

Introduction of Feasibility Study and ABE's Pre-Stressed Concrete Tank

Joint Study Team of



ABE NIKKO KOGYO CO., LTD.



KMC

Kaihatsu Management Consulting, Inc.



& Ceywater Consultants (Pvt.) Ltd.

Dec. 19, 2013

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Contents of the presentation

1. Objectives of the Feasibility Study on Pre-stressed water tanks
2. Features of ABE's Pre-stressed water tanks

2



Objectives of the Feasibility Study on PC water tanks

Introduction of the
parties involved in
the Study

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ABE NIKKO KOGYO CO., LTD.

- Established in 1949
- Head office: Gifu prefecture, Japan.
- 5 branch offices, 3 material centers and 5 factories
- Number of staff : 499
- Annual turnover: JPY25 billion (Rs. 36 billion): FY2012
- Specialized in constructions of pre-stressed concrete structure





Abe Nikko Kogyo Co. Ltd.

- Constructed the first PC tank in 1957.
- Constructed more than **5,000** PC tanks so far. They have **60%** of share in PC tanks in Japan.
- **International experience** in Egypt, Jordan, Bhutan, etc.
- **Rich experience and technical know-how** on design and construction.

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Abe Nikko Kogyo Co. Ltd.



プレビーム合成桁橋

PC bridges



プレキャストP C床版
(高炉スラグ微粉未使用)

PC highways



ループ橋

Mono-rails



下路桁橋



プレキャストT桁橋



新交通システム (リニア)



軌道桁 (モノレール)



混合橋



R Cアーチ橋

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ABE NIKKO KOGYO CO., LTD.

Abe Nikko Kogyo Co. Ltd.



東京都羽村市 水道事務所新築工事



京都府綾部 総合運動公園野球場

buildings



東海ユニオンビル新築工事

Sports grounds



静岡県 沼津市



徳島コミュニティセンター

PC swimming pools

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Abe Nikko Kogyo Co. Ltd.

■ PC板



PC panels



コンクリート直結軌道用PCまくらぎ
(横浜市交通局 グリーンライン)

Railway sleepers



弾性直結軌道用PCまくらぎ
(独立行政法人 鉄道建設・運輸施設整備支援機構 九州新幹線建設局)

■ PCスラブ PS slabs





弾性直結軌道用PCまくらぎ



弾性直結軌道用PCまくらぎ



Kaihatsu Management Consulting Inc.

- A consulting company located in Tokyo.
- Areas covered:
 - International cooperation
 - Global business support : in all over the world
- Experience in water sector projects in Sri Lanka:
 - Ex-post evaluations of
 - TNC
 - Greater Colombo Environmental Improvement Project II & III
 - Lunawa Environmental Improvement and Community Development Project and
 - Feasibility Study
 - Water Supply Schemes by Toyota Trading Corporation.
- Local Company : KMC Lanka in Colombo

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Objectives of the Feasibility Study

1. Current situation and future plan of water supply facility in the country
2. Technical issues of PC water tanks
3. Identify comparative advantages: PC v.s. RC
4. Planning for a pilot demonstration project
5. Planning for the future business opportunities
6. Identify Sri Lankan partners for construction

