



BTSl - Technical Review				
Company Name :- Middle East Investment Co.				
Technology :- Insulated concrete form (ICF) _ KOTO Integrated Building System_ Made by "KOTO International Co."				
Issue Date :-31.Mar.2022				
#	Requirements	Availability		Observations
		Yes	No	
1	Proposed Technology - Brief			
1.01	Company to provide brief on the proposed technology with technical write up and/or A/V presentation	✓		
1.02	Is this technology proven elsewhere			
	a. within KSA	✓		
	b. within Middle East	✓		
	c. elsewhere in the world	✓		
1.03	List of projects by region shall be submitted with its type and quantity of different prototypes		✓	Company submitted Photos only
1.04	Is this technology uses patterned assembly or custom made assemblies?			
1.05	If patterned assembly, list those patterns applicable for Villas, Townhouses and Apartments within KSA, complete with details of those patterns and its test reports?	✓		
1.06	If custom made assembly, how individual assemblies are designed, fabricated and tested against the requirements? eg: Structural stability, Fire resistance, Acoustic performance, Thermal performance, Seismic etc.,	✓		
1.07	Any other item which may illustrate on the proposed technology	✓		
2	Method of Construction			
2.01	Step by step method of construction from design, fabrication, handling, transportation, construction / assembly, completion, finishes etc., to be clarified with a method statement	✓		
2.02	On-site or Off-Site factory?			
	a.If on-site, Space and other requirements within or nearby project?	✓		
	b.If off-site, Location of off-site factory and type of fabrication / production at factory to be clarified.	✓		
	c.List of on-site and off-site works to be clarified	✓		
2.03	Logistics plan including type of modules, its size, handling at site factory & at site, transportation etc., to be clarified		✓	
2.04	List of dependencies from outside KSA such as molds, form works, machinery or any special materials etc., to be clarified		✓	
2.05	Submit drawings / sketches showing cross section of the proposed assembly with identification material and its specification	✓		
2.06	Clarify on the foundation type and its assembly / joint etc.,		✓	
2.07	Clarify on the method of assembly, joint and treatment for finishes, fire, ingress and acoustic protections	✓		
3	Code compliance of the proposed technology			
3.01	Is this technology approved within KSA? If yes, list those governmental agencies		✓	



BTSI - Technical Review				
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		Yes	No	
3.02	Is this technology approved within Middle East? If yes, list those governmental agencies, countries and independent third parties	✓		
3.03	Is this technology approved elsewhere in the world? If yes, list those governmental agencies, countries and independent third parties	✓		
3.04	Is this technology complies with Saudi Building Code?			Co. stated(Fire, structural integrity, strength, thermal resistance tests done in Malaysia using BS (British Standards)
	a. If Yes, please demonstrate its extent of compliance.	✓		
	b. If No, what is the proposed method to get it complied?			
3.05	Is this technology complies with KSA Civil Defense requirements?			Co. stated)If the civil defence requirement is the same as in Malaysia)
	a. If Yes, please demonstrate its extent of compliance.	✓		
	b. If No, what is the proposed method to get it complied?			
3.06	List of international codes and extent of compliance		✓	
4	List of material and its code compliance			
4.01	List of materials used to be clarified - Concrete, Steel, Polystyrene, Tiles etc.,		✓	
4.02	Specification of the individual material to be confirmed with its code compliance within KSA		✓	
5	Particular requirements			
5.01	Structural analysis & calculation sheet of the proposed assembly for various prototypes such as Villas (2 1/2 Story), Townhouses (2 1/2 Story) and Apartment G+6 Story Buildings to be clarified.		✓	
5.02	Technical limitations of the technologies, if any, to be clarified, such as number of storeys, size of modules etc.,		✓	
5.03	What is the tested fire rating of the wall and slab? Please provide with details of assembly and certifications	✓		
5.04	What is the tested thermal insulation of the wall and slab? Please provide with details of assembly and certifications	✓		
5.05	What is the tested acoustic insulation of the wall and slab? Please provide with details of assembly and certifications		✓	
5.06	Any tests on seismic done? If yes, please share those details		✓	Co. stated (No Siesmic tests done yet)
5.07	Is the slab or wall assembly be modified? eg: add opening or door etc.,			
	a.If yes, should the customer contact you or anyone can carryout modification?	✓		co .stated (Anyone Qualified)
	b.If anyone can carryout, what are the precautions to be taken?		✓	
5.08	How the ten years warranty for the structure and three years warranty for MEP Works will be supported by the company here in KSA, as per the requirements of the authorities having jurisdiction?		✓	



## BTSI - Technical Review

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		Yes	No	

## Recommendation

No objection' to the proposed method of construction -Insulated concrete form (ICF) \_ KOTO Integrated Building System\_ Made by "KOTO International Co."

However, The following shall be taken care:-

- 1-This acceptance doesn't mean commitment to use the products of the factory that might be established in KSA in MOMRAH projects otherwise the factory's products get approval from committee of materials approval in the ministry prior to supplying & construction.
- 2- Structure design (Complete with load analysis with all parameters wind, seismic, self weight, live and dead loads including considerations to foundations and floor / roof slab) to suit the architecture plans & soil test reports of the project.
- 3-EPS shall be plastered with mesh and corner guards using appropriate materials for durability and safety as per the codes.
- 4-Filling the space among columns with suitable density concrete to allow Fixing any items such as A/C units, Cabinets etc., anywhere on walls & avoiding hollow sound "knocking effect"
- 5-Type of internal walls which are bearing OR non bearing/partitions (if any) to be agreed in the structural design & get approval from project consultant.
- 6- Fire rating test reports complete with smoke emission classification shall be submitted, demonstrating its compliance with SBC, NFPA and Civil Defense requirements.
- 7-The concealed MEP services that will be embedded in the wall panels, Method of erection to be agreed with the consultant including repair.
- 8-Fixing any items on ceiling & walls such as A/C units, Chandeliers, TV, Cabinets etc., may require special anchoring.
- 9- Fire rating & thermal insulation subject to design to meet SBC & other concerning authorities requirements.
- 10-Roof & wet areas waterproofing will be subject to design & approval from project consultant.
- 11- A detail at windows and doors to be submitted & approved from supervision consultant and to ensure no thermal bridging at these locations.
- 12-Mock-up sample required and all technical tests to be applied and final acceptance according to the result
- 13- The above comments shall be addressed and approved by the consultant, prior to commencement of construction.

