

KUKJE ST

KUKJE SAFETY TECHNOLOGY

KUKJE ST

Deck Road & WPC

Guardrail - Technical Specification

Contents

1. Company Profile

2. Guardrail

- Material : PosMAC
- Product
- Product Lead Time
- Vehicle Impact Test

3. Deck Road & WPC

- Deck Road Concept
- Installation
- Feature
- Component
- WPC



Guardrail - Technical Specification

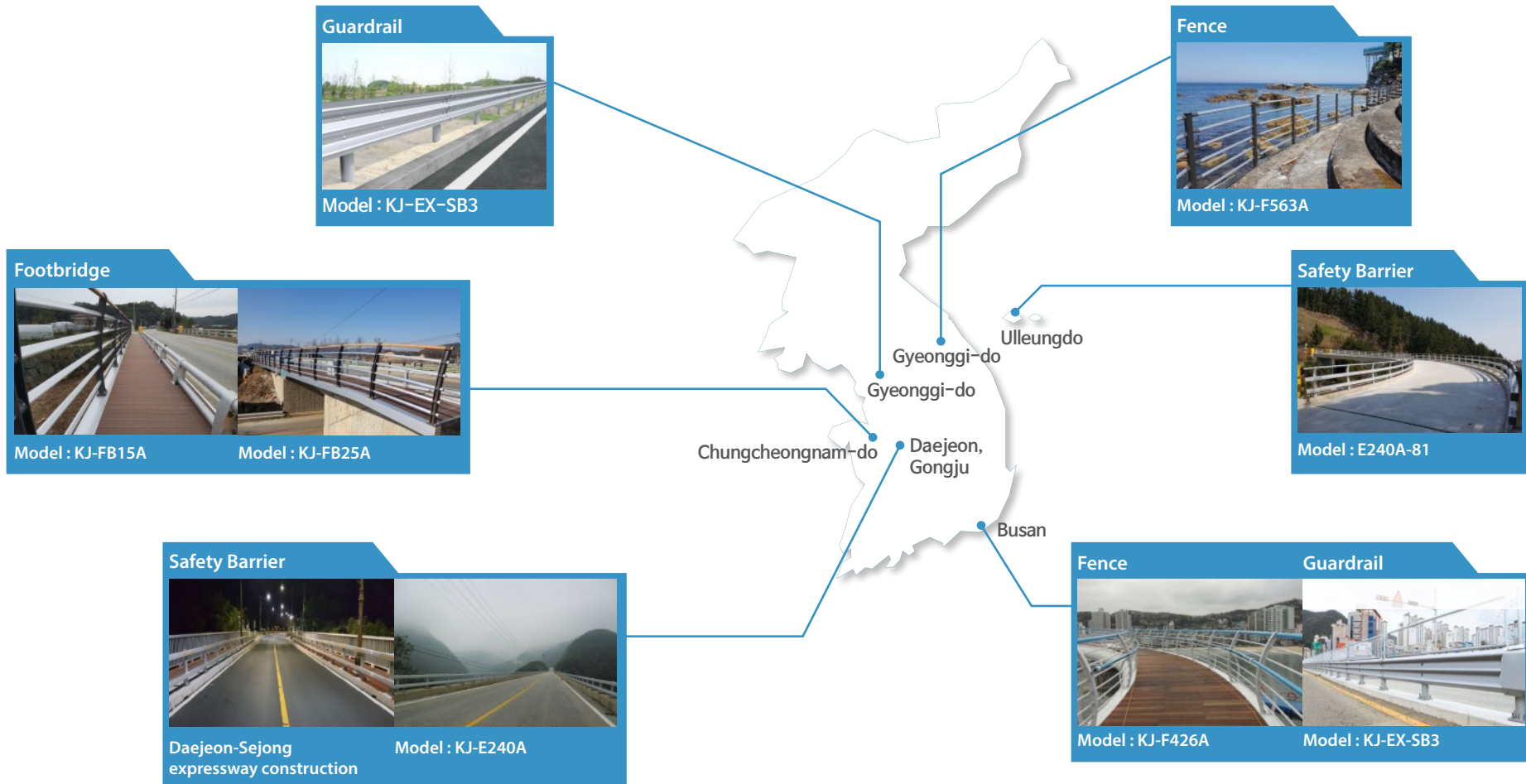
Deck Road & WPC

Company Overview

- ▲ **Company name** KUKJE ST Co., Ltd.
- ▲ **Established** 01, July, 2000
- ▲ **C.E.O** Kyong-Bai, Lee
- ▲ **Business Area** Road safety and bridge facilities
(Guardrail, Footbridge, Fence and Safety Barrier)
- ▲ **Address** 81, Dongsansaneopdanji-ro, Yeonmu-eup, Nonsan-si,
Chungcheongnam-do, Republic of Korea



Project References



Other major projects

Bike Lane Project in Haman

Bike Lane Project in Saemangeum

Imdong Bridge Project in Yeongju

Model : F488M / Qty : 4,036m

Model : DF502A / Qty : 4,547m

Model : E220A / Qty : 1,618m

Company History



1990.08

Established KUKJE Nonferrous Metals

2007.09

Selected as technology innovative SME, INNO-BIZ

2015.02

Selected as Outstanding Product (Footbridge) by the Public Procurement Service

2018.01.04

Relocated to Nonsan plant in Chungnam
Changed the company name to KUKJE ST

2001.01

Obtained KS certification, ISO-9001 certification

2008.08

Registered as a company specializing in industrial design

2017.04

Selected as strong SME for Youth Evolution



Why KUKJE ST?

Excellent Service

Providing total-solution service as fulfilled research, development, design, production and construction.

High Performance of Production Capacity

Available to produce

- Guardrail : 4km per day / 1,000km a year
- Fence and Barrier : 800m per day / 250km a year
- Aluminum Melting : 4ton per day / 1,200ton a year

Technical Innovation

- Established a technology research center for continuous R&D and satisfying customers' needs.
- Acquired around 120 intellectual property rights

Reliable Partner

- Awarded as Best Mid-sized Innovative Company.
- Awarded as Intellectual Property Management Star company



Certificate KS



Certificate of patent



Certificate ISO



Certificate Q-mark



GUARDRAIL

Material Specification

PosMAC 400 (SGMH295Y) same as EN-S280GD

Tensile Strength : 431 N/mm²

Yield Strength : 354 N/mm²

Elongation : 35%

BEYOND ASIAN HUB, TOWARD GLOBAL WORLD

TEST REPORT

96, Gyoyukwon-ro, Gwacheon-si, Gyeonggi-do, 13810, Korea TEL 82-42-931-8511 FAX 82-42-931-8514

Report No : TAK-2019-196079 Receipt Date : 2019.11.13.
Representative : LEE, KYONG BAI Test Completion Date : 2019.11.18.
Company name : KUKJE ST
Address : 81 DONGSANSANEOPDANUI-RO, YEONMU-EUP, NONSAN, CHUNGNAM, 33010, REPUBLIC OF KOREA
Sample name : Metal Specimen (SGMH295Y(T3.1))

Test Results				
TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
Tensile Strength	N/mm ²	-	431	KS B 0802 : 2003 (Test Specimen No.5)
Yield Strength	N/mm ²	-	354	KS B 0802 : 2003 (Test Specimen No.5)
Elongation	%	-	35	KS B 0802 : 2003 (Test Specimen No.5)
C	%	-	0.11	KS D 1652 : 2007
Si	%	-	0.02	KS D 1652 : 2007
Mn	%	-	0.48	KS D 1652 : 2007
P	%	-	0.008	KS D 1652 : 2007
S	%	-	0.001	KS D 1652 : 2007

- Usage of Report : QUALITY CONTROL

Note : 1. The test results of this test report are only limited in to the samples and sample names provided by the client and do not guarantee the quality of all products of the client. You Can check website (www.ktr.or.kr) or QR code to verify the authenticity of the certificate.
2. This test report shall be used only within the purpose of its defined usage and shall not be used for public relation, advertisement and lawsuit.
3. This test report is only valid when printed on KTR original report paper with hologram and when re-issued by KTR. The copy and the electronic file of the test report are only for reference.

