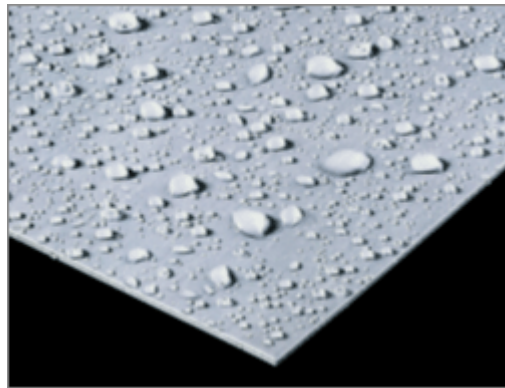


# **RHEINZINK COMPOSITE PANEL**

## **TECHNICAL DATA**



**DONGSHIN ENGINEERING CORPORATION**

## CONTENTS

1. SPECIFICATION OF PRODUCT
2. CHARACTERISTICS OF MATERIAL
3. MERITS OF MATERIAL
4. MATERIAL PROPERTIES
5. SPECIFICATIONS OF RHEINZINK COMPOSITE  
PANEL
6. INSTALLATION EXAMPLE OF RZ COMPOSITE PANEL
7. HANDLING MANUAL
8. WARRANTY
9. JOB REFERENCES

# 1. SPECIFICATION OF RHEINZINK Sheet

## 1.1. Product description :

RHEINZINK Preweathered Pro(Outer Skin)

## 1.2. Product Specification : Titanium Alloyed Zinc

Preweathered Type with Pickling process 99.995% Pure Electrolytic High Grade Zinc Alloyed with 1% Titanium and 1% Copper.

## 1.3. Color : preweathered pro", bluegray

"Preweathering", which is done in-house, ensures the immediate blue-grey surface look of the RHEINZINK® material. This new surface treatment protects the material during transportation and storage and processing traces (fingerprints). It is processed in rollforming-profiling machines without the use of any oil. RHEINZINK® "preweathered pro", bluegray is recommended for aesthetically ambitious roofing and façade surfaces, copings and roof drainage systems. If at all possible, facades should always be designed using RHEINZINK® "preweathered pro".

Note : For Composite panel, only this colored skin can be applied due to back skin's treatment for PE adhesive.

## 1.4. Original of RHEINZINK Sheet : Germany

RHEINZINK® was founded in 1966 by the Grillo, Stolberger Zink companies and the United German Metalworks ("Vereinigte Deutschen Metallwerke"); production began in 1969. The head office is located in Datteln, on the outskirts of the Ruhr district. As the first zinc manufacturer in Europe, RHEINZINK® replaced the conventional pack-rolling process with a new innovative technology – a continuous broadband casting rolling line.

# 2. CHARACTERISTICS OF MATERIAL

## 2.1. What is RHEINZINK

The basis of RHEINZINK® alloy is electrolytic high-grade fine zinc according to DIN EN 1179, with a 99.995% degree of purity. Added to this are precisely quantified amounts of titanium and copper. RHEINZINK® products are certified according to DIN ISO 9001: 1994 and are subjected to voluntary inspection by TÜV Rheinland/Berlin-Brandenburg according to the stringent Quality Zinc Criteria. RHEINZINK® is titanium zinc according to DIN EN 988.

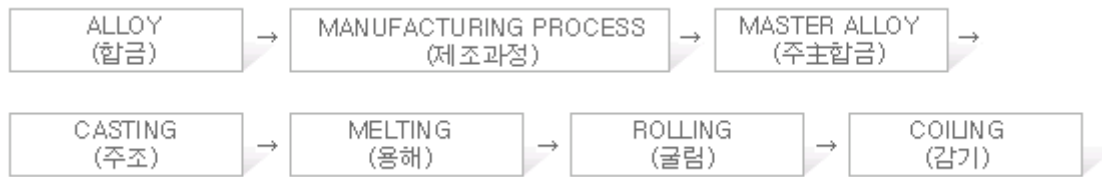
## 2.2. RHEINZINK as Construction Material :

RHEINZINK has good atmospheric resistance. First of all the zinc surface reacts with the oxygen from the air forming zinc oxide. By the interaction of water(rain, humidity) zinc hydroxide is then formed, which by reaction with carbon dioxide in the air is transformed into a dense, firmly adhering and water-insoluble coating of basic zinc carbonate(patina). This protective layer is responsible for the high corrosion resistance of zinc.