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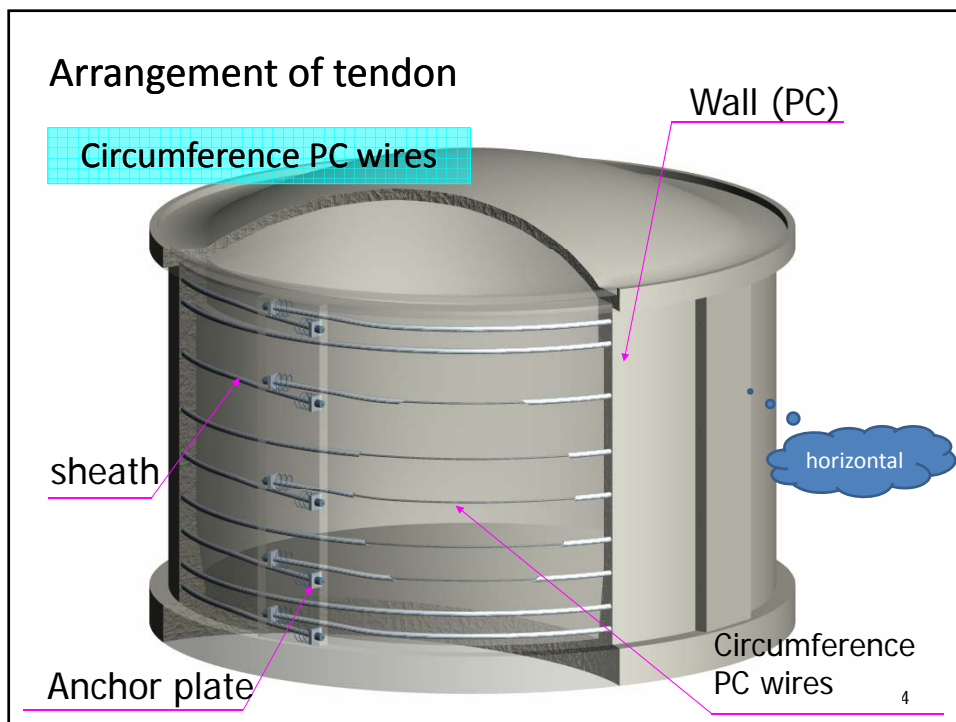
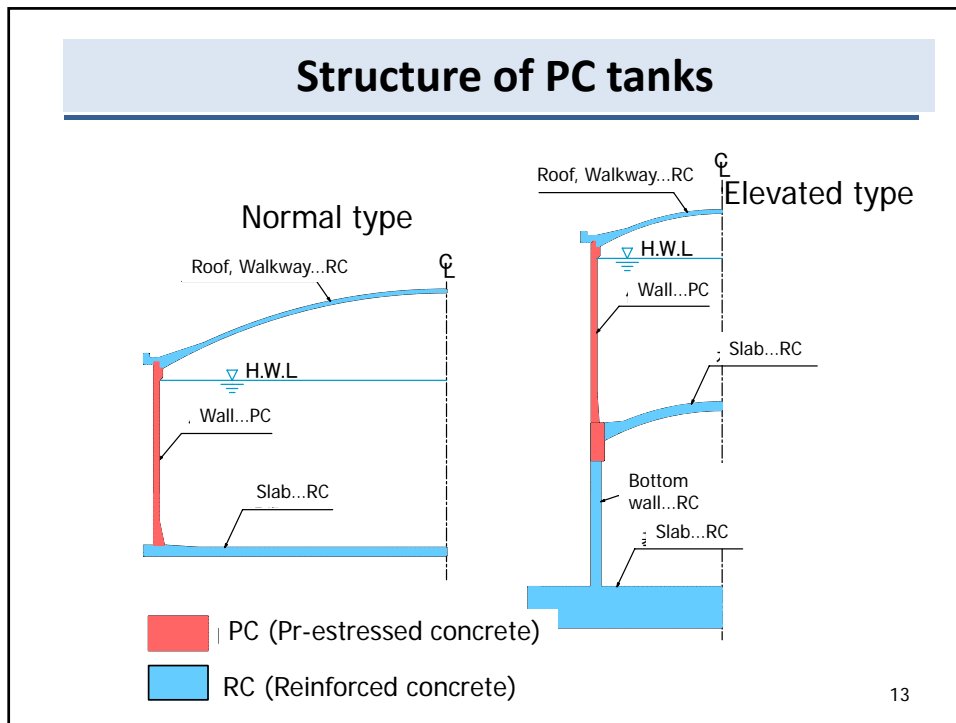
Team members			
Name	Title in the Joint Study Team	Organization	Expertise
Eng. Hiroshi Nishio	Team Leader	Senior Executive Managing Director, Abe Nikko Kogyo	Civil engineering
Eng. Shigemasa Kafada	Chief of the technical study	Department Manager, Vessel Technical Dep., Abe Nikko Kogyo	Civil engineering
Eng. Akira Miyazima	Water supply facility	Manager, Construction Dept. Chubu Branch, Abe Nikko Kogyo.	Construction management
Eng. Hin Rachana	Transmission and distribution facility	Consultant, Nakanihon Engineering Consultants	Designing of transmission and distribution facility
Ms. Tomoko Tamura	Project Manager, Socio-economic study	Consultant, International Cooperation Dep. KMC	Socio-economic study
Mr. Hiroshi Okabe	Business planning	President, KMC	Organizational development
Ms. Mika Kawamoto	Business planning and project coordination	Consultant, International Cooperation Dep. KMC	Management of natural resources
Dr. Masao Yamada	Regional Contribution	Senior Advisor, Live of Water, Chubu Forum, Nagoya	Regional Development
Dr. Chisato Takahashi	Research Assistant	KMC Lanka/ PARCIC	Social Study