The above testing certificate is not related to KS Q ISO/IEC 17025 and Korea Laboratory Accreditation Scheme.

Cheon Narae
Prepared by Cheon Narae
Tel : 02-2092-3636

Moon Suk Park
Reviewed by Moon Suk Park
Tel : 1577-0091 (AFRS ID-48)

2019.11.18

Korea Testing & Research Institute

President *Kwon Oh-jung*

Page : 1 of 1

KTR KOREA TESTING & RESEARCH INSTITUTE KTR-QP-P09-F01-05000

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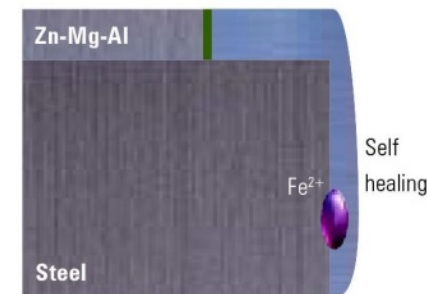
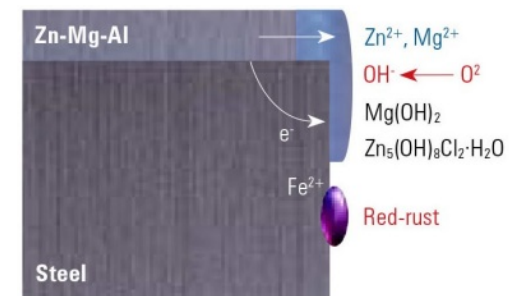
Surface Treatment

PosMAC







- A ternary alloy coated steel (Zn-3%Mg-2.5%AL) with high corrosion resistance

PosMAC Self Healing

- The upper coating layer can be dissolved to cover the cross-section the growth of a stable corrosion product. However red-rust can be found in the already exposed steel plate, but fortunately, the film of the corrosion products covers the cross-section to prevent corrosion.



Comparison to Hot Dip Galvanized Steel and Batch – Hot Dip Galvanized Steel in corrosion resistance of flat surfaces

SST	PosMAC	HGI	Batch-GI
480 Hr			
2400 Hr			

Salt Spray Test (SST),
[ISO 9227, JIS Z2371, ASTM B117] 5%NaCl, 35°C

BEYOND ASIAN HUB, TOWARD GLOBAL WORLD

TEST REPORT

우 51430 경상남도 창원시 의창구 용지로 248, 1층 103호(용호동, TEL (055)285-7505 FAX (055)285-7590
경남발전연구원)
상적서번호: TBO-000048
대 표 자: 권오준
업 체 명: (재)포항산업과학연구원
주 소: 경상북도 포항시 남구 청암로 67 (효자동)
시 료 명: 금속시험편(POSMAC, GI, ZN 후도금 등)

접 수 일 자: 2015년 08월 13일
시험완료일자: 2016년 02월 25일

시험 결과

시험항목	단위	시험구분	결과치	시험방법
Cyclic corrosion test(375 Cycle)	-	PosMAC 11종	KTR-TBO-48 보고서 참조	KS D ISO 14993:2003
Cyclic corrosion test(375 Cycle)	-	HGI 3종	KTR-TBO-48 보고서 참조	KS D ISO 14993:2003
Cyclic corrosion test(375 Cycle)	-	Batch-GI 1종	KTR-TBO-48 보고서 참조	KS D ISO 14993:2003
Salt spray test(3 000 h)	-	PosMAC 11종	KTR-TBO-48 보고서 참조	ASTM B117-11
Salt spray test(3 000 h)	-	HGI 3종	KTR-TBO-48 보고서 참조	ASTM B117-11
Salt spray test(3 000 h)	-	Batch-GI 1종	KTR-TBO-48 보고서 참조	ASTM B117-11

** 첨부자료: 보고서 4부

* 용 도: 품질관리용

비 고: 1. 이 성적서는 의뢰자가 제시한 시료 및 시료명으로 시험한 결과로서 전체 제품에 대한 품질을 보증하지 않으며, 성적서의 진위확인에는 홈페이지(www.ktr.or.kr) 또는 QR code로 확인 가능합니다.
2. 이 성적서는 총보, 선단, 광부 및 수송용 등으로 사용될 수 있으며, 용도 이외의 사용을 금합니다.
3. 이 성적서는 원본(동본 포함)만 유효하며, 사본 및 전자 인쇄본/파일본은 결과치 참고용입니다.

Kang Se Ho
직장자: 강세호
E-mail: kangseho@ktr.or.kr

Jung Donghoo
기술책임자: 정동규
Tel: 1577-3091(ARS 01-48)

2016년 02월 25일

KTR 한국화학융합시험연구원

Page: 1 of 1

KTR KOREA TESTING & RESEARCH INSTITUTE KTR-QP-TBO-F01-02(07) AM(210 X 287)