Sulphur dioxide, which under unfavourable conditions causes atmospheric pollution, impairs the protective coating of the metal when there is relative air humidity over 70%.

The protective layer, when worn or damaged, repairs itself by using zinc in relation to the wear. There are varying degrees of pollution in local atmospheres and thus varying intensity of atmospheric corrosion.

### 2.3. Material Production



## 3. MERITS OF MATERIAL

### 3.1. Permanent Lifetime

Thanks for the zinc itself protective layer, PATINA forming and special alloy, it keeps high corrosion resistance and abrasion resistance. It depends on different pollution by location, Rheinzink applied materials can have approximately 100 -120 years of lifetime for roof and approximately 150 years of lifetime for wall.

### 3.2. Excellent Color

This blue-gray partina harmonizes well with the natural colors of other building materials, such as concrete, brick, wood, and glass.

### 3.3. Various Design application and Workability

RHEINZINK have excellent durability and strength, but, it also have high flexibility and restitution and provide free fabrication and various installation which required by architects and designer' own intends.

### 3.4. Environment Friendly product

As a natural product, RHEINZINK is environment friendly product and available to recycle 100%.

### 3.5. Proved Excellent product

Since 40 years, RHEINZINK have been loved by Europe and all overseas architect and users with proving the excellent merit of product.

### 3.6. Easy Maintenance

After installation, it does not need to manage almost nothing and the cleaning is very easy, too.

## 4. MATERIAL PROPERTIES

### 4.1. Production Standard of RHEINZINK(DIN EN 1179 988)

FINE ZINC	Over Purity 99.995%
COPPER	0.08% < Cu < 0.17%
TITANIUM	0.07% < Ti < 0.12%

### 4.2. Physical Properties

Specific Density	7.2g/cm <sup>3</sup>
Thermal Conductivity	109w/mk
Electrical Conductivity	17m/Ωmm <sup>2</sup>
Melting Point	418°C
Recrystallisation Limit	300°C
Linear Thermal Expansion	0.022mm/m°C
Minimum Elasticity Modulus	80,000N/mm <sup>2</sup>

### 4.3. Mechanical Properties

Extension Coefficient 0.2 limit Rp02	100N/mm <sup>2</sup>
Tensile Strength Rm	150N/mm <sup>2</sup>
Breaking Extension A10	40%
Time Creep Limit(Creep resistance) for 1% expansion / p.a.-61/10000	50N/mm <sup>2</sup>
Brinell Hardness HB 1.25/2.5/3.0	40
Vickers Hardness HV 1/15	40

### 4.4. Technological Properties

Bend Test number for bending radius 4 x metal thickness	10
Folding Test – 180°with bend radius at 20°C(±2°) without tearing and bending up, without breading	0

### 4.5. Table of Weight

0.7mm	5.04 kg/m <sup>2</sup>
0.8mm	5.76 kg/m <sup>2</sup>
1.0mm	7.20 kg/m <sup>2</sup>
1.2mm	8.64 kg/m <sup>2</sup>
1.5mm	10.80 kg/m <sup>2</sup>

## 5. SPECIFICATIONS OF RHEINZINK COMPOSITE PANEL

### 5.1. Product Description

- 5.1.1. Rheinzink Composite Panel's standard composition is focusing on the face named "Rheinzink preweathered finish"
- 5.1.2. Rheinzink weathers to a pleasant blue-grey patina which harmonizes well with most materials
- 5.1.3. The self-healing patina will age gracefully, increasing the structure's attractiveness and offering the benefits of low maintenance.
- 5.1.4. Rheinzink has a minimum life expectancy or approx. 80 to 100 years.
- 5.1.5. Rheinzink composite panels are ideally suited to both new and retrofit construction.