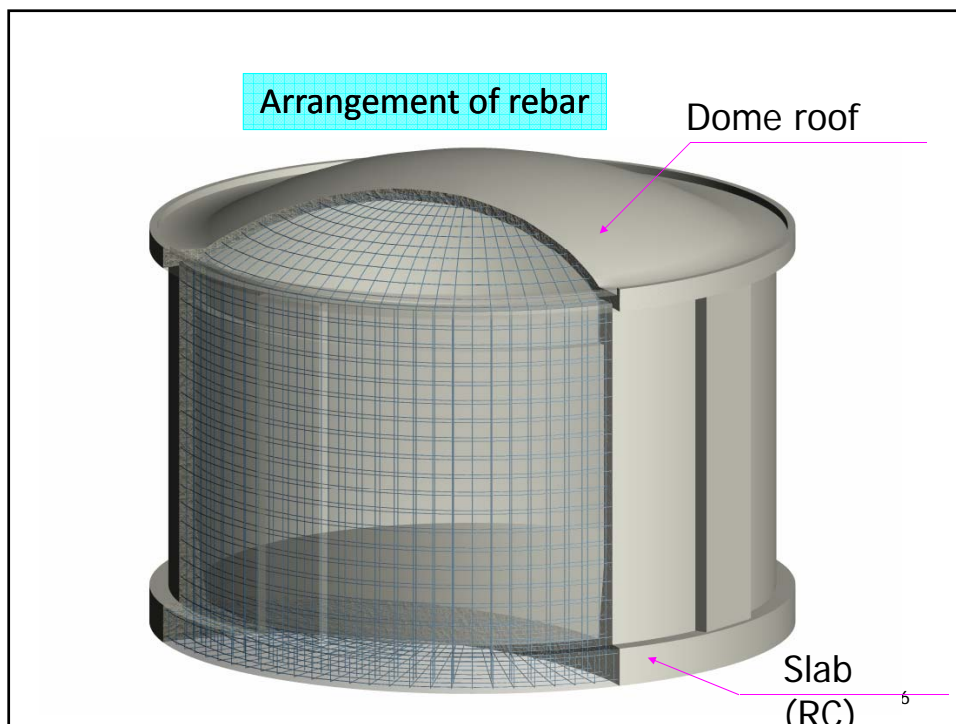
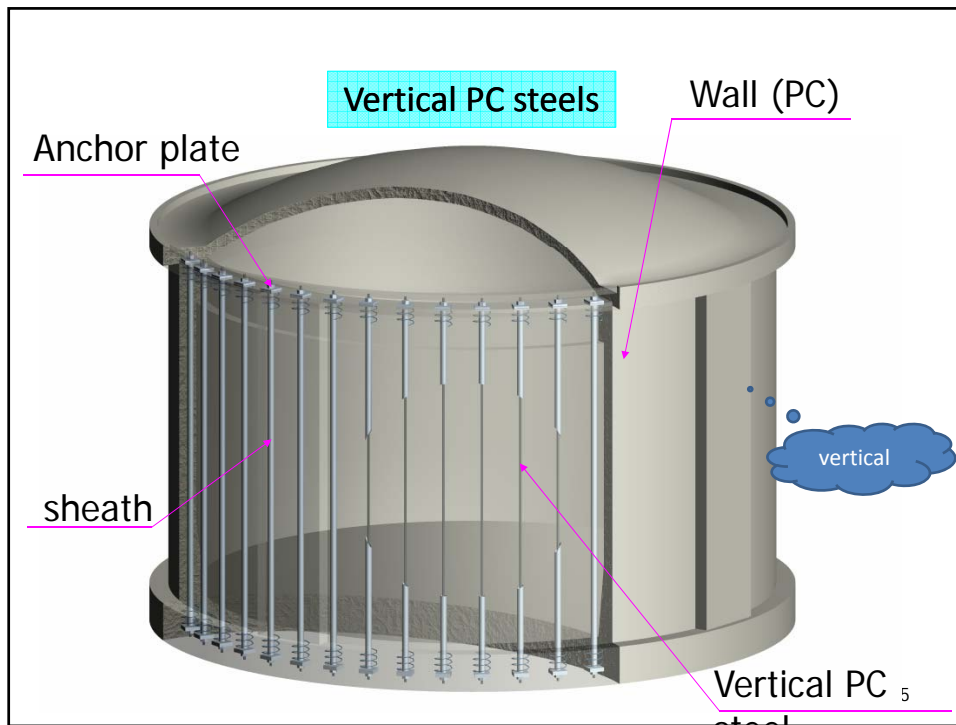
 **A team of Ceywater Consultants**

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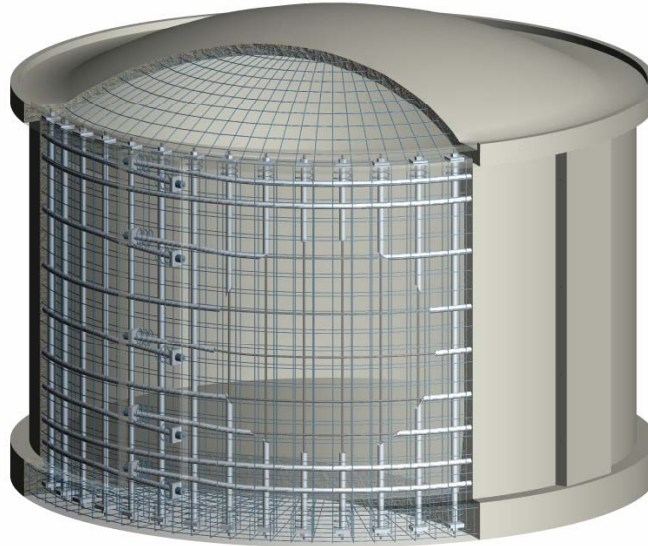
Introduction of ABE's PC tanks