Products - Guardrail

Thrie Beam



KJ-EX-SB1

Thrie Beam / W Beam



KJ-EX-SB5

Box Beam



KJ-GOD 200

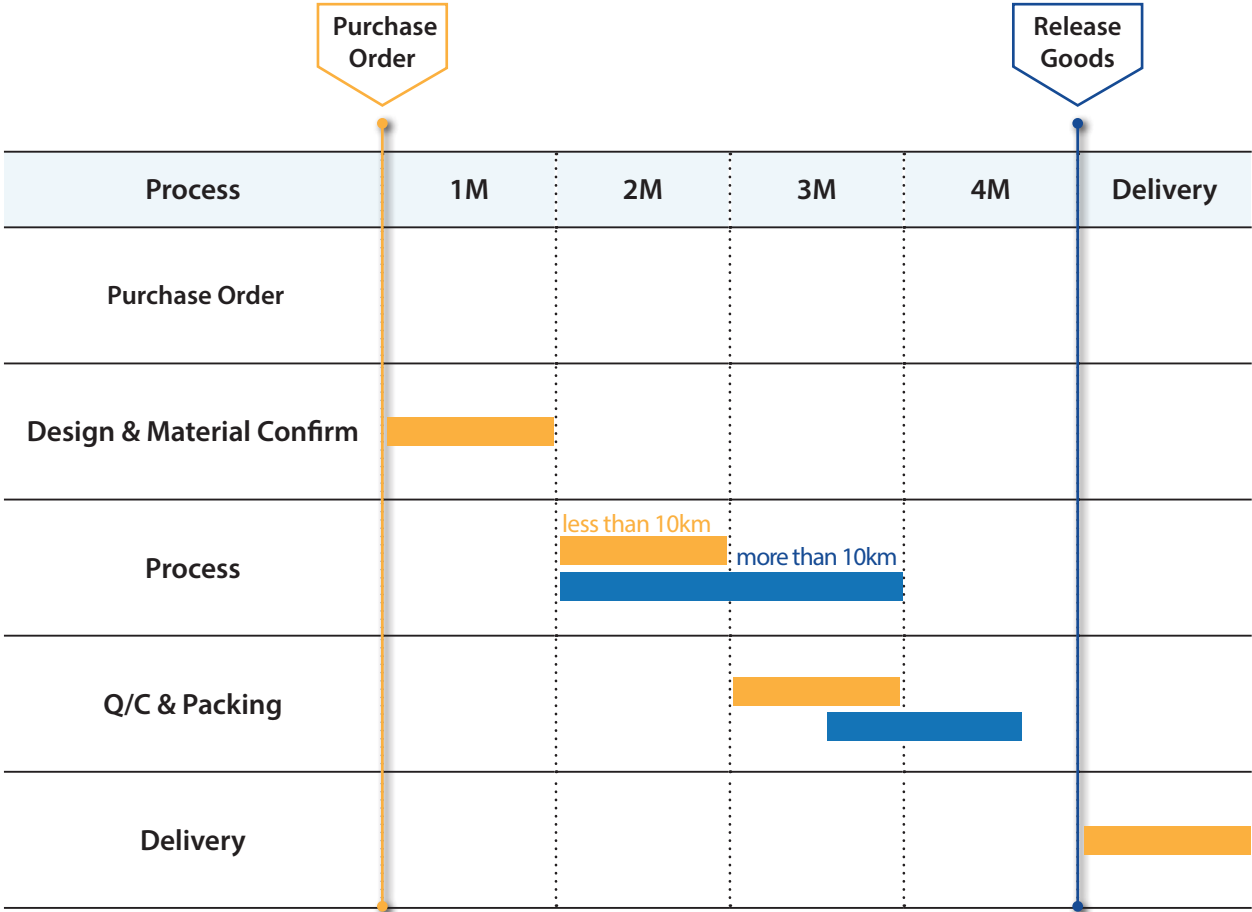
KJ-EX-SB3
KJ-EX-SB3-B

KJ-EX-SB5-B



KJ-GOD 400

Production Lead Time - Guardrail



Vehicle Impact Test

Test Condition - Strength

Grade	Impact Speed (km/h)	Vehicle Weight (kg)	Impact Angle (°)	Impact Energy (kJ)
SB1	55	8,000	15	60
SB2	65			90
SB3	80			130
SB3-B	85			150
SB4	65	14,000		160
SB5	80			230
SB5-B	85			270

Test Condition – Passenger Safety

Grade	Impact Speed (km/h)	Vehicle Weight (kg)	Impact Angle (°)
SB1	60	900 or 1,300	20
SB2, SB4	80		
SB3	100		
SB5, SB6, SB7			
SB3-B, SB5-B	120		

Vehicle Impact Test – Pass Criteria

Performance Standard

Deformation : $\leq 1.0\text{m}$

THIV : $\leq 33\text{km/h}$

PHD : $\leq 20\text{g}$

Model	Grade	Deformation (m)	THIV (km/h)	PHD (g)	Pass / Fail
KJ-EX-SB1	SB1	0.73	15	3	Pass
KJ-EX-SB3	SB3	0.41	23	11	Pass
KJ-EX-SB3-B	SB3-B	0.40	27	14	Pass
KJ-EX-SB5	SB5	0.96	23	9	Pass
KJ-EX-SB5-B	SB5-B	0.99	27	16	Pass
KJ-GOD 200	SB2	0.71	18	8	Pass
KJ-GOD 400	SB4	0.64	20	10	Pass

* THIV : Theoretical Head Impact Velocity

PHD : Post-impact Head Deceleration

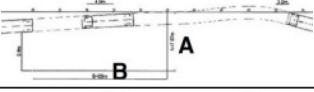
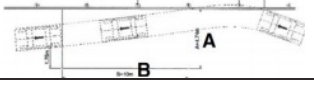
Results - Vehicle Impact Test

Product : KJ-EX-SB1

Grade : SB1

Product type : Thrie Beam / Round steel post

Material : PosMAC400

Item	Standard	Result
Tracking path (Strength test)	Should be inside the B line A: 7.87m / B: 20m	
Tracking path (Passenger safety test)	Should be inside the B line A: 4.74m / B: 10m	
Deformation	≤ 1.0m	0.73m
THIV	≤ 33km/h	15km/h
PHD	≤ 20g	3g's
Damage inside of the crashed car (Passenger safety test)	Roof: ≤ 100mm	4mm
	Front side: ≤ 75mm	2mm
	Front door: ≤ 230mm	1mm
	Impacted window: No damage	Damaged nothing
Angle of roll and pitch	≤ 75°	Roll: -2.04° / Pitch: -30.82°

시험 성적서

발급 번호 : 2019-3-0021-002

신청자

회사명 : (주)태평양 외 36개사 공동참여

주 소 : 전라북도 군산시 외항로 921

대표자 : 김 태 수

시험제품

1. 시설물의 명칭 : 노측용 성토부 방호울타리
(모델명 : EX-SB1)

2. 형식 및 규격 : 3W형 레일, 원형지주

3. 시설물 종류/등급 : 연성 방호울타리 / SB1등급

4. 시험방법 : 강도성능 평가(트럭 8ton - 15° 측면충돌)

탑승자 보호성능 평가(승용차 1.3ton - 20° 측면충돌)

적용기준

도로안전시설 설치 및 관리지침(차량방호 안전시설 편, 국토교통부, 2014)

상기 제품에 대하여 위 적용 기준의 방호울타리 성능평가 항목과 충돌시험 조건에 따라 충돌시험을 실시한 결과, 시험성적서를 발급합니다.

첨부 : 1. 방호울타리 충돌시험 결과 총괄표 1부.

2. 지주 수평지지력 시험결과 1부.

3. 충돌차량의 제적, 시설물 및 구성 부재 분리·비산 상황 사진 1부.

4. 시설물 도면 1부.

5. 공동참여 업체 목록.

※ 본 성적서와 관련된 비KS 재료의 화학·물리적 시험성적서는 신청업체가 제시한 것임.

발급일자 : 2019. 7. 26.