### 5.2. Standard Composition

- 5.2.1. Face : 0.5mm Rheinzink preweathered
- 5.2.2. Core : 2.0mm & 3.0mm PE(LDPE) / Mineral Wool
- 5.2.3. Base : 0.5mm Aluminium[AA3003(H14)]

### 5.3. Panel Thickness(mm) & Weight(kg/m<sup>2</sup>)

- 5.3.1. 4mm(3mm: also possible)
- 5.3.2. 8.07kg/m<sup>2</sup> (on 4mm basis) & 7.14kg/m<sup>2</sup>(3mm)

### 5.4. Panel Size (mm)

- 5.4.1. Width : 1,000mm(& 800mm) standard size
- 5.4.2. Length : max. 4500(approx. 3000 is recommendable)

### 5.5. Test Report of Rheinzink Composite Panel

Test Item	Unit	Value	Method
Squareness(1,000mm length)	mm	0.25	KS F 4737:2002
Tensile Strength	N/mm <sup>2</sup>	52	KS B 0802:1998
Elongation	%	39	KS B 0802:1998
Flexural Strength	N/mm <sup>2</sup>	108.2	KS F 4737:2002
Peel Adhesive Load	N/25mm	274.2	KS F 4737:2002



Korea Testing and Research Institute for Chemical Industry  
88-2, Youngdeungpo-dong 8-ga, Youngdeungpo-gu, Seoul, Korea  
TEL : +82-2-2164-0011 FAX : +82-2-2634-1008

# TEST REPORT

(Additional Copy)

Report No : TAK-006860  
Name of President : J R KIM  
Name of Company : MIJIE INDUSTRIAL CO., LTD.  
Client's Address : #(7F Opus Bldg), 296-10, Seokchon-Dong, Songpa-Ku, Seoul, Korea.  
Receipt Date : Apr.29.2005 Test Date : May.12.2005  
Sample Name : RZ Complex panel 4T(two sides 0.5t / W=1000mm)

## TEST RESULTS

TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
Flatness(On 1000mm)	mm		0.25	KS F 4737 : 2002
Tensile Strength	N/mm <sup>2</sup>		52	KS F 4737 : 2002(*)
Elongation	%		39	KS F 4737 : 2002(*)
Flexural Strength	N/mm <sup>2</sup>		108.2	KS F 4737 : 2002
Peel Adhesive Load	N/25mm		274.2	KS F 4737 : 2002

\* Mean Values of n=3

USAGE : QUALITY CONTROL

NOTE : 1. The test result of this test report only limited in the sample and sample name presented by the client and do not guarantee the all products of the client.  
2. This test report shall be used only within the purpose of its defined usage and also shall not be used for public relation, advertisement and suit without the KOTRIC's written approval.

Testing Personnel : Kim Hyun-Sup (82-32-5709-686)