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Arrangement of tendon and rebar



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Advantages of ABE's PC Tanks

Extremely Durable

- Very strong
- No cracks. No leakage. No maintenance.
- Estimated life time: more than 100 years.
- Almost no damage by **earthquakes and tsunami**.



a) 全景



b) 周辺地盤の地割れ

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Advantages of ABE's PC Tanks

Less land acquisition needed

- No limitation of the depth of the water.
- Elevated type PC tank can be 50m high.



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Advantages of ABE's PC Tanks

Less cost

- Less volume of concrete needed
← Because walls can be thinner.
- Less land is needed.
← Because it can be higher. Ex) 50m
- Less earthwork is needed.
← Because PC tanks doesn't need excavation

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Advantages of ABE's PC Tanks

Speedy in construction

- Pre-cast concrete can be used
- Air dome method for roofing

• • • Explain later

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Applications of PC tanks

- ✓ Water supply
- ✓ Agricultural water
- ✓ Sewerage
- ✓ Industrial water
- ✓ Gas and Oil

...and so on

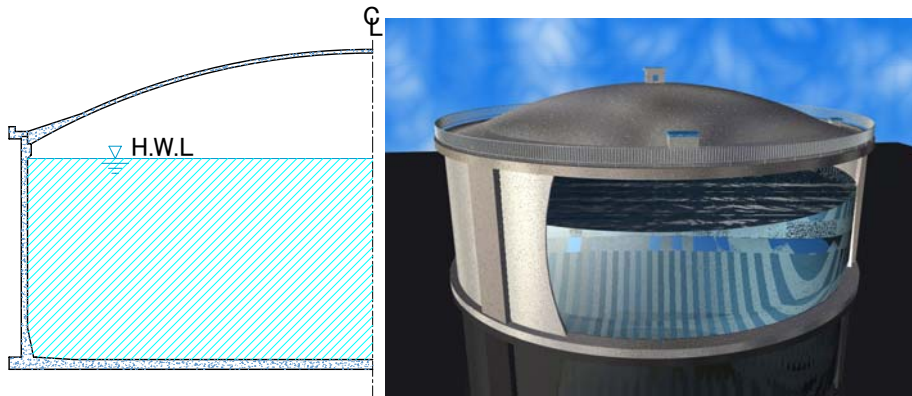


長野県・諏訪市 諏訪湖農田排水処理場建設工事
容量=4,600m³ 内径=MAX19.0m 有効水深=26.0m

No.128

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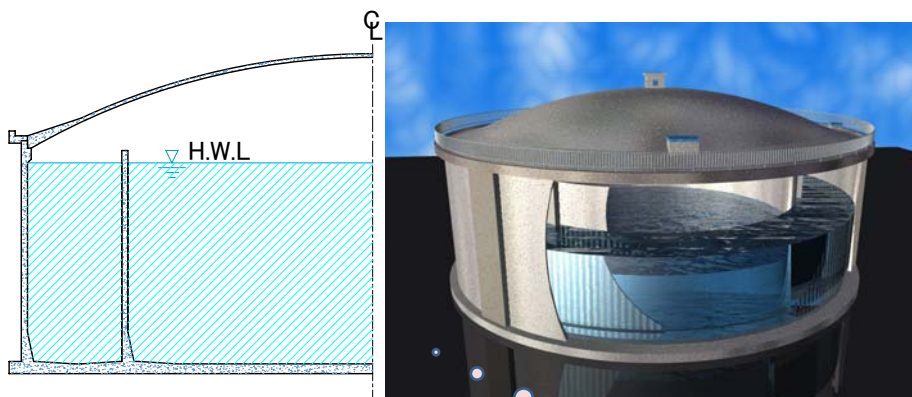
1) Normal type



The most standard PC tank.

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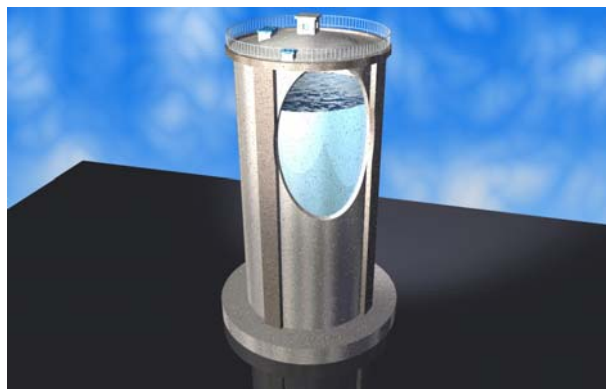
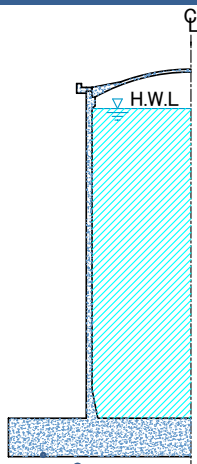
2) Double type