한국도로공사 도로교통연구원장

Page 1 of 12

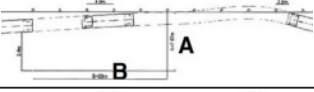
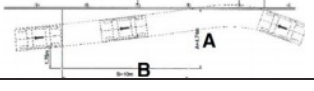
Results - Vehicle Impact Test

Product : KJ-EX-SB3

Grade : SB3

Product type : Thrie Beam / Round steel post

Material : PosMAC400

Item	Standard	Result
Tracking path (Strength test)	Should be inside the B line A: 8.17m / B: 20m	
Tracking path (Passenger safety test)	Should be inside the B line A: 4.77m / B: 10m	
Deformation	≤ 1.0m	0.41m
THIV	≤ 33km/h	23km/h
PHD	≤ 20g	11g's
Damage inside of the crashed car (Passenger safety test)	Roof: ≤ 100mm	2mm
	Front side: ≤ 75mm	1mm
	Front door: ≤ 230mm	5mm
	Impacted window: No damage	Damaged nothing
Angle of roll and pitch	≤ 75°	Roll: 5.16° / Pitch: 2.2°

시험 성적서

발급 번호 : 2018-3-0052-002

신청자

회사명 : (주)태평양 외 36개사 공동참여

주 소 : 전라북도 군산시 외항로 921

대표자 : 김 태 수

시험제품

1. 시설물의 명칭 : 노측용 성토부 방호울타리

(모델명 : EX-SB3)

2. 형식 및 규격 : 3W형 테일, 원형지주

3. 시설물 종류/등급 : 연성 방호울타리 / SB3등급

4. 시험방법 : 강도성능 평가(트럭 8ton - 15° 측면충돌)

탑승자 보호성능 평가(승용차 1.3ton - 20° 측면충돌)

적용기준

도로안전시설 설치 및 관리지침(차량방호 안전시설 편, 국토교통부, 2014)

상기 제품에 대하여 위 적용 기준의 방호울타리 성능평가 항목과 충돌시험 조건에 따라 충돌시험을 실시한 결과, 시험성적서를 발급합니다.

첨부 : 1. 방호울타리 충돌시험 결과 총괄표 1부.

2. 지주 수평지지력 시험결과 1부.

3. 충돌차량의 제재, 시설물 및 구성 부재 분리·비산 상황 사진 1부.

4. 시설물 도면 1부.

5. 공동참여 업체 목록.

※ 본 성적서와 관련된 비KS 재료의 화학·물리적 시험성적서는 신청업체가 제시한 것임.

발급일자 : 2018. 6. 21

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Page 1 of 12


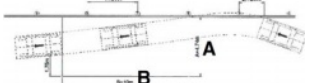
Results - Vehicle Impact Test

Product : KJ-EX-SB3-B

Grade : SB3-B

Product type : Thrie Beam / Round steel post

Material : PosMAC400

Item	Standard	Result
Tracking path (Strength test)	Should be inside the B line A: 7.87m / B: 20m	
Tracking path (Passenger safety test)	Should be inside the B line A: 4.74m / B: 10m	
Deformation	≤ 1.0m	0.40m
THIV	≤ 33km/h	27km/h
PHD	≤ 20g	14g's
Damage inside of the crashed car (Passenger safety test)	Roof: ≤ 100mm	0mm
	Front side: ≤ 75mm	5mm
	Front door: ≤ 230mm	18mm
	Impacted window: No damage	Damaged nothing
Angle of roll and pitch	≤ 75°	Roll: 13.75° / Pitch: 6.53°



시험 성적서

발급 번호 : 2018-3-0053-002

신청자

회사명 : (주)태평양 외 36개사 공동참여

주 소 : 전라북도 군산시 외항로 921

대표자 : 김 태 수

시험제품

1. 시설물의 명칭 : 노측용 성토부 방호울타리
(모델명 : EX-SB3-B)
2. 형식 및 규격 : 3W형 레일, 원형지주
3. 시설물 종류/등급 : 연성 방호울타리 / SB3-B등급
4. 시험방법 : 강도성능 평가(트럭 8ton - 15° 측면충돌)
탑승자 보호성능 평가(승용차 1.3ton - 20° 측면충돌)

적용기준

도로안전시설 설치 및 관리지침(차량방호 안전시설 편, 국토교통부, 2014)

상기 제품에 대하여 위 적용 기준의 방호울타리 성능평가 항목과 충돌시험 조건에 따라 충돌시험을 실시한 결과, 시험성적서를 발급합니다.

- 첨부 : 1. 방호울타리 충돌시험 결과 총괄표 1부.
2. 지주 수평지지력 시험결과 1부.
3. 충돌차량의 제적, 시설물 및 구성 부재 분리·비산 상황 사진 1부.
4. 시설물 도면 1부.
5. 공동참여 업체 목록.

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발급일자 : 2018. 7. 17

한국도로공사 도로교통연구원장

Page 1 of 12


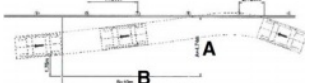
Results - Vehicle Impact Test

Product : KJ-EX-SB5

Grade : SB5

Product type : Thrie Beam and W Beam / Round steel post

Material : PosMAC400

Item	Standard	Result
Tracking path (Strength test)	Should be inside the B line A: 8.78m / B: 20m	
Tracking path (Passenger safety test)	Should be inside the B line A: 4.74m / B: 10m	
Deformation	≤ 1.0m	0.96m
THIV	≤ 33km/h	23km/h
PHD	≤ 20g	9g's
Damage inside of the crashed car (Passenger safety test)	Roof: ≤ 100mm	1mm
	Front side: ≤ 75mm	5mm
	Front door: ≤ 230mm	1mm
	Impacted window: No damage	Damaged nothing
Angle of roll and pitch	≤ 75°	Roll: 5.63° / Pitch: 1.63°



시험 성적서

발급 번호 : 2018-3-0054-002

신청자

회사명 : (주)태평양 외 36개사 공동참여

주 소 : 전라북도 군산시 외항로 921

대표자 : 김 태 수

시험제품

1. 시설물의 명칭 : 노측용 성토부 방호울타리

(모델명 : EX-SB5)

2. 형식 및 규격 : 3W형 레일, 2W형 레일, 원형지주

3. 시설물 종류/등급 : 연성 방호울타리 / SB5등급

4. 시험방법 : 강도성능 평가(트럭 14ton - 15° 측면충돌)

탑승자 보호성능 평가(승용차 1.3ton - 20° 측면충돌)

적용기준

도로안전시설 설치 및 관리지침(차량방호 안전시설 편, 국토교통부, 2014)

상기 제품에 대하여 위 적용 기준의 방호울타리 성능평가 항목과 충돌시험 조건에 따라 충돌시험을 실시한 결과, 시험성적서를 발급합니다.

첨부 : 1. 방호울타리 충돌시험 결과 총괄표 1부.

2. 지주 수평지지력 시험결과 1부.

3. 충돌차량의 제적, 시설물 및 구성 부재 분리·비산 상황 사진 1부.

4. 시설물 도면 1부.

5. 공동참여 업체 목록.

※ 본 성적서와 관련된 비KS 재료의 화학·물리적 시험성적서는 신청업체가 제시한 것임.

발급일자 : 2018. 7. 17.