May. 12. 2005

DIRECTOR GENERAL, KOREA TESTING & RESEARCH INSTITUTE FOR CHEMICAL INDUSTRY

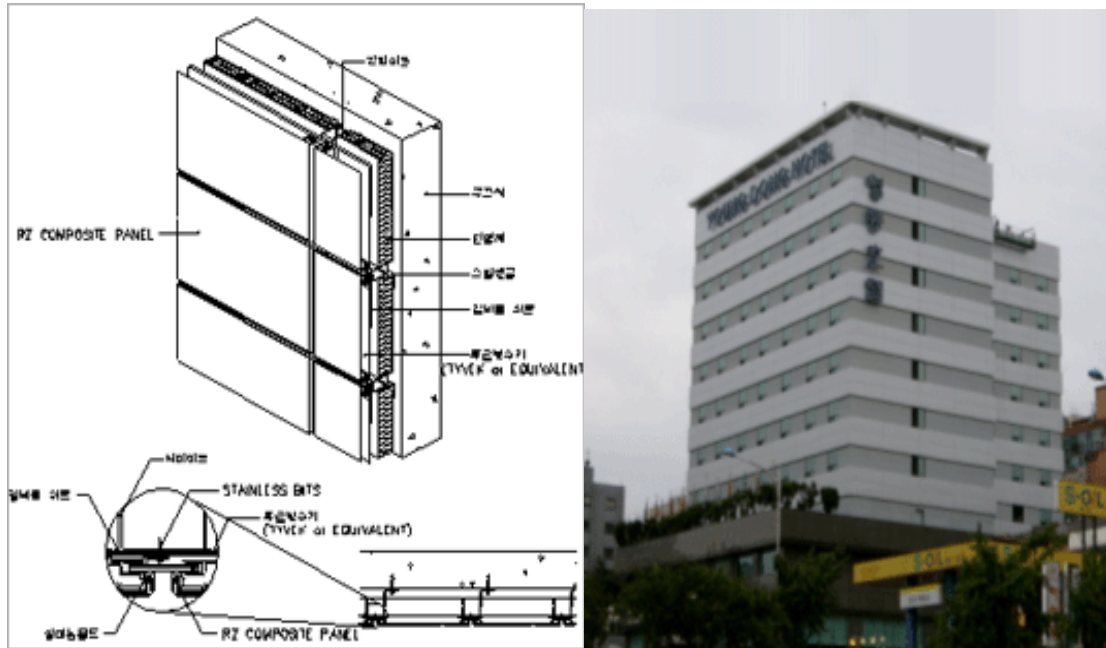
1 of Total 1 Page(s)

*Bo Won . Lee*

## 6. INSTALLATION EXAMPLE OF RZ COMPOSITE PANEL

6.1. The installation methods shall be decided by architerct and normally can be recommended as Open Joint Type, Caulking Type, gasket Type or designer's own specific method.

6.2. The below method is good for the flatness and waterproofing and for showing harmony with other construction materials with RHENZINK's own natural coloring and high dignity. Also, it can be recommended for New construction and renovation.





## 7. Handling Manual

### A. Quality management of Installation

1. In order to maintain the Installation quality of Rheinzink Composite Panel, it is recommended to be installed by installation company who have excellent experiences in same materials or similar metal panels works.
2. It shall not be installed under the inclement weather condition such as rainy and severe cold season.
3. The proper exterior temperature for panel fabrication is 5°C.
4. In case Silicone sealant are used for panel joint finishing and other joint, non-pollution type's silicone sealant of metal usage shall be used.
5. Installer shall wear the rubber coated glove during the fabrication, transportation, installation in order to prevent being stained with sweat and finger print.
6. Rheinzink Composite Panel shall not be exposed it to rain or snow through the stocking in warehouse which can shut out rain or snow. Also, In case of Protection film pasted product, if possible, the protection film shall be removed after installation as soon as possible. Since if any rain or humidity penetrate into film inside, there may occur White Rust on them, it shall be paid attention to this and especially, care full storage before installation is more important.

### B. Periodic Maintenance

1. Periodic inspection shall be carried out by supervisor or managing staff of installation special company.
2. Inspection of two times per a year is recommended and any damages or joint part on outlook shall be watched. Especially, this inspection shall be surely to carry out in case of natural disaster such as of big typhoon, flood.
3. During the inspection, any alien substance on panel skin shall be removed.

4. Especially, alien substance having copper shall be surely to be removed.
5. Any damaged panels shall be replaced or repaired as soon as it is found.
6. The replacement or repairing work shall be conducted by the supervisor of Installation special company.

### C. Cleaning Works

Rheinzink Composite Panel is not a product which needs Cleaning works, because there cannot be rusted due to the oxidation protection layer of Rheinzink itself. However, in case of the pollution cleaning by alien substances, it shall be accordance with follow instruction.

1. Non-acid soap (Dove or Ivory brand) with water are recommended to be used for cleaning. This case, piece of soft cloth shall be used and it shall be rinse out one more with clean water.
2. In case of water cleaning, it shall be carried out by Top to Bottom direction.
3. Removing Stains or Printing
  - 1) To rub the stained part with a piece of soft cloth which touched non-acid stainless cleaner, paint thinner, or WD-40.
  - 2) In case of deep stains, steel brush is needed to remove. Through this scrapping the stain off the panel skin, silver white color will be seen. This is the pure Zink layer under oxidation protection layer which will be changed as same color as surrounding color through natural oxidation processing. It takes 2 – 5 years to be same color according to conditions.
4. When some spare panels are stored for maintenance usage, those shall be stored inside warehouse which are well ventilated.