## Disclaimers

1. The above review is limited to technical aspects of the proposed technology only (Phase:1) which doesn't release the company from complying with the requirements of the local authorities having jurisdiction.
2. The capabilities of the company shall be demonstrated in the next phase to BTI team once technical review is complete and the team agreed to proceed to next phase (Phase: 2).
3. The proposed technology, it's specific assembly for the agreed housing products and materials used etc., are subject to approval of the authorized third party consultant who will be appointed by the developer during design and supervision phases of the project (Phase:3).



*engineering affordability*

# KOTO ICF

## (Insolated Concrete Form)

Address: No. 3A, Jalan Teknologi ,  
Taman Sains, Kota Damansara,  
47810 Petaling Jaya,  
Selangor – Malaysia

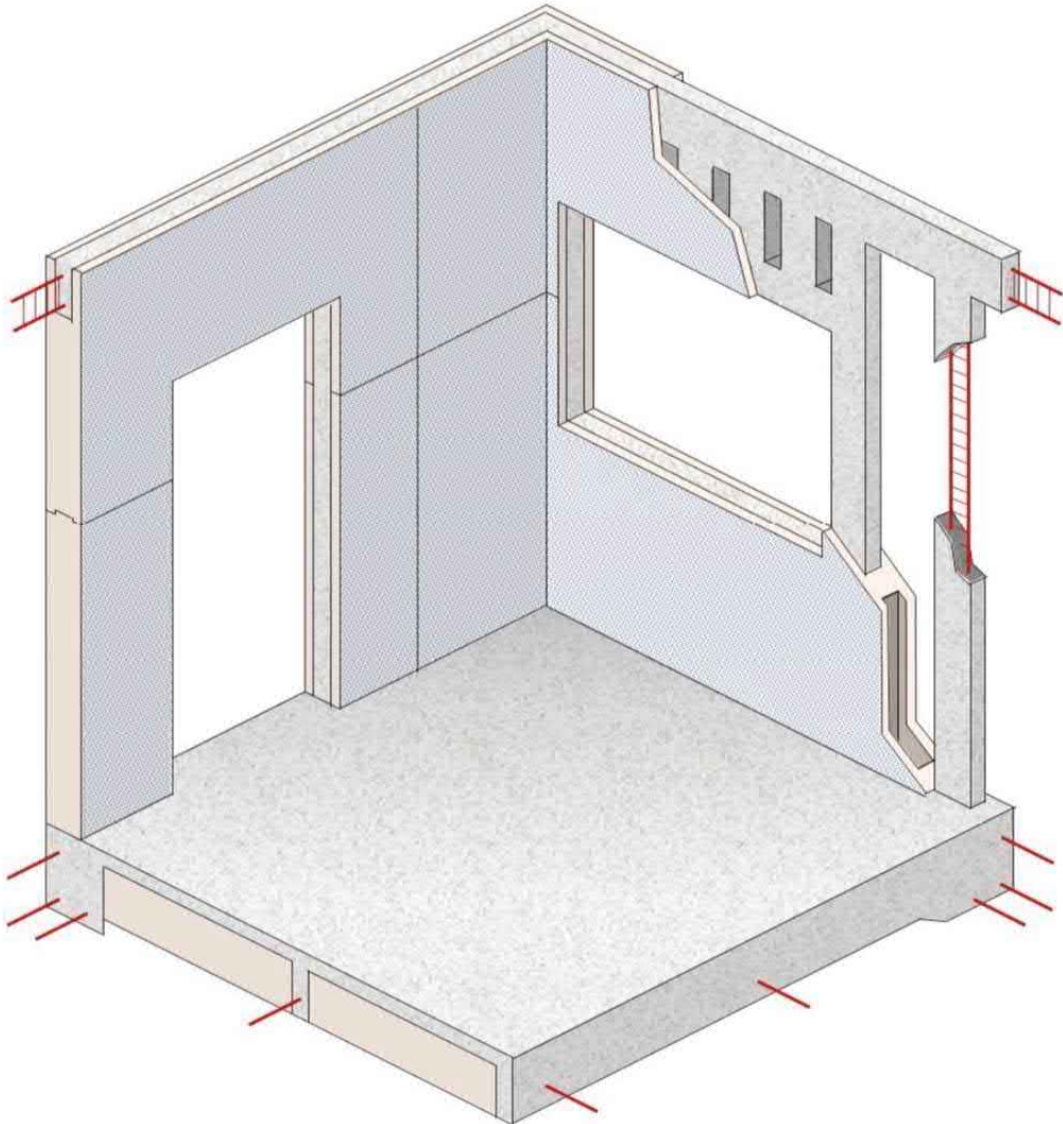
Web: [www.kotocorp.com](http://www.kotocorp.com)  
Email: [info@kotocorp.com](mailto:info@kotocorp.com)