한국도로공사 도로교통연구원장

Page 1 of 12

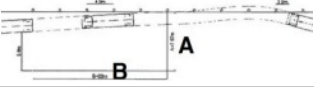
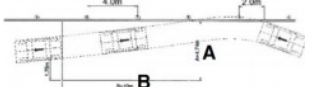
Results - Vehicle Impact Test

Product : KJ-EX-SB5-B

Grade : SB5-B

Product type : Thrie Beam and W Beam / Round steel post

Material : PosMAC400

Item	Standard	Result
Tracking path (Strength test)	Should be inside the B line A: 8.74m / B: 20m	
Tracking path (Passenger safety test)	Should be inside the B line A: 4.74m / B: 10m	
Deformation	≤ 1.0m	0.99m
THIV	≤ 33km/h	27km/h
PHD	≤ 20g	16 g's
Damage inside of the crashed car (Passenger safety test)	Roof: ≤ 100mm	4mm
	Front side: ≤ 75mm	6mm
	Front door: ≤ 230mm	7mm
	Impacted window: No damage	Damaged nothing
Angle of roll and pitch	≤ 75°	Roll: 13.1° / Pitch: -4.21°

시험 성적서

발급 번호 : 2019-3-0023-002

신청자

회사명 : (주)태평양 외 36개사 공동참여

주 소 : 전라북도 군산시 외항로 921

대표자 : 김 태 수

시험제품

1. 시설물의 명칭 : 노측용 성토부 방호울타리
(모델명 : EX-SB5-B)

2. 형식 및 규격 : 3W형 레일, 2W형 레일, 원형지주

3. 시설물 종류/등급 : 연성 방호울타리 / SB5-B등급

4. 시험방법 : 강도성능 평가(트럭 14ton - 15° 측면충돌)

답습자 보호성능 평가(승용차 1.3ton - 20° 측면충돌)

적용기준

도로안전시설 설치 및 관리지침(차량방호 안전시설 편, 국토교통부, 2014)

상기 제품에 대하여 위 적용 기준의 방호울타리 성능평가 항목과 충돌시험 조건에 따라 충돌시험을 실시한 결과, 시험성적서를 발급합니다.

첨부 : 1. 방호울타리 충돌시험 결과 총괄표 1부.

2. 지주 수평지지력 시험결과 1부.

3. 충돌차량의 궤적, 시설물 및 구성 부재 분리·비산 상황 사진 1부.

4. 시설물 도면 1부.

5. 공동참여 업체 목록.

※ 본 성적서와 관련된 비KS 재료의 화학·물리적 시험성적서는 신청업체가 제시한 것임.

발급일자 : 2019. 7. 26.

한국도로공사 도로교통연구원장

Page 1 of 12

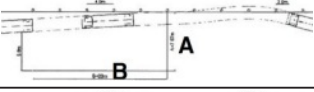
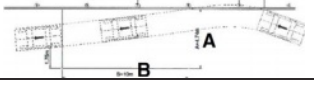
Results - Vehicle Impact Test

Product : KJ-GOD 200

Grade : SB2

Product type : Box Beam / Round steel post

Material : PosMAC400

Item	Standard	Result
Tracking path (Strength test)	Should be inside the B line A: 8.78m / B: 20m	
Tracking path (Passenger safety test)	Should be inside the B line A: 4.74m / B: 10m	
Deformation	≤ 1.0m	0.71m
THIV	≤ 33km/h	18km/h
PHD	≤ 20g	8g's
Damage inside of the crashed car (Passenger safety test)	Roof: ≤ 100mm	2mm
	Front side: ≤ 75mm	4mm
	Front door: ≤ 230mm	1mm
	Impacted window: No damage	Damaged nothing
Angle of roll and pitch	≤ 75°	Roll: 12.99° / Pitch: -2.31°



시험 성적서

발급 번호 : 2019-3-0047-2-002

신청자

회사명 : (주)케이에스티 외 3개사 공동참여
주 소 : 충청남도 논산시 연무읍 동산산업단지 81
대표자 : 이 경 배

시험제품

1. 시설물의 명칭 : 노측용 성토부 방호울타리
(모델명 : KJ-GOD200)
2. 형식 및 규격 : 개방형 레일, 원형지주
3. 시설물 종류/등급 : 연성 방호울타리 / SB2등급
4. 시험방법 : 강도성능 평가(트럭 8ton - 15° 측면충돌)
타승차 보호성능 평가(승용차 1.3ton - 20° 측면충돌)

적용기준

도로안전시설 설치 및 관리지침(차량방호 안전시설 편, 국토교통부, 2014)

상기 제품에 대하여 위 적용 기준의 방호울타리 성능평가 항목과 충돌시험 조건에 따라 충돌시험을 실시한 결과, 시험성적서를 발급합니다.

- 첨부 : 1. 방호울타리 충돌시험 결과 총괄표 1부.
2. 지주 수평지지력 시험결과 1부.
3. 충돌차량의 제적, 시설물 및 구성 부재 분리·비산 상황 사진 1부.
4. 시설물 도면 1부.
5. 공동참여 업체 목록.

※ 본 성적서와 관련된 비KS 재료의 화학·물리적 시험성적서는 신청업체가 제시한 것임.

발급일자 : 2019. 11. 12.

한국도로공사 도로교통연구원장

Page 1 of 10

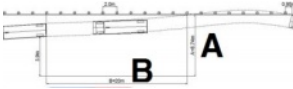

Results - Vehicle Impact Test

Product : KJ-GOD 400

Grade : SB4

Product type : Box Beam / Round steel post

Material : PosMAC400

Item	Standard	Result
Tracking path (Strength test)	Should be inside the B line A: 8.74m / B: 20m	
Tracking path (Passenger safety test)	Should be inside the B line A: 4.77m / B: 10m	
Deformation	≤ 1.0m	0.64m
THIV	≤ 33km/h	20km/h
PHD	≤ 20g	10 g's
Damage inside of the crashed car (Passenger safety test)	Roof: ≤ 100mm	10mm
	Front side: ≤ 75mm	0mm
	Front door: ≤ 230mm	2mm
	Impacted window: No damage	Damaged nothing
Angle of roll and pitch	≤ 75°	Roll: 5.7° / Pitch: -3.87°



시험 성적서

발급 번호 : 2019-3-0052-2-002

신청자

회사명 : 메탈시스산업 외 3개사 공동참여
주 소 : 대전광역시 대덕구 대화로 32번길 455-5
대표자 : 이 해 진

시험제품

1. 시설물의 명칭 : 노측용 성토부 방호울타리
(모델명 : KJ-GOD400)
2. 형식 및 규격 : 개방형 레일, 원형지주
3. 시설물 종류/등급 : 연성 방호울타리 / SB4등급
4. 시험방법 : 강도성능 평가(트럭 14ton - 15° 측면충돌)
달승차 보호성능 평가(승용차 1.3ton - 20° 측면충돌)

적용기준

도로안전시설 설치 및 관리지침(차량방호 안전시설 편, 국토교통부, 2014)

상기 제품에 대하여 위 적용 기준의 방호울타리 성능평가 항목과 충돌시험 조건에 따라 충돌시험을 실시한 결과, 시험성적서를 발급합니다.

- 첨부 : 1. 방호울타리 충돌시험 결과 총괄표 1부.
2. 지주 수평지지력 시험결과 1부.
3. 충돌차량의 캐직, 시설물 및 구성 부재 분리·미산 상황 사진 1부.
4. 시설물 도면 1부.
5. 공동참여 업체 목록.

