. It is bulky and is easily impregnated with matrix materials such as resins, aqueous solution, and dispersive agents. Dry processed **DONACARBO PAPER** is more bulky compared to wet process type. It is the most suitable product for filter and bedding. (Dry processed type is custom-made upon request.)

Specifications (Wet processed type)

Product code	Fiber grade	Diameter (μm)	Thickness (mm)	Unit mass (g/m ²)	Binder
S-251	S	13	1,3	50	Epoxy
S-252	S	13	3.2	100	Epoxy
S-253	S	13	0.65	30	Epoxy + PVA
S-255AH	S	13	2.4	75	Epoxy
S-259P	S	13	0.50	30	Polyester

Applications

- Antistatic sheet, tile, mat
- Fuel cell electrode
- Filter
- Lining for FRP
- Bedding



[DCL (Light weight acoustic insulation)]

DCL (DONA COOL LIGHT) is the nonflammable and ultra light insulation, having excellent restitution property against compression. It is favorably used as acoustic insulation and thermal insulation of train cars, due to its excellent performance such as nonflammability and durability for vibration.

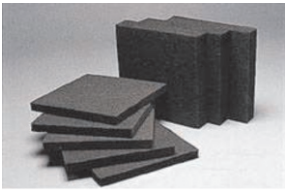
Applications

Acoustic insulation for train car, automobile, vessel and aircraft/ Incombustible cushion/ Acoustic insulation for construction/ Acoustic shielding wall for high way/ Air conditioner filter/ Bedding



Features of DCL

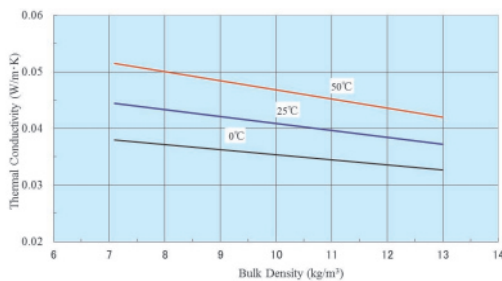
- Nonflammable
- Durable to vibration.
- 1.6 times lighter than general glass fiber insulation
- DCL can be processed readily and is less likely to cause inflammation on human skins. DCL can be cut easily into whatever shape you like.
- Be customized into desired shape
- Excellent restitution property against compression



Performance

Items	Value	Method
Test for flammability	Nonflammable	Method of Japan Railway Rolling Stock & Machinery Association
Bulk density	7 ~ 12 kg/m ³	
Thickness	15 ~ 80 mm	
Reverberant sound absorption coefficient	0.67 at 3000 Hz	ASTM E1050 (measured with no back air layer) Test piece: 7 kg/m ³ ; 50mm (DCL-0750)

Thermal conductivity (Measured example)



Sample : DCL-0750
Method : ASTM-C518
ISO 8301

[DONACARBO RIGID INSULATION]

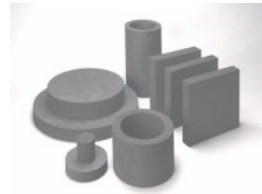
In recent years, with rapid technological development of the electronics industry and other industries, the importance of industrial furnaces has been increasing

even further. Heat treatment of metals and firing of fine ceramics are performed at high temperatures, thus requiring superior insulation materials.

DONACARBO RIGID INSULATION, made from DONACARBO FELT, is impregnated with high carbon content resin, molded into the required shapes, hardened, carbonized, and graphitized.

Applications

- Sintering furnace for carbon, ceramic, hard metal
- Single crystal growth furnace for silicon
- Vacuum deposition furnace for aluminum
- HIP furnace for hard metal
- Brazing furnace for silver, copper, aluminum



Item	Grade Code ¹⁾ Type ²⁾ (*)	STD DON- ⁰ 0-*		DSR DON- ⁰ 0*1-		
		R	H	2R (Board) 3R (Cylinder)	2H (Board) 3H (Cylinder)	2L (Board) 3L (Cylinder)
Nominal bulk-density (g/cm ³)		0.13	0.16	0.10 (2R) 0.12 (3R)	0.12 (2H) 0.14 (3H)	0.07 (2L) 0.07 (3L)
Standard dimensions (mm)		1000W x 1500L x (30 / 40 / 50)t				
Maximum dimensions (mm) ³⁾	Board	1300W (up to 1600 with interlocking work and adhesion) x 2000L x 250t				
	Cylinder	φ1600 x 1200H x 250t				
	Disc	φ1300 (up to 1650 with interlocking work and adhesion) x 250t				
Surface treatment	Contents	Untreated	Dona-coated	Graphite sheeted	Cloth lining	T-coated (anti SiO ₂ gas)

1) Please refer to the other technical information about product code.