# KOTO panel strength



KOTO Integrated Building System

Building Details



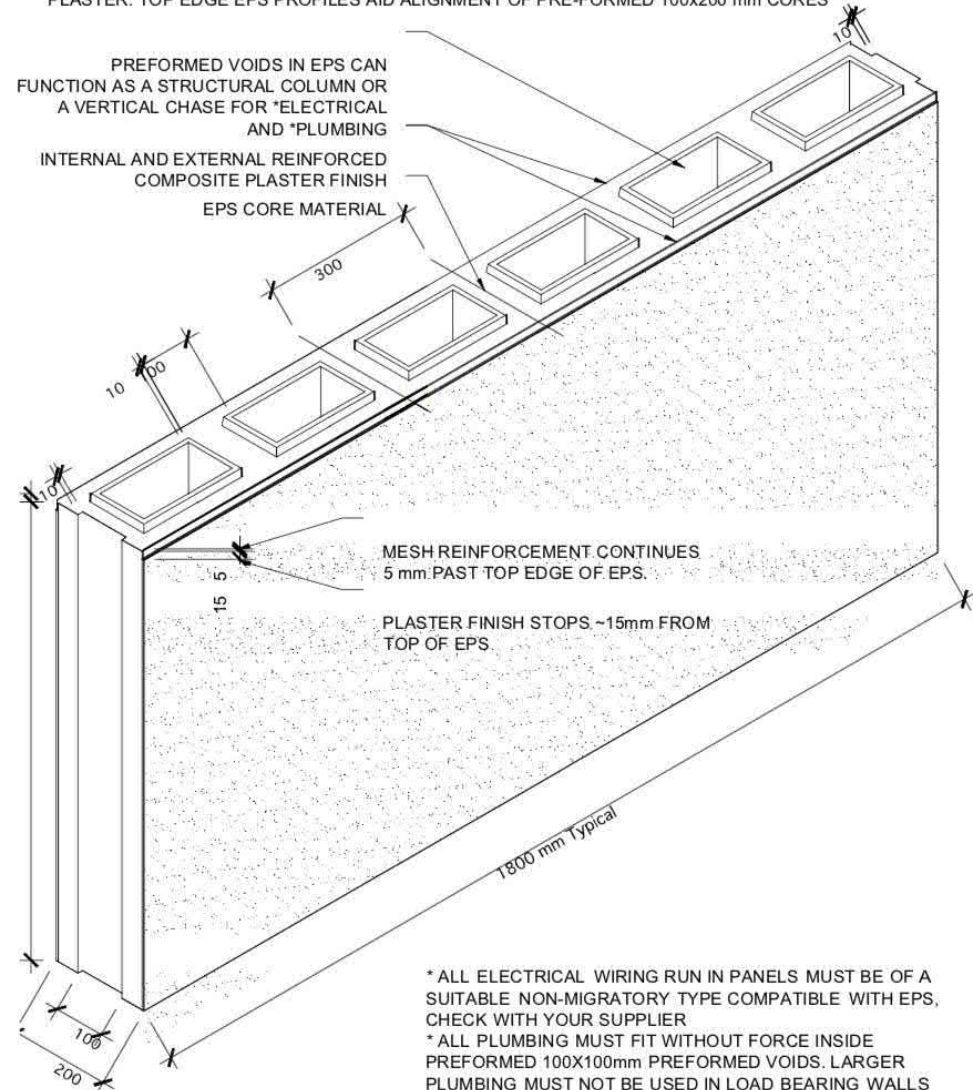
# KOTO form shape and technical specifications

## KOTO TYPICAL K-PANEL ISOMETRIC VIEW

SCALE 1:10

(Core hole configuration may vary from that shown here)

TYPICAL 200 mm WIDE EPS CORE PRE-COATED ON BOTH SIDES WITH A REINFORCING COMPOSITE PLASTER. TOP EDGE EPS PROFILES AID ALIGNMENT OF PRE-FORMED 100x200 mm CORES



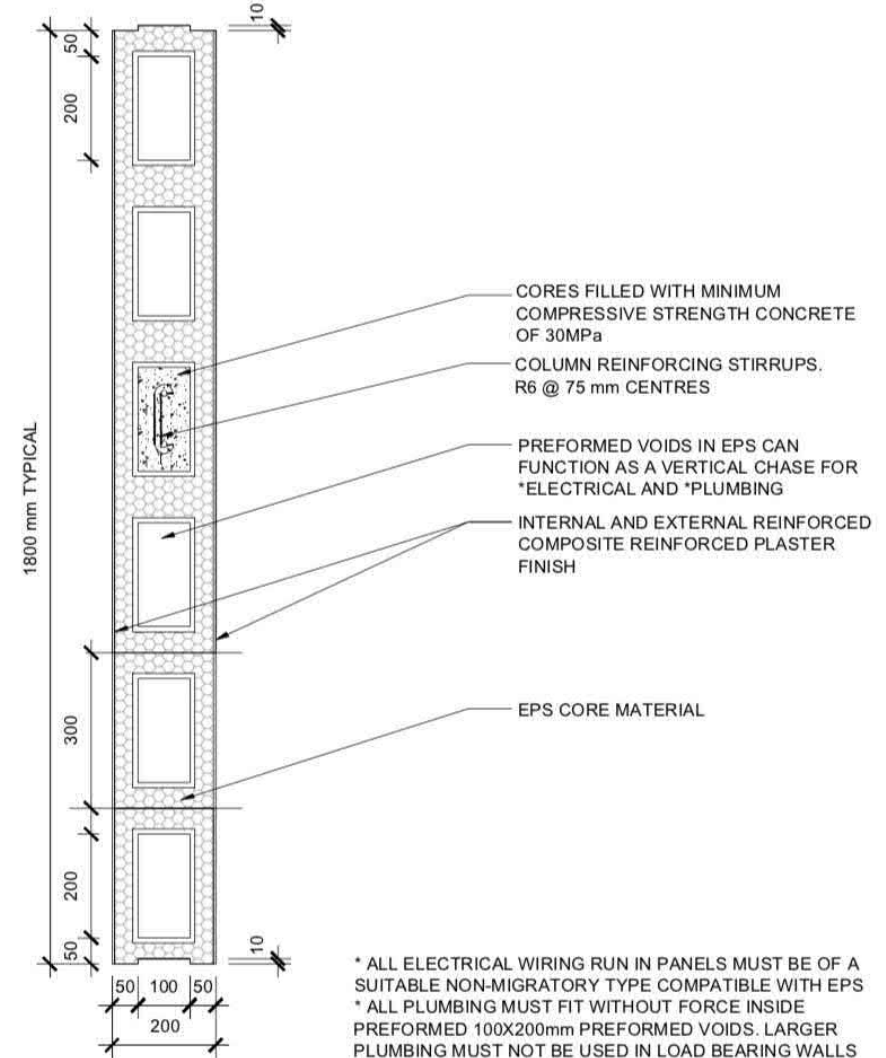
\* ALL ELECTRICAL WIRING RUN IN PANELS MUST BE OF A SUITABLE NON-MIGRATORY TYPE COMPATIBLE WITH EPS. CHECK WITH YOUR SUPPLIER  
 \* ALL PLUMBING MUST FIT WITHOUT FORCE INSIDE PREFORMED 100X100mm PREFORMED VOIDS. LARGER PLUMBING MUST NOT BE USED IN LOAD BEARING WALLS