※ 본 성적서와 관련된 비KS 재료의 화학·물리적 시험성적서는 신청업체가 제시한 것임.

발급일자 : 2019. 11. 26.

한국도로공사 도로교통연구원장

Page 1 of 10

Intellectual Property Rights



Title of the Invention

Guardrail with structure for shock absorption and climb-over prevention

Patent Number

10-1851953



Registration product

Guardrail

Design Registration Number

30-0968988



▶▶ Deck Road & WPC

Deck Road Concept

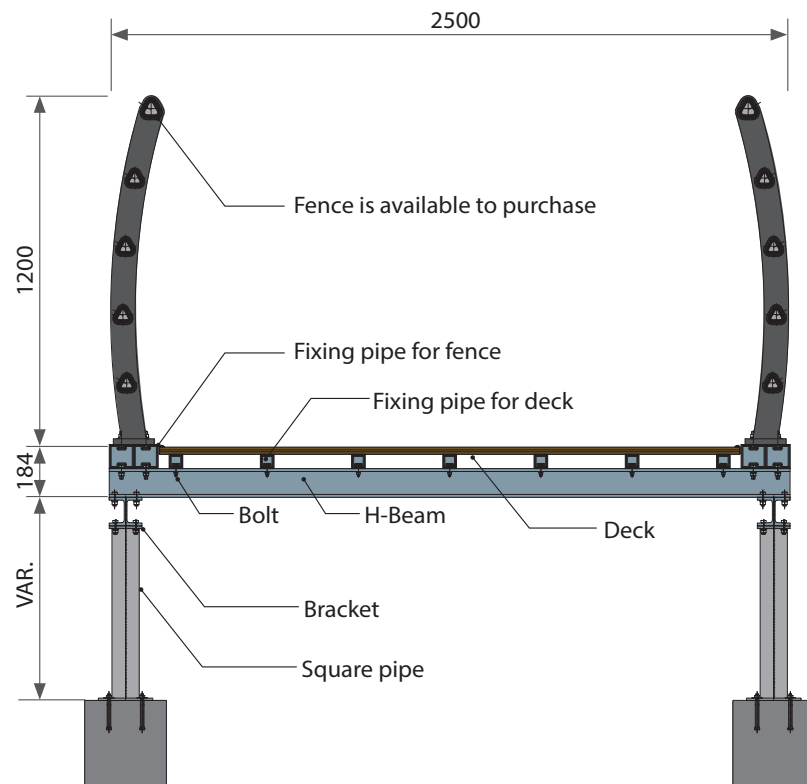


Deck Road Concept 1



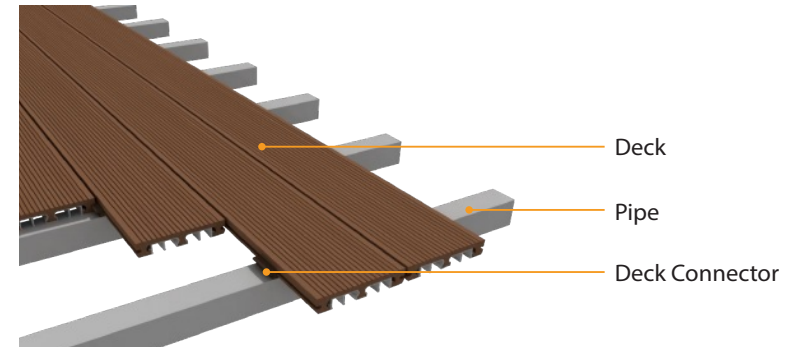
Deck Road Concept 2

Cross Section

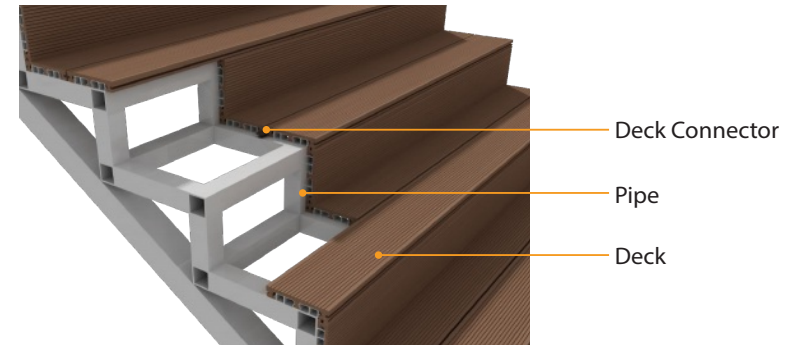


Installation Example

Flat Section



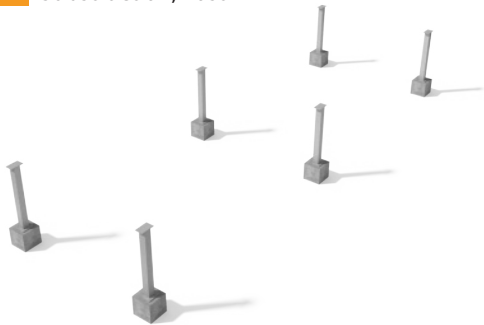
Slop Section



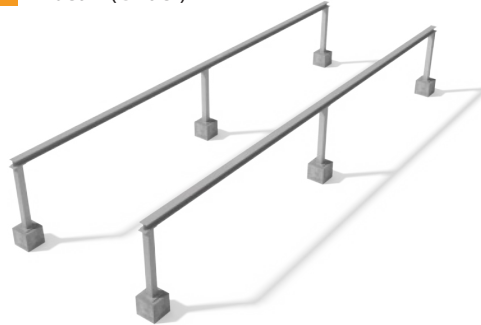
Installation

Installation Sequence

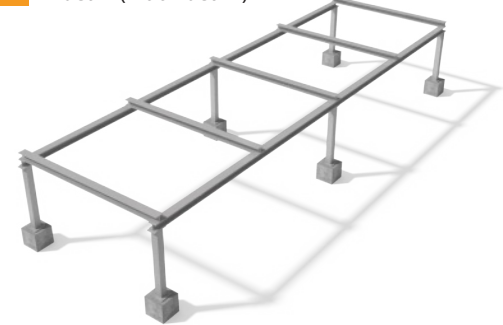
1 Substruction, Post



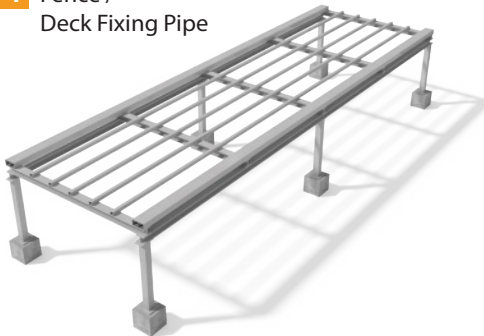
2 H-beam(Girder)