Useful for
cleaning and
maintenance

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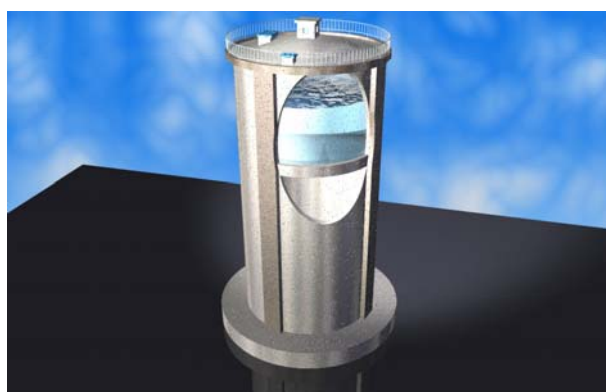
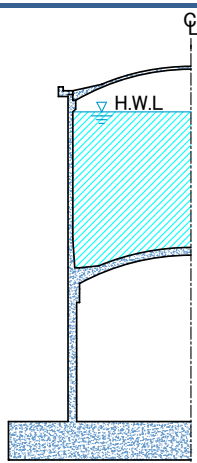
3) Tower type



Surge tank

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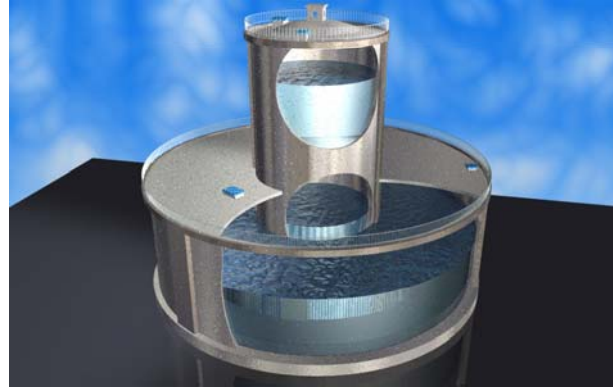
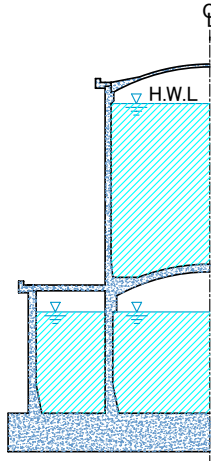
4) Elevated type



Water tank is in elevated position.

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5) Compound type



Space saving

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Some of the achievements of ABE



Okinawa



Saitama

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Some of the achievements of ABE



Ibaragi

Yamagata



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Some of the achievements of ABE



Egypt



Jordan



Bhutan

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Some of the achievements of ABE



Large volume ($V=58,000\text{m}^3$)



Twin towers

福岡県・北九州市 不屋橋配水池築造工事
 容量=250万 内径=7.5m 有効水深=5.5m 全高=31.3m・2塔 No.111

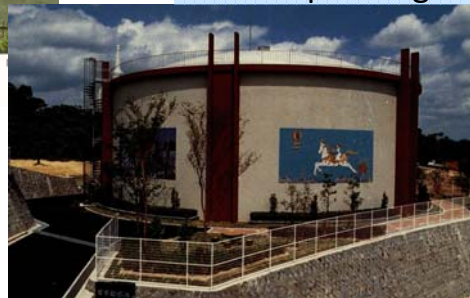
Some of the achievements of ABE



Oval tank

千葉県・船橋市 南房総通水路長柄PC長円形吐水槽
 有効容量=2,700万 型状=54.0m×18.0m 有効水深=3.0m

Wall painting



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Some of the achievements of ABE



Decorative walls



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Some of the achievements of ABE



福井県・朝日町 中央地区統合農畜水道事業配水池築造工事
 高区 容量=87m³ 内径=6.8m 有効水深=3.0m No.129
 低区 容量=約1,280m³ 内径=24.3m 有効水深=5.0m
 低区 容量=内 889m³ 内径=15.6m

Compound Type
 Ground reservoir +
 elevated tower



金ヶ崎町上水道第三次拡張森山配水池工事
 二重高架水槽 (Va=3,500; D=27m; He=6m) No.29
 (Va=150; D=8m; He=3m)