## KOTO TYPICAL K -PANEL PLAN VIEW

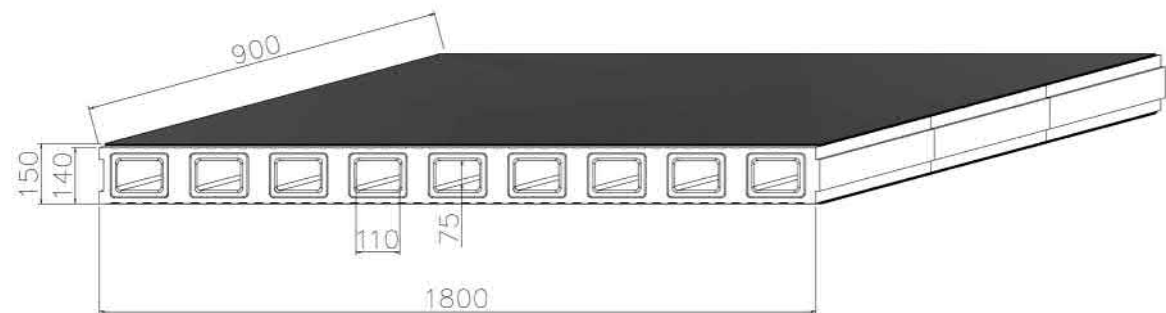
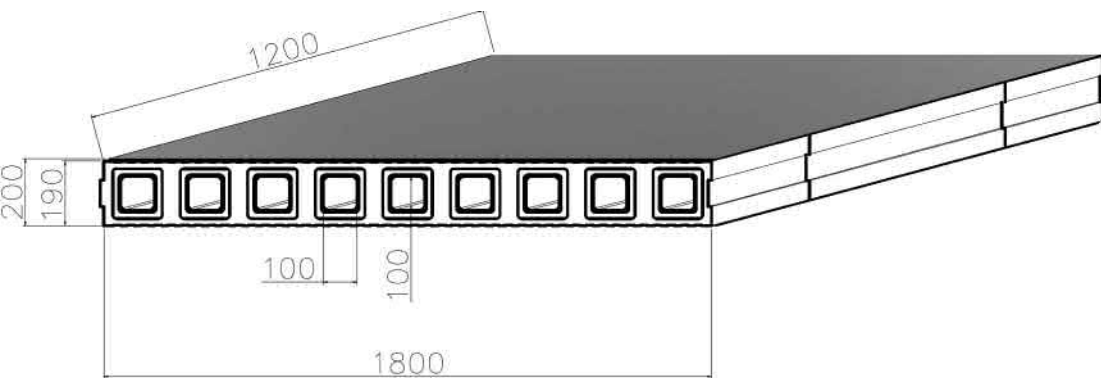
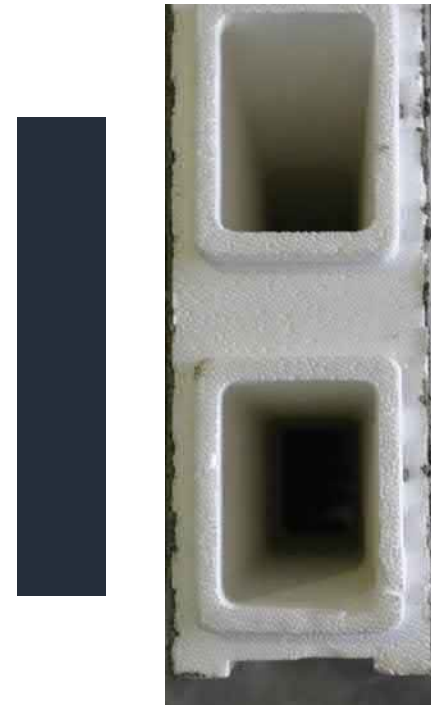
SCALE 1:10

TYPICAL 200 mm WIDE EPS CORE PRE-COATED ON BOTH SIDES WITH A REINFORCING COMPOSITE PLASTER. TOP EDGE EPS PROFILES AID ALIGNMENT OF PRE-FORMED 100x200 mm CORES



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# KOTO ICF sizes and dimensions