2) R: Standard, H: High thermal insulation, L: Low heat capacity

3) Please contact us for the maximum size.

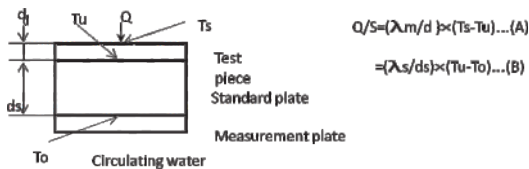
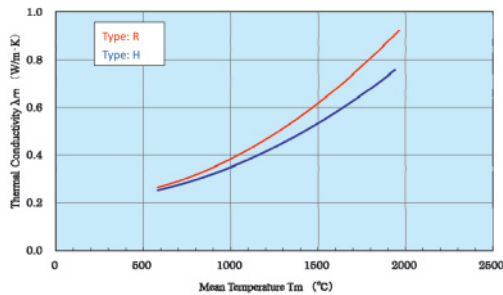
? Impurities (Measured example) Unit: mass ppm

Ash	B	Na	Mg	Al	Si	P	K	Ca
20	1.5	0.08	0.08	1.3	0.7	< 1	< 0.1	5.3
Ti	V	Cr	Mn	Fe	Ni	Cu	Zn	
0.72	2.0	< 0.07	< 0.08	0.28	< 0.1	< 0.08	< 0.1	

? Performance (Measured example)

Item	Unit	DON- ⁰ 0-0-R	DON- ⁰ 0-0-H
Flexural strength (Thickness direction)	MPa	0.63	0.99
Compressive stress (Thickness direction) 【5%ressor】	MPa	0.13	0.18
Tensile strength	MPa	0.04	0.06
Coefficient of thermal expansion 【T ₁ ~1000°C】	10 ⁻⁶ /K	2.2	2.2

Thermal conductivity (Measured example, DON-1000)



$$Q/S = (\lambda_m/d) \times (T_s - T_u) \dots (A)$$

$$= (\lambda_s/d_s) \times (T_u - T_o) \dots (B)$$

1. Method: Standard plate method
2. Condition

- (1) $S = 0.00785 \text{ m}^2$ (heat flux area: diameter of measurement plate is 100 mm)
- (2) $d_s = 100 \text{ mm}$ $d = 30 \text{ mm}$
- (3) Q_w (amount of circulation water) : 40L/Hr
- (4) λ_s (Thermal conductivity of the standard plate) is known (depend on temperature).
- (5) Atmosphere: in nitrogen

3. Measured value

ΔT_w (difference of the circulation water temperature between inlet and outlet), T_s, T_o

4. Calculation

- (1) $Q/S = Q_w \times \Delta T_w / S$
- (2) Assume T_u and get λ_s from the value $(T_u + T_o/2)$ that is the mean temperature of the standard plate. Get T_u from (B)

formula. Continued the trials until assumed and calculated T_u are in agreement.

- (3) Get λ_m (thermal conductivity of test piece) from (A) formula. And T_m (mean temperature of test piece) = $(T_s + T_u)/2$.

[CARBON SHEET]

• **DONACARBO CARBON SHEET**, made from DONACARBO PAPER, is impregnated with high carbon content resin, molded, carbonized, and graphitized. Due to the appropriate formation, fluid can easily pass through the sheet.

Applications

- Heat protector
- Fuel cells electrode

Comparison of properties (Measured example)

Items	Unit	Made from	Made from
Gas permeability	$\text{cm}^3/\text{s} \cdot \text{MPa}$	50.7	25.3
Electric conductivity	Thickness direction	$10^3 \Omega \cdot \text{cm}$	8
	Plane direction		2
Thermal conductivity	Thickness direction	$\text{W/m} \cdot \text{K}$	2.9
	Plane direction		4.7

Test piece: Bulk density- 0.51 g/cm^3 / Thickness- 1.2 mm / Length- 7.6 mm / Diameter- 13 mm (DONACARBO), $14.5 \mu\text{m}$

(Linear fiber). Test piece specification is different from DONACARBO CARBON SHEET.