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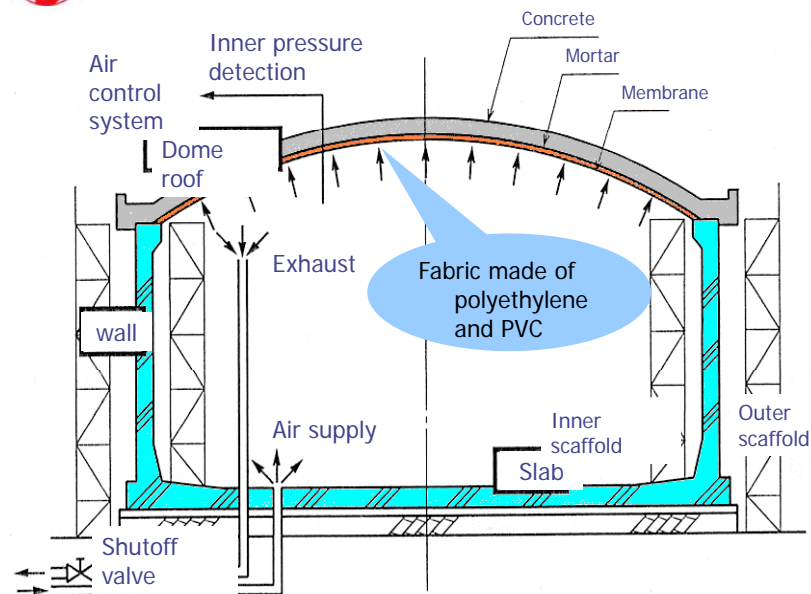
Egg-shaped digester



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Air dome engineering



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Air dome engineering

Anchor bolts
balloon

Supporting tapes, coating, gum and mortal

Rebar and concrete

Days	10	20	30	40	50
Air dome	[Progress bar]		Ex) 5000m ² No form work needed No dangerous work		
conventional	[Progress bar]		[Progress bar]		[Progress bar]
	型枠支保工 組立		型枠解体 足場組換え		支保工解体
	配筋 養生		養生		防触工

Pre-cast concrete PC tank

PC concrete panels
4m x 2m (3-5.5t)

Small scale air ration
sewerage digestion tank

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Introduction to pre-stressing

Definition

Pre-stressing is an application of initial compressive stress on concrete structures to enable the structure to counteract the tensile stresses arising during its service period.



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History

1. Force-fitting of metal bands on wooden barrels;

The metal bands around the barrel induce a state of initial hoop compression to counteract the hoop tension caused by filling of liquid in the barrels.



wooden barrels wounded with steel bands

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2. Pre-tensioning of spokes in a bicycle wheel;
The pre-tension is applied in the spoke to such an extent that there will always be a residual tension in the spoke.



spokes of a bicycle wheel in pretension

- The concept of pre-stressed concrete is also not new. In 1886, a patent was granted for tightening steel tie rods in concrete blocks. This is analogous to modern day segmental constructions.
- Early attempts were not very successful due to low strength of steel at that time. Since we cannot pre-stress at high stress level, the pre-stress losses due to creep and shrinkage of concrete quickly reduce the effectiveness of pre-stressing.

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Comparative Advantages of PC

- Take full advantages of high strength concrete and high strength steel
- Need less materials
- Smaller and lighter structure
- No cracks (Less maintenance required)
- Use the entire section to resist the load
- Better corrosion resistance
- Very effective for deflection control
- Improve shear resistance
- Can withstand during natural disaster situation (Ex. Tsunami, Tremors)

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Present Situation in Sri Lanka

- Details of existing reservoirs were collected by a study team covering all regions in Sri Lanka.
- Many reservoirs are RC except few.
- During the survey, It was revealed that many reservoirs need structural rehabilitations due to many reasons.
- There are some places, external pre-stressing has been done to strengthen the RC structure.
- External appearance is not good due to deposition of hydrated products surfaces.

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Present Situation Cont'd



The First PC Tank in Sri Lank, Beekka

This is a PC tank constructed in 1976, Capacity - 9000m³, Shape - Circular, Diameter - 116 feet (34.8m) , height- 30 feet (9.0m), Base – RC combination, Wall thickness – 9 inches (225mm), Roof – 4 inches (100mm) thick dome roof.

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Present Situation Cont'd



Elevated tower at Gabadaweediya, Matara

Initially constructed as RC around in 1960, then pre-stressed around in 1992 under ADB 02nd Project as a renovation for enhancing the durability.

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Present Situation Cont'd



Elevated tower at Nupe, Matara

Initially constructed as RC around in 1960, then pre-stressed around in 1992 under ADB 02nd Project as a renovation for enhancing the durability.