# KOTO panel lightweight and reinforced







**KOTO WALL PANEL**  
Design and Detailing Manual



**KOTO ICF**

Energy Efficient High Speed Building System

**RESIDENTIAL FLOORING MANUAL**

No. 3M

Date of issue: 2.12.2015

*Malaysian Environment Context*

## APPLICATION OF DESIGN

### 1. INTRODUCTION

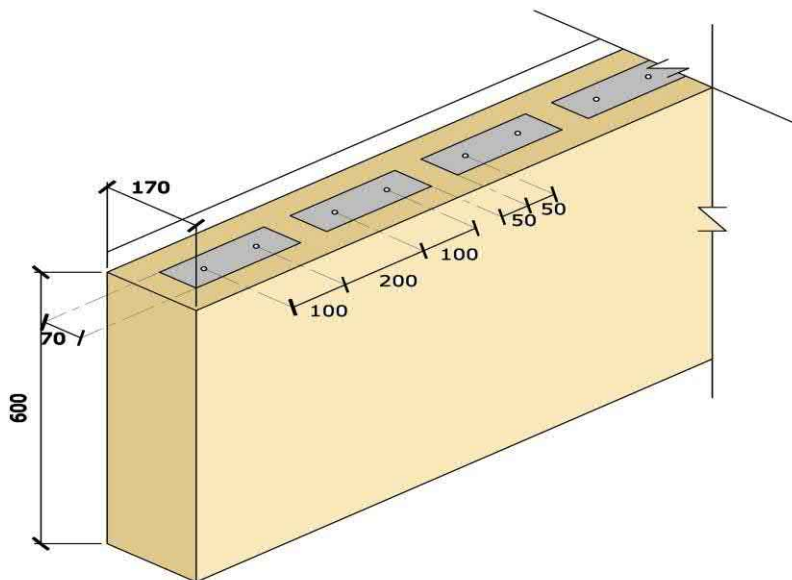
This design manual has been prepared for guidance in the design of reinforced concrete columns and beam Residential buildings using KOTO permanent formwork and infill walls.

While construction using K-Blocks is applicable to all buildings, the design tables included in this manual are for residential buildings up to 5 stories high with floor to ceiling height of up to 3.6m and subjected to wind speed of up to 60 m/s.

The preferred foundation is a K-Pod Raft and the preferred flooring is K-Rib lightweight floor.

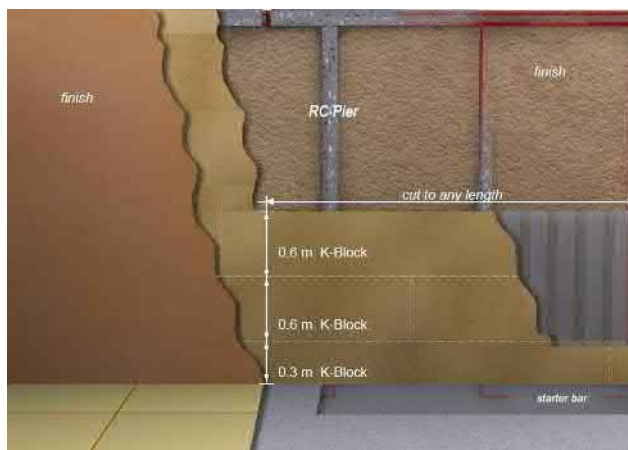
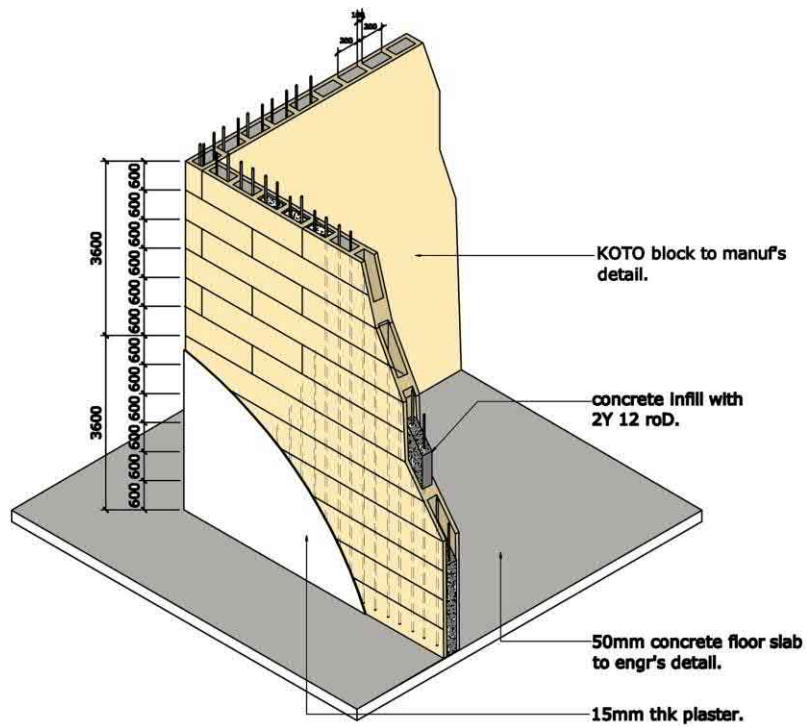
### 2. THE K-BLOCK

The K-Block consists of 170mm thick panel of light weight material with precision cut 100mm by 200mm cores at 300mm centers. The blocks are pre-coated with fibre- mesh composite coating. K-Blocks provide permanent formwork for reinforced concrete columns and beams and then act as infill walls between those columns.



**KOTO WALL**

# 1 KOTO SYSTEM



# 2 APPLICATION OF MANUAL

The designs in this manual have been carried out on the basis of the following:-

- a. Foundation and floors has sufficient strength and stiffness to provide a rigid support to the KOTO columns.