Specification (Measured example)

	Unit	Value	Remark
Thickness	mm	0.23	
Unit mass	g/m^2	94	
Flexural strength	MPa	2	
Flexural modulus	GPa	3	
Electric conductivity	$\Omega \cdot \text{cm}$	0.02	Measurement device: Loresta-EP MCP-T360 (Mitsubishi Chemical Corp.) Type of sensor: ASP-probe
	Ω/\square	0.9	
Carbon content	mass%	95>	Distance of sensor: 5mm

Shape / size

Carbon sheet can be produced up to 1 square meter. Please contact us for shape and/or size.

An Appeal

Next Issue of SSPC India News letter is in November, 2017. Articles, news item, new products, new R&D result and company profiles are invited.

Dead line: 15th Oct., 2017

Sr. No.	Details	For 1 Issue	For 4 Issues
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Various Surfaces which we use in day to day domestic & industrial usages are

1. Metal 2. Concrete 3. Wood 4. Plastic

These surfaces invariably get attacked by environment abuses and deteriorate with time under continuous usage. The consequences of deterioration of these surfaces are many times dire and life threatening.

Metal

Metal deteriorates in the form of corrosion and effects of corrosion are very serious.

a. Thickness reduction- Can lead to Bridge collapse, Pipeline burst spoiling green field , Non functioning of equipments and many more

b. Incur huge costs of repair, rectification & replacement

c. Looses aesthetical value of component

Concrete

Concrete erodes and loses its surface properties/ strength resulting into

1. Corrosion of rebar structures resulting into weakening of column/beam strength

2. Formation of cracks and De bonding of plaster result into heavy leakages & seepages

Wood

Now a days wood is extensively used in building farm houses, out door furniture etc. Continuous exposure of UV Radiations & rains deteriorate wood surfaces and call for frequent repairs & replacement

Plastics

Plastic is now integral part of our life. It is extensively used in automobile, construction, chemical, infrastructure industries and are exposed to all sort of attacks causing complete deterioration beyond repair.

For each surfaces, there are various ways to control deterioration. But the most effective, convenient & economical is by way of using high performance protective coatings.

To achieve desired performance level, the

coating has to fulfill following properties

Performance Properties against Environmental Abuses like

- ▲ Moisture
- ▲ Sunlight (Ultra Violet Radiation)
- ▲ Saline Atmosphere
- ▲ Chemicals (Acid, Alkali, Chlorine, Ammonia etc.)
- ▲ Temperature Variations & Climatic Changes
- ▲ High Temperature
- ▲ Scratch & Abrasion

Type of coatings presently in use

1. Epoxy 2. Polyurethane 3. Polyurea
4. Acrylics 5. Emulsions 6. Powder Coatings

By limitations of their chemical structure, above coatings does not fulfill all the desired properties and hence can not be used on their own General Coating System

Constraints/limitations of present system

- Does not possess all the desired properties. Hence combination of different paint system is suggested like Primer + Barrier coat+ Middle coat+ Top coats
- Needs longer time for curing/drying and prolongs the process of painting operation resulting into delay in deliveries / dispatches.
- Involves Complicated painting process like Weighing & Mixing of Two components, Pot Life, Curing Cycles & painting procedural flaw
- Performance of paint largely depends of human skills
- Huge wastages due to shorter pot life of Two pack systems
- Difficult to Touch up & repair. Calls for complete stripping for recoating.
- Use of toxic ingredients & solvents makes it unsafe during application

Challenges doesn't stop here...

The paint industry globally has evolved from the basic purpose of providing protection for surfaces to incorporate innovations such as improved environmentally "green" solutions primarily aimed at protecting the surrounding environment as well and delivering the longest sustained value for consumers, society and the environment

Sustainability spans the full spectrum: from low-VOC inputs to highperformance outputs, with Life Cycle Assessments (LCAs) to have a smaller impact on environment and a greater impact on our daily lives.