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Analysis and Design Considerations for Comparison

		RC	PC
Structural Analysis	Loads	Self weight, super dead, imposed and water pressure	
	Structural Analysis	FEM using SAP2000	
	Limit States	SLS and ULS	
	Joint constraints	Roof dome & circular wall joint = Pinned Circular wall joint & base joint = Fixed	
Code	BS8007: 1987 & BS8110: 1985		
Material	Concrete	G35A	G35A
	Steel	$f_y = 460 \text{ N/mm}^2$	$f_y = 460 \text{ N/mm}^2$ $f_{yt} = 1860 \text{ (High tensile steel tendons)}$
Durability	Crack width	0.1 ~ 0.2 mm	No cracks

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Cost Comparison

Item No	Item Description	Cost in SLRs.	
		In PC	In RC
1	2000 m ³ Tank (Beruwala)	26,984,694.33	31,168,279.42
2	3000 m ³ Tank (Katunayake)	35,376,036.87	
3	4000 m ³ Tank (Katunayake)	42,102,090.47	
4	8000 m ³ Tank (Ambatale)	76,000,015.26	83,297,612.51
5	18000 m ³ Tank (Kalatuwawa)	134,749,466.22	135,451,633.16

Note: NWSDB rates were used. O/H and profit included.

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Design and Construction of Pre-Stressed Concrete Tank

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RC / BS8007

2.2.3.3 Cracking. For the purpose of defining the serviceability crack width limit state, the maximum design surface crack widths for the exposure conditions defined in 2.7.3 should be taken to be the following.

a) *Reinforced concrete.* The maximum design surface crack widths for direct tension and flexure or restrained temperature and moisture effects are:

- 1) severe or very severe exposure: 0.2 mm;
- 2) critical aesthetic appearance: 0.1 mm.

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PC / BS8110-Part1

4.1.3 Serviceability classification

In the assessment of the likely behaviour of a prestressed concrete structure or element, the amount of flexural tensile stress allowed under service load defines its class as follows:

- class 1: no flexural tensile stresses;
- class 2: flexural tensile stresses but no visible cracking;
- class 3: flexural tensile stresses but surface width of cracks not exceeding 0.1 mm for members in very severe environments (see Table 3.2) and not exceeding 0.2 mm for all other members.

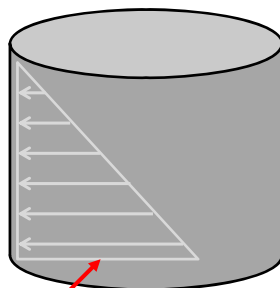
Class1 no flexural tensile stress

PC tanks : **no direct tensile stress**

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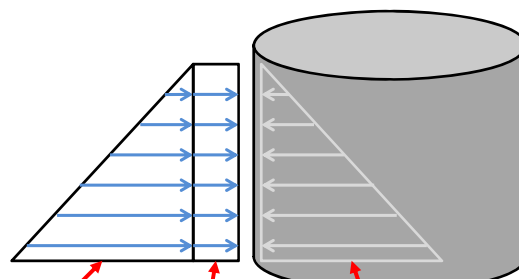
Design