**KOTO WALL PANEL**  
Design and Detailing Manual



**KOTO ICF**

Energy Efficient High Speed Building System

**RESIDENTIAL FLOORING MANUAL**

No. 3M

Date of issue: 2.12.2015

*Malaysian Environment Context*

## APPLICATION OF DESIGN

### 1. INTRODUCTION

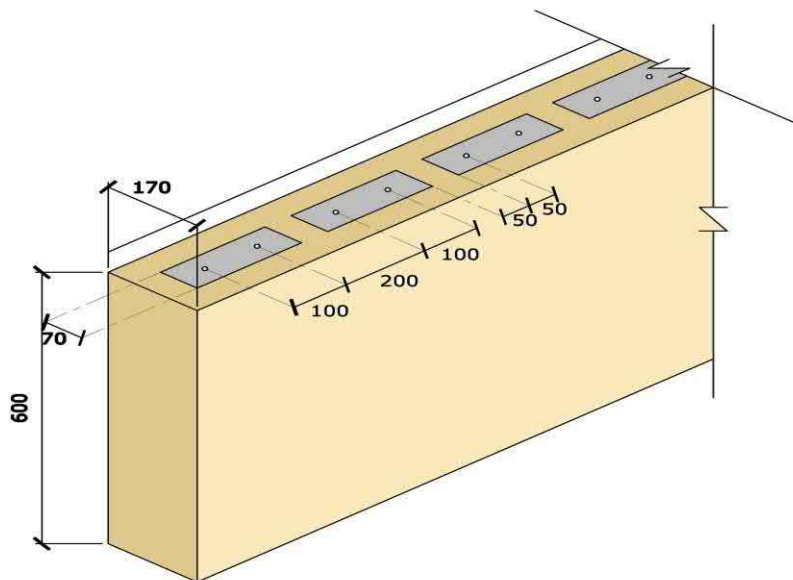
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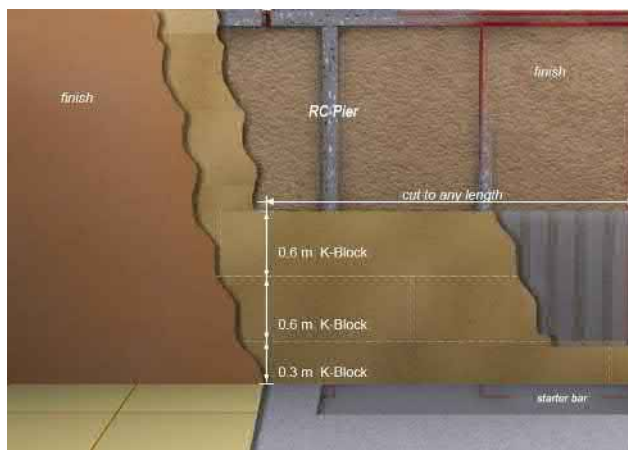
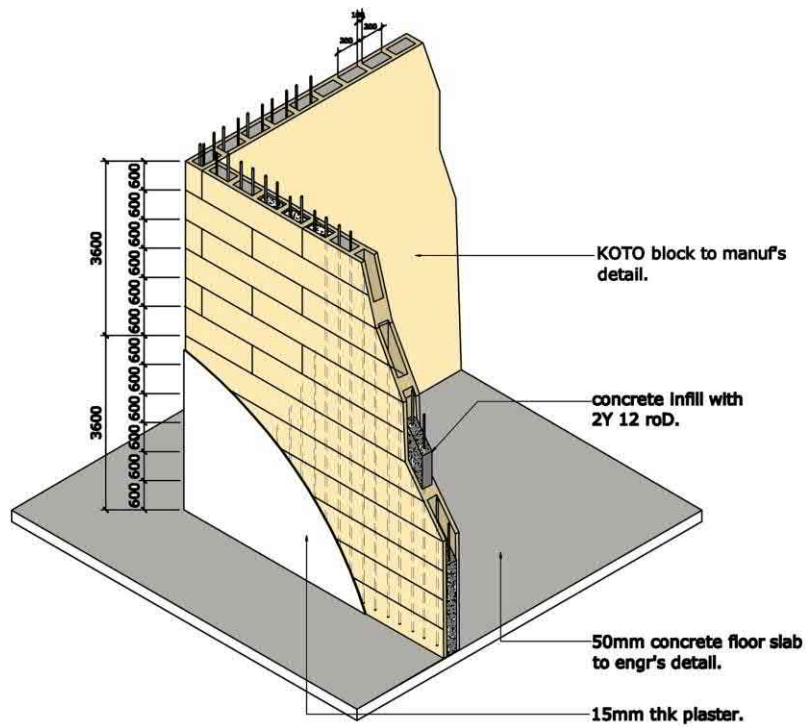
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**KOTO WALL**

# 1 KOTO SYSTEM



# 2 APPLICATION OF MANUAL

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## TEST REPORT

REPORT NO : 2008CB1404

PAGE : 1 OF 9

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Applicant. : KOTO CORP.  
 144 Granite St Geebung,  
 Brisbane, Qld 4034,  
 Australia.

Manufacturer : KOTO CORP.

Product : K-Block Panel

Reference Standard/  
 Method of Test : ISO 8990 : 1994  
 Thermal Insulation – Determination of Steady-State Thermal Transmission  
 Properties – Guarded Hotbox Method.

Description of Sample : K-Block Panel is a lightweight fire retardant insulated Clock Panel, complete with vertical core holes at 200mm centres to allow for insertion of reinforced concrete or reinforcement to form a column and beam structure. Both vertical faces of the K-Block Panel are mechanically coated with a high impact resistant proprietary intellectual property mineral composite coating, manufactured by Koto Corp.

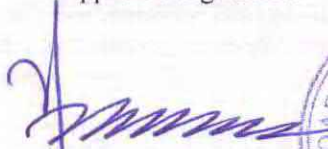
Brand : KOTO  
 Model : 200  
 Serial Number : K-BP200  
 Thickness : 200 mm

Date Received : 08/09/2008

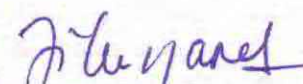
Job No. : J20085041327 / SQAS / CCST / T.REC /02

Issued Date : 12 SEP 2008

Approved Signatories

  
 (FAIZ MOHD YUSUF)  
 Senior Technical Executive



  
 (Y.M. RAJA NOR SIHA RAJA ABD. HANAN)  
 Group Leader

Civil & Construction Section  
 Product Certification, Inspection & Testing Department.