## 8. WARRANTY

### Warranty for RZ Composite Panel

TO :  
FROM :  
PRODUCT:  
Project :

Mijie(M) and Howsol(H) hereby warrants to Customer that RZ'C.P. supplied by M and H to Customer pursuant to orders placed by Customer and accepted by M and H are, at the time of shipment. Free from defects which would cause the said panels to delaminate to the extent that unevenness of the surface of said panels is visually recognizable by a normal person.

This warranty is not applicable to defects of any other sorts or distortion resulting after shipment caused by any reasons including, without limitation, extreme cases and the unnormal environmental conditions. Depreciation, wear and tear, building subsidence, acts of God, defective workmanship performed by others, including installation workmanship. Defects in the building structure or other forces, conditions or circumstances unrelated to the quality of the material at the date of shipment, or failure of a building owner occupant to do normal maintenance.

M and H agree to repair or replace, at its sole cost and discretion, any RZ C,P, of such defects as shall have been proven by Customer to the satisfaction of M and H not to be in compliance with the aforesaid warranty. The above obligation of M and H is expressly conditioned upon.

( i ) receipt by M and H of notification in writing from Customer of any claimed non-compliance with this warranty within thirty(30days after such non-compliance first comes to the attention of Customer and within ten(10) years after the date of each shipment:

( ii )full compliance by Customer with instructions given by M and H whether in written or oral form, and normal practices of the design, construction and real property industries and of the, industry to which Customer belongs with respect to handling, delivering, storing, processing, treating, installing and maintaining such RZ C.P. (“instruction and Practice”)”and

( iii )provision by customer to its employees. Contractors and customers with relevant parts of instruction and practice. Customer's failure to satisfy any of the above three conditions shall be construed as the waiver by Customer of any right it may have to enforce this warranty.

His warranty and remedy is exclusive and there are no other warranties, written or oral, expressed or implied and including any warranty of merchantability or fitness for a particular purpose. In no event shall M and H be liable for any incidental or consequential losses or damages(including, but not limited to economic loss or loss of profits) suffered or incurred by customer as a result of or in connection with any breach of this warranty by M and H except in the case of cross negligence or willfulness of Mijie and Howsol.

All notices given under or pursuant to this warranty shall be in writing in English and sent by Registered or Certified Mail. Postage prepaid, return receipt requested to :

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JOB EXPERIENCES FOR RHENZINK SHEET & COMPOSITE PANEL			
NO.	PROJECT NAME	QUANTITY	Location
1	Worldcup Soccer Main Stadium	12,000 m2	Seoul
2	Super Highway Telecommunication Center(IT World)	7,200 m2	Gwachon
3	Seoul Science Exhibition Hall	8,000 m2	Seoul
4	Yellow Soil Musium	1,000 m2	Gwangju
5	World Famous Building Musium	600 m2	Bucheon
6	HaeInSa Temple Relics Exhibition Hall	3,500 m2	Habcheon
7	Baekbum Memorial Hall	4,000 m2	Seoul
8	Kimhae Daesungdong Ancient Tombs Exhibition Hall	2,500 m2	Kimhae
9	Jeju Island Ancient Relics Exhibition Hall	1,400 m2	Jeju
10	Gwangju Ceramic EXPO	3,600 m2	Gwangju
11	Gwangju National Music Institute	2,000 m2	Gwangju
12	DMC Public Relationship Hall	4,000 m2	Seoul
13	Sewage Facility PR Hall	1,000 m2	Yongsan
14	Citizen Safety personal Experiences Hall	3,400 m2	Seoul
15	Land End Observatory	1,500 m2	Haenam
16	International Culture EXPO Hitech Film Hall	1,500 m2	Gyeongju
17	Pocheon Culture Hall	3,200 m2	Pocheon
18	Sungnam Youth Culture Center	1,900 m2	Sungnam
19	Namyangju Gymnasium	4,000 m2	Namyangju
20	Yansung market Renovation	2,000 m2	Muju
21	Naengchun Horse Racing ticket Arena	3,800 m2	Taegu
22	Middle-Small Enterprise Support Center	3,000 m2	Suwon
23	East Pokpo Telephone Office	1,500 m2	Pokpo
24	Sangdong Telephone Office	700 m2	Taegu
25	Jindo Korea Telecom Corp. Building	600 m2	Jindo
26	Incheon Airport Tollgate	1,000 m2	Incheon
27	Keumgang Highway Resting Place	1,600 m2	Okcheon
28	Palmido Island Lighthouse	700 m2	Incheon
29	Poyidong Catholic Church	1,400 m2	Seoul
30	Huam Church	3,000 m2	Seoul
31	Sanggye First Church	1,500 m2	Seoul
32	Nonsan St. Paul Sanatorium	2,000 m2	Nonsan
33	Gyungsang University Library	2,200 m2	Jinju
34	Myongju University Hospital	600 m2	Seoul
35	Myongju College Literature Hall	1,000 m2	Seoul