So additional & major challenge is to produce Sustainable coatings

Requirements of Coatings to be eligible for Sustainable Solutions

- ❖ Responsible use of resources
- ❖ Low VOC
- ❖ Enhanced Life Cycle
- ❖ Enhanced Functionality
- ❖ Safe Disposal, Recovery & Recyclability

Summarizing challenges & limitations

1. Difficult Application: Two Pack Systems, Pot Life,
2. Longer painting duration: Delays in deliveries & dispatches
3. Success depends on Human skills
4. Environmental regulations restricting use of coatings: Does not qualify for Green Coating category

SK Formulations India Pvt. Ltd, a research based organization with in-depth study of present coating systems has developed sustainable coating solution addressing all constraints & limitations of existing systems based on

patented "Grafted Copolymer Technology"

To achieve entire spectrum of performance properties, the said technology comprises of combination of Four Monomers & thus synergizing properties of these four specialty polymers contributing to the desired performance.

Moreover, arrangement of polymer chains (morphology) is so designed that

it will form a branched, net like structure rather than random arrangement by grafting

polymer chains in desired structure.

The coatings formulated with above polymer molecule thus satisfy all required performance properties like

More interestingly, they are designed to make the coating application very simple & operational friendly. The features include

- Single pack System: No need of hardener or mixing operation
- Quick Drying at Ambient temperature without oven baking
- Application with conventional application tools like Brush, Roller, Airless & Air Assisted spray Gun
- Application on all substrates like Mild Steel, Stainless Steel, Copper, Aluminum, Galvanized steel & Concrete,
- Different finishes possible: Glossy, Semi Glossy, Matt, Textured.

Green Aspects

- Enhances life with High Performance Properties
- Saves Energy with Ambient Temperature Curing Properties
- All performance properties at lower DFT of 80 to 100 microns --

Cost Effective

- Controlled VOC
- ROHS Compliant – Free from Toxic & Hazardous elements

With formulation of basic polymer molecule, SK Formulations has developed

range of unique coatings namely

- Anticorrosion Protective Coatings
- Heat Insulation Energy Saving Coatings
- Room Temperature Galvanizing Coatings
- High Temperature Coatings

1. Anticorrosion Coating Systems

ANTICOR SK-03 – General Purpose Anticorrosion Coatings

ANTICOR –FR – Fire Resistant Anticorrosion Coatings

ANTICOR- MRN – Self Antifouling Marine Coatings



2. Heat Insulation energy Saving Coatings

- High Solar Reflectivity Index & Emissivity
- Saves Electricity consumption by up to 35% by reducing the heat load on air conditioning units.
- Prevents Leakages of concrete structure and Corrosion of metal roofs during rainy season.
- Reduces evaporation losses from storage tanks of volatile liquids



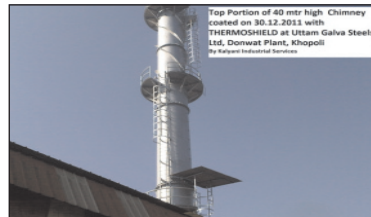
3. Cold Galvanizing Coating

- Replacement of Hot Dip Galvanizing
- On Site & Off Site Application
- Cost Saving by > 40%
- Colour Spectrum Possible



4. High Temperature Coatings

- High Temperature Resistance
- Stable up to 600°C.
- Excellent Resistance to Corrosion



Offerings from SK Coatings

- Life Enhancement
- Energy Savings
- Environmental Friendly
- Operational Friendly
- Time saving
- Cost Effective

About SK Formulations

Three Wings of operation

- Research & Development
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Instrumentation & Technologies

Development of Pigment Manufacturing in India to Meet Industrial Challenge

Mr. Ishan Raveshia

VOXCO Pigments and Chemicals Pvt. Ltd.

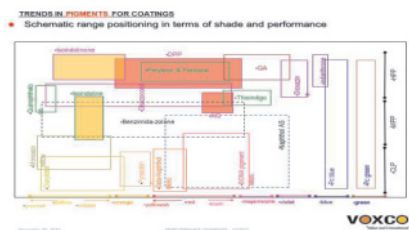
Especially for High Performance Pigments -

India is today one of the reputed producer of pigments in the world. These pigments are widely used for coatings, inks and masterbatch industries and unlike their end application industry generate sizable international revenue due to its exports. Pigments imparts not only the aesthetic properties but also give protection to various substrate thereby extending the life cycle of the end products.

In relation to the total manufacturing pigment capacities in the world, China is the largest producer of commodity products whereas Germany is the biggest producer of High Performance Pigments. India in the last two decades is slowly and steadily taking a key position and emerging as a strong producer of both commodity as well as high performance pigment for the world markets. Though, if we divide the colour scheme for generalizing, India is strong in the manufacturing of Blues and Greens, whereas China is strong in their production of Reds and Yellow pigments.