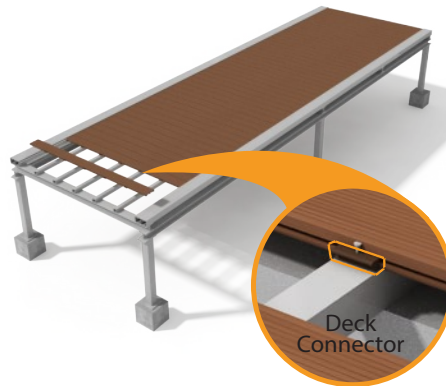
3 H-beam(Floor beam)



4 Fence /
Deck Fixing Pipe



5 Deck Connector

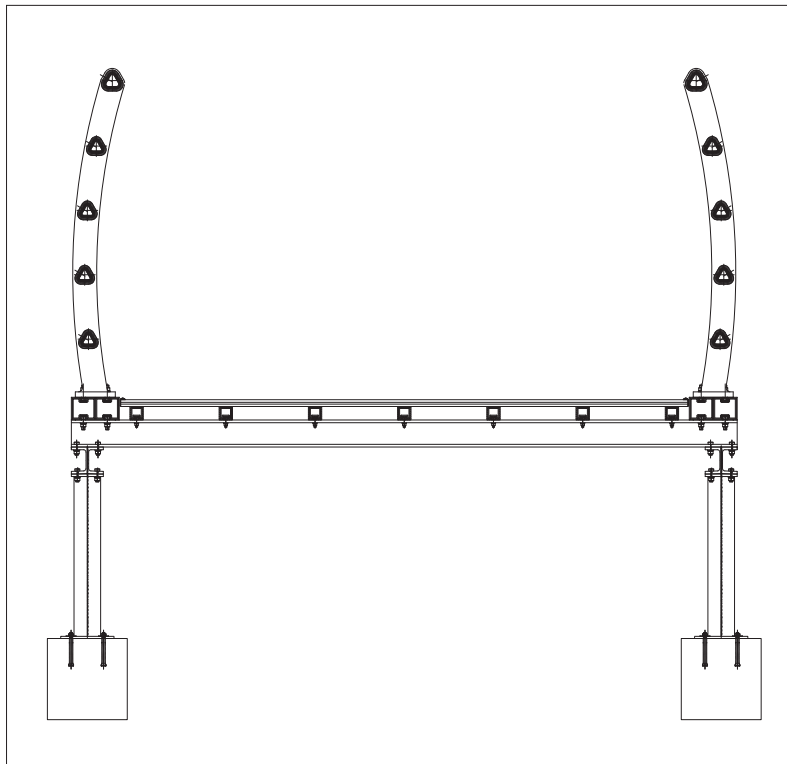


6 Fence

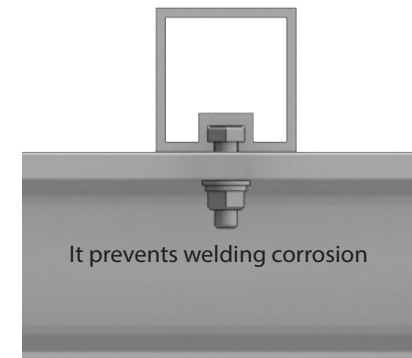


Sliding Groove in Extrusion Pipe

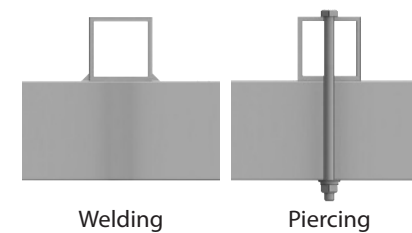
- Fixing pipe and H-beam are connected without welding and piercing



KUKJE ST



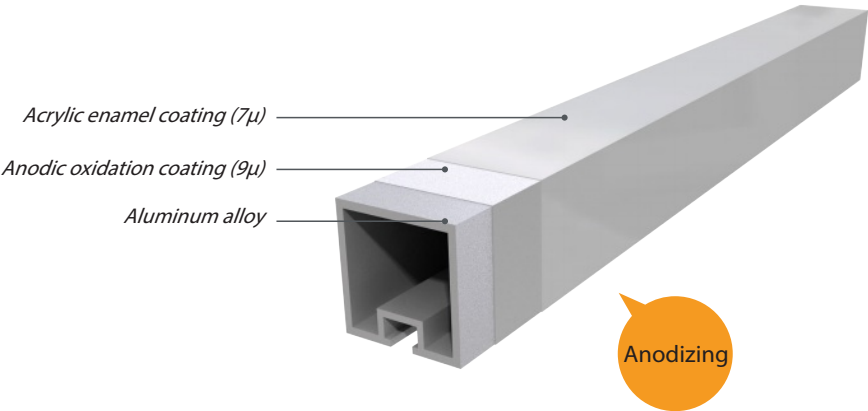
Others



Corrosion Resistance

Salt Spray Test	Calcium Chloride Immersion Test	Alkali Resistance	Cass Corrosion Resistance
240Hr	150Hr	RN 10/16Hr	RN 10/24Hr

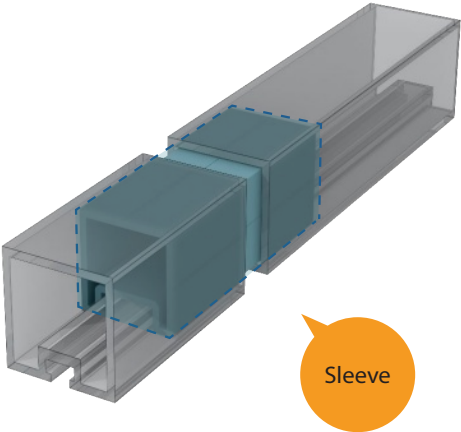
*Tested by Korea Testing & Research Institute

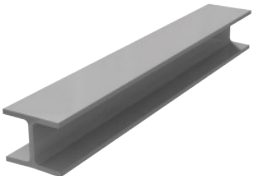
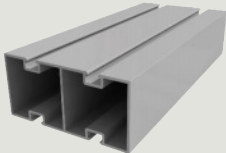
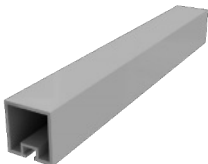
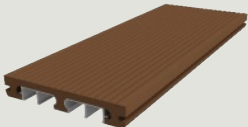







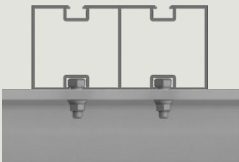





Custom-Made Sleeve









Thermal expansion and contraction can be controlled by custom-made sleeve

Custom-made sleeve has precision coupling system that improves joint strength



	H-beam	Fence Fixing Pipe	Deck Fixing Pipe	Deck	Angle
Image					
Cross section					
Joining method					
Requirement/m	4.5m	2m	7m	2.14m ²	2m

Products -WPC

	Image	Characteristic	Supplier
Beam Deck		<ul style="list-style-type: none"> - Lightweight : Hollow type - Wood powder contents over 50% of total - WPC+Reinforcing structure(AL) keeps rigidity even at high temperature - Anti-slip treatment 	
Hollow Deck		<ul style="list-style-type: none"> - Lightweight : Hollow type - Wood powder contents over 50% of total - Dimensional stability against heat is relatively low - Anti-slip treatment 	
Solid Deck		<ul style="list-style-type: none"> - Heavy : Solid type - Wood powder contents over 50% of total - Dimensional stability against heat is relatively low - Anti-slip treatment 	
Real Deck		<ul style="list-style-type: none"> - Heavy : Solid type - Wood powder contents over 70% of total - Dimensional stability against heat is relatively high - Wood texture 	