<b>NO.</b>	<b>PROJECT NAME</b>	<b>QUANTITY</b>	<b>Location</b>
36	Gangwon University Complex Hall	400 m2	Chuncheon
37	Taegu Teacher's College Domitory	1,300 m2	Taegu
38	Animation High School	2,000 m2	Ulsan
39	Seojin High School	3,500 m2	Jinju
40	Shinga Middle School	1,200 m2	Gwangju
41	Jangsan Middle School	1,000 m2	Gyongsan
42	Changshin Elementary School	3,500 m2	Seoul
43	Hwasoon Elementary School	4,100 m2	Hwasoon
44	Sagok Elementary School	1,400 m2	Gumi
45	Hotel Youngdong Renovation	1,500 m2	Seoul
46	G-21 Gallery	600 m2	Paju
47	Yangjae Auto Gallery	400 m2	Seoul
48	Changbi Company HQ Office Building	700 m2	Paju
49	Mr. Chow Restaurant Nonhyun Branch	500 m2	Seoul
50	Mokdong Dr. Chung's Obstetrics	3,000 m2	Seoul
51	Willtech Bundang HQ Office Building	3,300 m2	Sungnam
52	Dongyang Cement	1,700 m2	Seoul
53	Hyowon Group Traning Center	2,500 m2	Asan
54	Shinsadong Seowon Building	1,200 m2	Seoul
55	Hannamdong UN Village	2,000 m2	Seoul
56	Samsungdong Symphony House	1,500 m2	Seoul
57	Daenong Villart	1,600 m2	Seoul
58	Chungdamdong Villa	800 m2	Seoul
59	Bangbaedong DAUM Apartment	1,100 m2	Seoul
60	Donghae House	800 m2	Donghae
61	Oryudong Motel	600 m2	Seoul
62	Royal Hawaii Motel	1,000 m2	Gyongsan
63	Jinju Shopping Mall	800 m2	Jinju
64	Houses & Shopping mart	10,000 m2	
65	Jeju Summit Reception Hall	1,200 m2	Jeju
66	Consulate General in Shanghai	3,000 m2	China
67	Macau Entertainment Center	17,000 m2	Macau
68	Singapore Woodland Sport Center	12,000 m2	Singapore
69	Scott Church	6,800 m2	Australia
70	Scott Church add1	550 m2	Australia
70	AGL North Sydney Project	550 m2	Australia

70	IBIS Hotel	1,621 m2	Australia
71	IBIS Hotel Additional	248 m2	Australia
72	185 Mcquarie Street	58 m2	Australia
73	Dixon Street	160 m2	Australia
74	AGL North Sydney Project	550 m2	Australia
75	Bullingham	1,467 m2	UK
76	Pal Mall Manchester	569 m2	UK