# TEST REPORT

REPORT NO.: 2008CB1404

PAGE : 2 OF 9

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- Product** : K-Block Pane  
Brand : KOTO  
Thickness : 200 mm
- Test Method** : ISO 8990 : 1994  
Thermal Insulation – Determination of Steady-State Thermal Transmission Properties – Guarded Hotbox Method.
- Location of Test** : Building Physics Laboratory  
Civil & Construction Section  
Product Certification, Inspection & Testing Department.  
SIRIM QAS INTERNATIONAL SDN BHD
- Instrumentation** : All instrumentation utilized in the tests conforms to the general requirements of the test procedures. All instruments used were calibrated prior to and following test.
- The instrument used were;  
1) Dual Climatic Walk – in Test Chamber.  
2) Heating Box.  
3) Air circulating devices.  
4) Thermocouples  
5) Power Hitester recorder.
- Test Procedure** : The test specimen was installed in the opening between two adjacent in the test chamber. The specimen was mounted and sealed in such a way that neither air nor moisture will ingress into the specimen from the edges or pass from the hot side to the cold side or vice versa.
- The edges of the specimen are insulated so that  $\theta_s$  is reduced to a level where the accuracy requirements are met. Air velocities on the hot and cold sides are adjusted accordingly for the test.
- The measurement of  $R$  and  $U$ ,  $\theta_p$  and  $T$  from two successive measuring periods of at least 3 h after near-stability has been reached and agree within 1 % and results shall not change unidirectional.
- Test Condition / Setup** : Thermostatic room set value :  $20 \pm 1^\circ\text{C}$   
Heating box set value :  $20 \pm 1^\circ\text{C}$   
Low temperature room set value :  $0 \pm 1^\circ\text{C}$   
Cold air blow out device : 45 Hz



12 SEP 2008



## TEST REPORT

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PAGE : 9 OF 9

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Sample : K-Block Pane  
Brand : KOTO

Summary of Data :

Title	Data		
	Test 1	Test 2	Test 3
Mean air temperature in low temperature room. $\theta_{ca}$ (° C.)	0.653	0.652	0.876
Mean air temperature in heating box. $\theta_{ha}$ (° C.)	20.637	20.595	20.762
Mean surface temperature in low temperature room. $\theta_{cs}$ (° C.)	0.359	0.338	0.345
Mean surface temperature in heating box. $\theta_{hs}$ (° C.)	20.937	20.868	20.643
$Q = QH + QF - QL$ (W)	16.163	17.110	16.553
Area of test body. (m <sup>2</sup> )	1.0		
Measured thickness of test body. (m)	0.2		
Correction value of surface heat transmission. (m <sup>2</sup> . K /W)	0.016		
Resistance of heat transmission on air. $R_a$ (m <sup>2</sup> .K /W)	1.252	1.182	1.217
Average resistance of heat transmission on air. $R_a$ (m <sup>2</sup> .K /W)	0.217		
Average of thermal transmittance. U (W /m <sup>2</sup> .K)	0.822		
Resistance of heat transmission on surface. $R_s$ (m <sup>2</sup> .K /W)	1.289	1.216	1.242
Average resistance of heat transmission on surface $R_s$ (m <sup>2</sup> .K /W)	1.249		
Average of thermal conductivity k (W / m.K)	0.16		

### Test Results:

- 1) Thermal Conductivity (k - value) = 0.16 W/m.K
- 2) Resistance of Heat Transmission on air ( $R_a$  - value) = 0.22 m<sup>2</sup>.K/W
- 3) Resistance of Heat Transmission on surface ( $R_s$  - value) = 1.25 m<sup>2</sup>.K/W
- 4) Average of thermal transmittance. (U value) = 0.82 W/m<sup>2</sup>K

**Notes:** The R-value of above test result, which presented in S.I units, can be converted to the U.S. R-value by multiplying the R-value with 5.67446 ft<sup>2</sup>.°F/Btu.



12 SEP 2008



**SIRIM QAS International Sdn. Bhd.**  
 No. 1, Persiaran Dato' Menteri, P.O.Box 7035, Seksyen 2, 40700 Shah Alam, Selangor Darul Ehsan  
 MALAYSIA  
 Tel: 03-55446465 Fax: 03-55446454 http://www.sirim.my  
 (Company No: 410334-X)



### TEST REPORT

<b>REPORT NO.:</b> 2014FE0416	<b>PAGE</b> 1 <b>OF</b> 4
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**Applicant** : IRIS KOTO (M) SDN. BHD.  
 Lot 4030 Jalan Satu D,  
 Kampung Baru Subang,  
 40150 Shah Alam,  
 Selangor Darul Ehsan.  
 (Attn: Mr. Kaine)

**Manufacturer** : ISIS KOTO (M) SDN. BHD.  
 Jalan 3,  
 Kampung Baru Subang,  
 40150 Shah Alam,  
 Selangor Darul Ehsan.

**Product** : KOTO INSULATED PANEL

**Reference Standard/ Method of Test** : BS 476 : Part 7: 1997  
 Fire Test on Building Materials and Structures  
 Part 7: Surface Spread of Flame Test.

**Description of Test Specimen** : 6 pieces of KOTO Insulated Panel.  
 Size of Specimen : 270mm x 885mm x 50mm (measured thickness)  
 Brand : KOTO 8  
 Model : Surface Coating  
 Mass Per Unit Area : 27.8 kg/m<sup>2</sup>

Descriptions of sample as claimed by the submitter: Refer to page 2.

The specimens were tested with the face side exposed to the specified heating condition of the fire test.