The development of various pigments commenced almost two centuries earlier but since the last three decades, new development has drastically reduced due to huge investment requirement vis-à-vis to the already available products having very good properties and are available in different hues and colours. Though, the last three decades most of the pigment development has been made:

1. In their coating technology which gives excellent properties to the specific end applications.



2. In their manufacturing processes, which brings in the processing efficiency giving better return on investments.

There are a wide range of Inorganic and Organic Pigments for different end application; whereby

for a pigment the cost is directly related to its properties and durability. Higher the durability better the prices.

Herewith appended is the schematic range positioning of different colours (except white and black) verses chemistries in terms of shade and performance for better understanding.

India, today is one of the top three pigment producing countries in the world. This is because it has the requisite technical skills, understanding of different chemistries and knowledge of processes and instrumentation. This combination not only brings quality consistency but also improves the overall efficiency in the production processes thereby making the products price competitive in the global markets.

The pigment manufacturing requires:

1. Technical Knowledge with high level of understanding in chemistry in relation to crystallisation processes and coating technology to have high quality, consistent and performance end products.
2. The human skill and knowledge in fluid mechanics, plant designing, stoichiometry and process control.
3. Ample availability of portable water, human resources, power availability and good logistics with government support for common CETP sites.

The advantages of pigment development and manufacturing in India are:

1. The pigments unlike coatings have excellent export potential and can generate good international revenue.

Moreover, almost all the neighbouring countries are users of these products and do not have the capability to produce them.

2. These products have an unending application life due to its wide usage in all areas of life.

3. India today is one of the fastest growing economy in the world and itself has a huge potential requirement of these products for coatings, inks and plastic markets.



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Researchers: New Fire-Resistive Coating Developed

Officials say new research out of Nanyang Technological University, Singapore, has produced a fire-resistant coating that also provides corrosion protection and requires a less intensive application process than more traditional alternatives. The team, working in conjunction with national industrial developer JTC, led by Assistant Professor Aravind Dasari, from the School of Materials Science and Engineering, and Professor Tan Kang Hai, from the School of Civil and Environmental Engineering, created FiroShield as a commercially viable alternative to protect reinforced concrete against underground fires.

Fire Protection : With the ability to function aesthetically like normal paint, FiroShield is a three-in-one system that can be applied to bare steel without prior sandblasting. The coating meets the two-hour window that allows for those in a building to evacuate in case there is a fire, and the same functionality has been tested on reinforced concrete and laminated timber. According to NTU, to achieve the two-hour fire rating, FiroShield is applied in five layers to be both corrosion and fire resistant. The coating also retained much of its efficiency when it underwent weathering testing in the lab, which included moisture and ultraviolet rays. The groups says conventional coating performance dropped by 75 percent when tested under such conditions, but FiroShield's performance only dropped 2 percent. "In a fire, our coating forms a compact charred layer that acts as a protective barrier against the heat," said Professor Dasari, who is also a Principal Investigator at the NTU-JTC Industrial Infrastructure Innovation Centre. "While typical fire coatings will also form a charred layer, those are thick and foam-like, which can fall off easily and leave the steel exposed to the fire. What we aimed at was an innovative coat that works differently from conventional intumescent coatings and can stick to the steel surface for as long as possible under high temperatures, and yet has durability and weather resistance under normal conditions without a need for a top coat of paint."

Coating Composition : FiroShield's base material is composed of synthetic resins, which are combined with other common chemicals—one of which is endothermic—to give the coating its fire- and corrosion-resistant properties. The endothermic element absorbs heat, causing a chemical reaction that makes the coating adhere firmly to the surface. Pigments can also be added to the paint, providing both the appearance of normal paint and increased commercial value. For the next step in the development process, FiroShield will be sent to the U.K. for certification, which is slated for completion in April 2018. The certification includes a load-bearing fire test that facilities in Singapore do not have the capacity to complete.