Characteristic -WPC



	Maximum support spacing	Maximum allowable load
Unit	500mm	500kg/m ²



	Maximum support spacing	Maximum allowable load
Unit	300mm	300kg/m ²



	Maximum support spacing	Maximum allowable load
Unit	400mm	350kg/m ²



	Maximum support spacing	Maximum allowable load
Unit	400mm	400kg/m ²

* We conform to maximum support spacing and maximum allowable load

Quality Standard (KS F 3230)

Test item		Standard	
Weight		0.8~1.5	
Flexural maximum load (N)		H,H-T	3000 or more
		S,S-T	3400 or more
Flexural maximum load (N)		H,H-T	0.20 or less
		S,S-T	0.25 or less
Impact resistance	Room temperature condition	Clear	
	Low temperature condition	Clear	
Impact strength(KJ/m ²)		3.0 or more	
Warping(%)		2.0 or less	
Screw nail holding force (N)		H,H-T	400 or more
		S,S-T	780 or more
Coefficient of slip resistance		0.40 or more	
Water absorption rate	Weight change (%)	8.0 or less	
Freezing-thawing	Maximum flexural load rate (%)	Initial 90 or more	
Coefficient of length line thermal expansion (1/°C)		S,-T, H-T	3.0x10 ⁻⁵ or less
		S,H	6.0x10 ⁻⁵ or less
Weatherability	Impact strength change rate (%)	Initial 80 or more	
Harmful substance elution (mg/L)	As	0.1 or less	
	Cd	0.1 or less	
	Cr	0.1 or less	
	Pb	0.1 or less	
	Hg	0.005 or less	
Formaldehyde emission quantity (mg/L)		1.5 or less	
Flame retardance	Carbonization length (cm)	20 or less	
	Remaining fire (sec)	10 or less	

Test Result (High temperature: 80°)

Test item	Standard	Result
Flexural maximum load (N)	3000 or more	4,922
Impact resistance	Clear	Clear
Warping (%)	2.0 or less	0.2
Water absorption	8.0 or less	1.6
Flame retardance (Carbonization)	20 or less	12
Flame retardance (Remaining fire)	10 or less	3
As	0.1 or less	0.0
Cd	0.1 or less	0.0
Cr	0.1 or less	0.0
Pb	0.1 or less	0.0
Hg	0.005 or less	0.000

Test Report (High temperature: 80°)

BEYOND ASIAN HUB, TOWARD GLOBAL WORLD

TEST REPORT

98, Gyoyukwon-ro, Gwacheon-si, Gyeonggi-do, 13810, Korea TEL 82-42-931-8511 FAX 82-42-931-8514

Report No : TAK-2019-080156 Receipt Date : 2019.05.17
 Representative : LEE, KYONG BAI Test Completion Date : 2019.06.13
 Company name : KUKJE ST
 Address : 81 DONGSANSANEOPDANJII-RO, YEONMU-EUP, NONSAN, CHUNGNAM, 33010, REPUBLIC OF KOREA

Sample name : Composite Beam Deck

Test Results				
TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
Flexural Maximum Load(80±2) °C, 72 h)	N	Wood Plastic Composite + Aluminium	4 922	KS F 3230 : 2013(Apply correspondingly)
Impact resistance(80 ± 2) °C, 72 h)	-	Wood Plastic Composite + Aluminium	No Defects	KS F 3230 : 2013(Apply correspondingly)
Warping((80 ± 2) °C, 72 h)	%	Wood Plastic Composite + Aluminium	0.2	KS F 3230 : 2013(Apply correspondingly)
Water absorption(Changes in weight -A Type)	%	Wood Plastic Composite + Aluminium	1.6	KS F 3230 : 2013
Flame retardance(carbonization)	cm	Wood Plastic Composite + Aluminium	12	KS F 3230 : 2013

- Next Page -

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2019.06.13

Korea Testing & Research Institute

President Byun, Jong-Ryeop

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Page : 1 of 3

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BEYOND ASIAN HUB, TOWARD GLOBAL WORLD

TEST REPORT

98, Gyoyukwon-ro, Gwacheon-si, Gyeonggi-do, 13810, Korea TEL 82-42-931-8511 FAX 82-42-931-8514

Report No : TAK-2019-080156 Receipt Date : 2019.05.17
 Representative : LEE, KYONG BAI Test Completion Date : 2019.06.13
 Company name : KUKJE ST
 Address : 81 DONGSANSANEOPDANJII-RO, YEONMU-EUP, NONSAN, CHUNGNAM, 33010, REPUBLIC OF KOREA

Sample name : Composite Beam Deck

Test Results				
TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
Flame retardance(remaining fire)	sec	Wood Plastic Composite + Aluminium	3	KS F 3230 : 2013
As	mg/L	Wood Plastic Composite + Aluminium	0.0	KS F 3230 : 2013
Cd	mg/L	Wood Plastic Composite + Aluminium	0.0	KS F 3230 : 2013
Cr	mg/L	Wood Plastic Composite + Aluminium	0.0	KS F 3230 : 2013
Pb	mg/L	Wood Plastic Composite + Aluminium	0.0	KS F 3230 : 2013
Hg	mg/L	Wood Plastic Composite + Aluminium	0.000	KS F 3230 : 2013

* Test methods and conditions Present the client
 - Span : 400mm
 - Usage of Report : QUALITY CONTROL

- Next Page -

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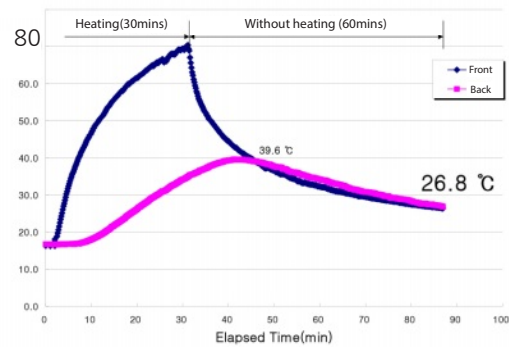
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Page : 2 of 3

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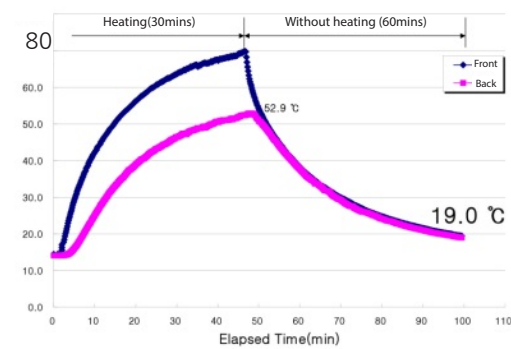
Thermal Response Performance

Solid



[Temperature after 60mins without heating : 26 °]

Beam



[Temperature after 60mins without heating : 19 °]



KUKJE ST Co.,Ltd.

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