**Date Received** : 08.09.2014  
**Date of Test** : 24.09.2014  
**Job No./ Ref No.** : J20141440431 /SQAS/FPS/15/1-6  
**Test Result** : **Classification of Surface Spread of Flame Test** : **Class 1**  
**Issued Date** : 20 OCT 2014  
**Approved Signatories** :

  
 MOHD ALIFF MUSTAFFA  
 Testing Executive



  
 ROHAYA IBRAHIM  
 Head  
 Fire Protection Section  
 Testing Services Department  
 SIRIM QAS International Sdn. Bhd.

# 06 accreditations



## SIRIM fire test

## Fire Dept. approval

## CIDB IBS approval

**SIRIM QAS International Sdn.Bhd.**  
(Company No.: 199601037981 (410334-X))  
No.1, Persiaran Dato' Menteri, Section 2, P.O.BOX 7035,  
40700 Shah Alam, Selangor Darul Ehsan, Malaysia.  
Tel: 03-55446465  
Fax: 03-55446464  
www.sirim-qas.com.my

**SIRIM QAS INTERNATIONAL**

**SIRIM**

**STANDARDS MALAYSIA**  
MS ISO/IEC 17025 TESTING  
SAMM NO. 085

**TEST REPORT**

REPORT NO.: 2020FE0365	PAGE : 1 OF 18
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**THIS TEST REPORT IS ISSUED IN SECURED PDF SOFTCOPY**

**Applicant :** KOTO ASIA SDN. BHD (716332-P),  
3A Jalan Teknologi,  
Taman Sains, Kota Damansara,  
47810 Petaling Jaya,  
Selangor Darul Ehsan.  
(Attn.: Mr. Tan Jen Hwa)

**Manufacturer :** Same as above

**Product :** KOTO Insulated Concrete Form

**Reference Standard/ Method of test :** BS 476: Part 22: 1987  
Methods for determination of the fire resistance of non-load bearing elements of construction.  
Clause 5 – Determination of fire resistance of partition

**Description of test specimen :** Hose Stream test utilizing the test methodology given in ASTM Standard E2226-10: Standard Practice for Application of Hose Stream

**Date Received :** 13 March 2020

**Job No. :** J20201440186

**Overall test result :** **Fire Resistance Test**

**Integrity :** 120 minutes  
**Insulation :** 77 minutes (failure occurred)

**Hose Stream Test**

The wall panel system maintained its integrity with no development of any hole, crack or other penetrating that allows the passage of water from the hose stream and wetting on the unexposed surface of the test assembly.

Issued date : 24 August 2020

Approved Signatory:   
(KHAIRUL ANWAR KAMARUDDIN)  
Testing Executive

AZMI MUSA)  
Head  
Fire Protection Section  
Testing Services Department

No. Fail: JBPM/MP/RNP:700-7/2/25-99 ( 2 )  
(BAHARU)

**SIJIL PEPASANGAN KESELAMATAN KEBAKARAN**  
APPROVAL CERTIFICATE

**Jabatan Bomba dan Penyelamat Malaysia**  
dengan ini memperakukan  
Fire and Rescue Department of Malaysia  
hereby certify

**WALL SYSTEM**  
'KOTO INSULATED CONCRETE FORM' Thickness: 180mm

Berdasarkan Piawai  
Complying with  
**BS 476: PART 22:1987**

**Syarikat Berdaftar**  
Registered company

**KOTO ASIA SDN BHD (716332-P)**  
Lot 3781, Jalan 4D,  
Kampung Melayu Subang,  
40150 Shah Alam,  
Selangor DE.

Tempoh sah perakuan: 11/12/2020 hingga 10/12/2021

(DATO' YUSOF BIN SIDEK)  
Pengarah  
Bahagian Perancangan dan Penyelidikan  
b.p. Ketua Pengarah  
Jabatan Bomba dan Penyelamat Malaysia.

Tarikh: 27 Disember 2020

**\*\* Peringatan :**  
Silta patuhi sepenuhnya syarat-syarat dan had 19 of 19 seperti dalam Lampiran A1

**CIDB MALAYSIA**

**IBS MANUFACTURER & PRODUCT ASSESSMENT & CERTIFICATION IMPACT**

Adalah dengan ini disahkan bahawa :  
It is hereby verified that :  
KOTO ASIA SDN. BHD. (716332-P),  
NO. 3A, JALAN TEKNOLOGI, TAMAN SAINS,  
KOTA DAMANSARA, 47810 PETALING JAYA,  
SELANGOR.

Merupakan :  
Is :  
**PENGLUAR**

Lokasi Kilang :  
Factory Location :  
LOT 3781, JALAN 4D,  
KAMPUNG MELAYU SUBANG,  
40150 SHAH ALAM, SELANGOR.

Sebagai syarikat Status IBS yang mengeluarkan produk IBS berikut:  
As an IBS status company that manufactures the following IBS components:  
**SISTEM INOVATIF:**  
- KOTO INSULATED CONCRETE FORM (ICF)

No. Laporan :  
Report No. :  
**ISL070421IBS3221**

Tarikh Dikeluarkan :  
Issue Date :  
**19 JULY 2021**

Sah Sehingga :  
Valid Until :  
**19 JANUARY 2022**

Kategori :  
Category :  
**PENGLUAR**

Standard Rujukan :  
Reference Standard :  
**ENGINEERING INSPECTION**

**CIDB IBS SDN BHD**  
Lot 8, Jalan Chan Sow Lin,  
55200 Kuala Lumpur  
Malaysia

TEL: 03-92816909  
FAX: 03-92815870

Laman Web  
www.ibscentre.com.my

**DATUK IR-ELIAS ISMAIL**  
Timbalan Ketua Eksekutif I

**Pendaftaran ini hendaklah diperbaharui selawat-lewatnya 30 hari sebelum tarikh tamat tempoh.**  
This registration shall be renewed within 30 days before expiration date.