Afterward, the coating will be applied on steel structures within the future JTC Logistics Hub. Other plans include the development of a another coating for the construction and building industry, and the research team working with relevant agencies to make FiroShield available on a wider scale

Source : <http://www.durabilityanddesign.com>, November 6, 2017

First 3-D Printed Concrete Bridge Opens

Engineers in the Netherlands say they've completed the world's first 3-D-printed reinforced concrete bridge, a span for cyclists that's now open in the town of Gemert. Created at Eindhoven University of Technology, the bridge—26 feet long and about 11 feet wide—was tested with a load of five tons, far more loading than it will be subject to day-to-day handling bicycle traffic. The breakthrough creation, the university says, has provided engineers a chance to better understand the concrete 3-D printing process, and will help them to build larger spans in the future. The Gemert project is part of a larger road project undertaken by contractor BAM Infra. EUT professor Theo Salet, whose specialty is concrete construction, headed up the printing operation. The EUT team created a 1:2 scale prototype in the spring, then commenced 3-D printing of the real thing in June.

Future of 3-D Printing: While 3-D printed structures—created by machines that deposit layers of material such as concrete—have grown in popularity in recent years, one breakthrough of the Dutch bridge project is the insertion of steel reinforcing cables, important in concrete load-bearing structures, during the printing process. The researchers note that the 3-D printing process uses less concrete than traditional concrete construction, because deposition by layer allows the builders to add concrete only where it's needed, while traditional concrete pours fill the formwork with concrete completely. The process also eliminates the waste of formwork that would be discarded at the end of a construction project.

The engineers say the deposition process has the potential to speed the bridge-building process up, possibly by as much as threefold. Larger bridges could be built by assembling smaller parts created by printers.

Source : <http://www.durabilityanddesign.com>, November 2, 2017



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Date	Event	Venue	Organizer	Contact Details
November 09-11, 2017	Automotive Engineering Show	Chennai Trade Centre, Chennai, India	Messe Frankfurt	T : (022) 61445900 E : info@messefrankfurt.com W: aes-show.com
November 15-17, 2017	CHINACOAT 2017	China Import and Export Fair Pazhou Complex, Guangzhou, China	Chinacoat Exhibition Ltd.	T : (+86) 20-89139130 E : info@cantonfair.org.cn W: cantonfair.org.cn/en/
November 16-17, 2017	13th India Surface Coating Show 2017 Northern Region	India Habitat Centre, New Delhi, India	CII	E : shubra.jyoti@cii.in W: Cii.in
December 14 – 16, 2017	ADMAT2017	Kovalam, Kerla		T : 9447583674 E : skymat2017@gmail.com W: www.admat2017.org
January 15-18, 2018	STEELFAB 2018	Expo Centre, Sharjah, UAE	Expo Centre	T : (+971) 65770000 E : info@expo-centre.ae W: Steelfabme.com
February 21-26, 2018	19th International Symposium on Eco-Materials Processing and Design(ISEPD) and Surface Protective Coatings Expo	Jaipur Marriott Hotel, Jaipur, India	ISEPD 2018	T : E : info@isepd2018.org W: isepd2018.org
March 08-10, 2018	PAINTINDIA 2018	Bombay Exhibition Centre, Mumbai, India		T : (91-22) 24306319 E : chaitali.davangeri@nm-india.com W: paintindia.in
September 27 – 29, 2018	International Conference On Materials Technology & Advanced Materials	CIDCO EXPO Centre Navi Mumbai	ASM International EXPO	T : +91-22-28378309 E : asmi@vsnl.com W:



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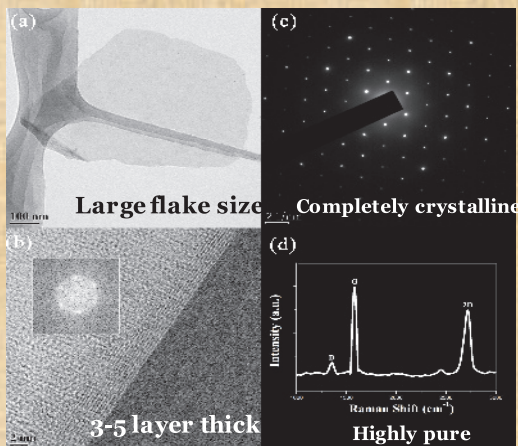
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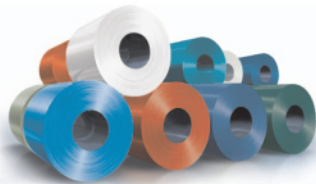
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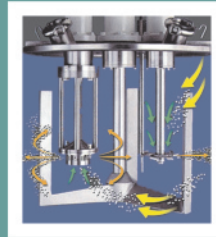
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