RC / BS8007



Hydrostatic pressure

PC /BS8110-Part1

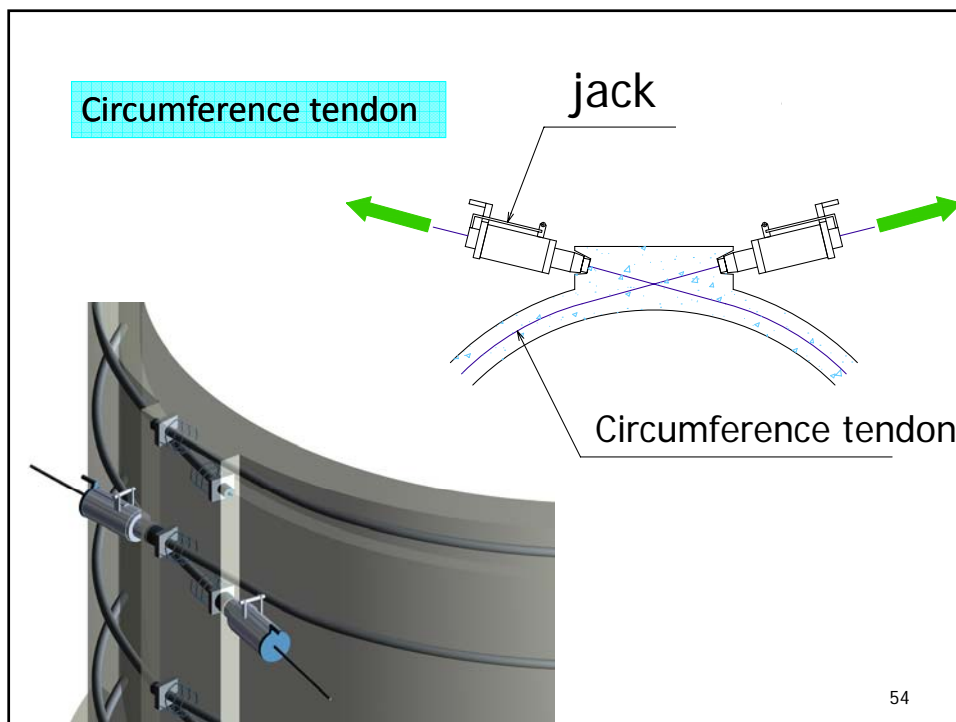
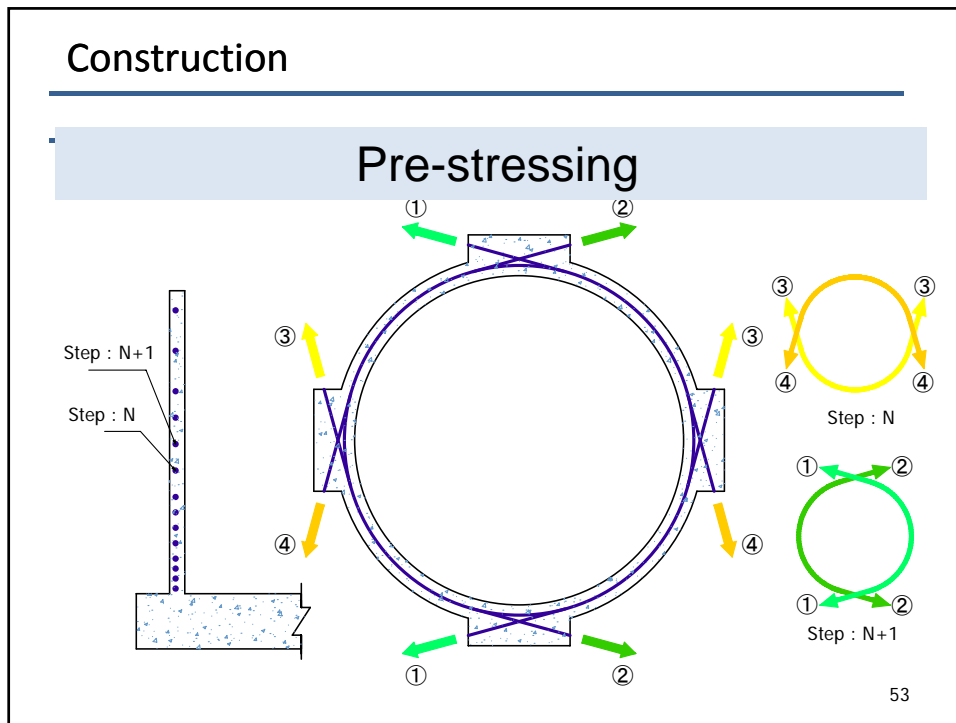


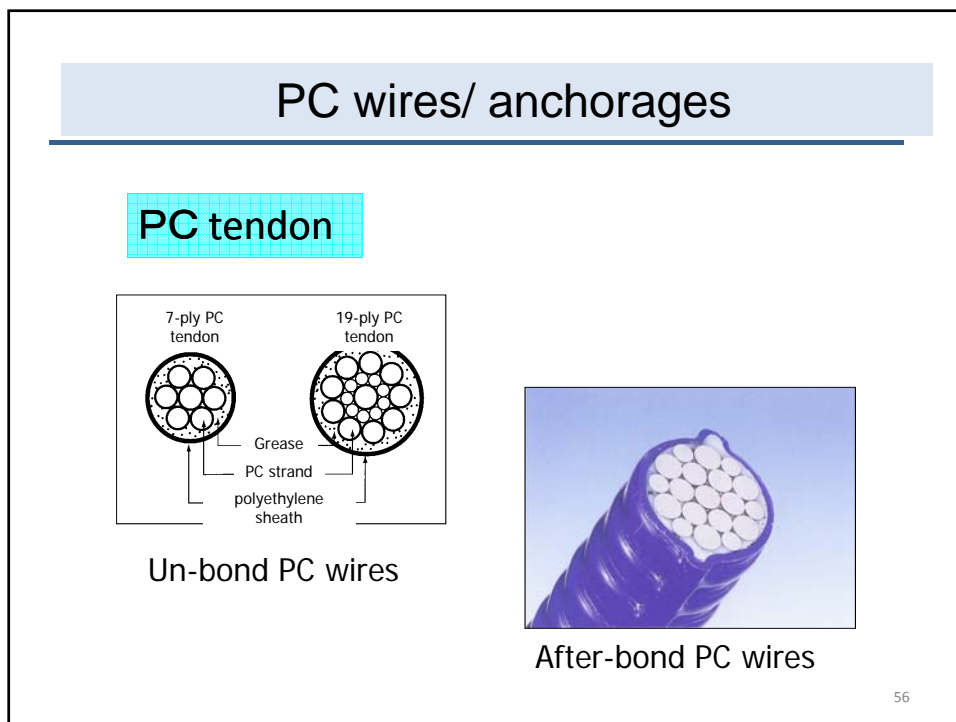
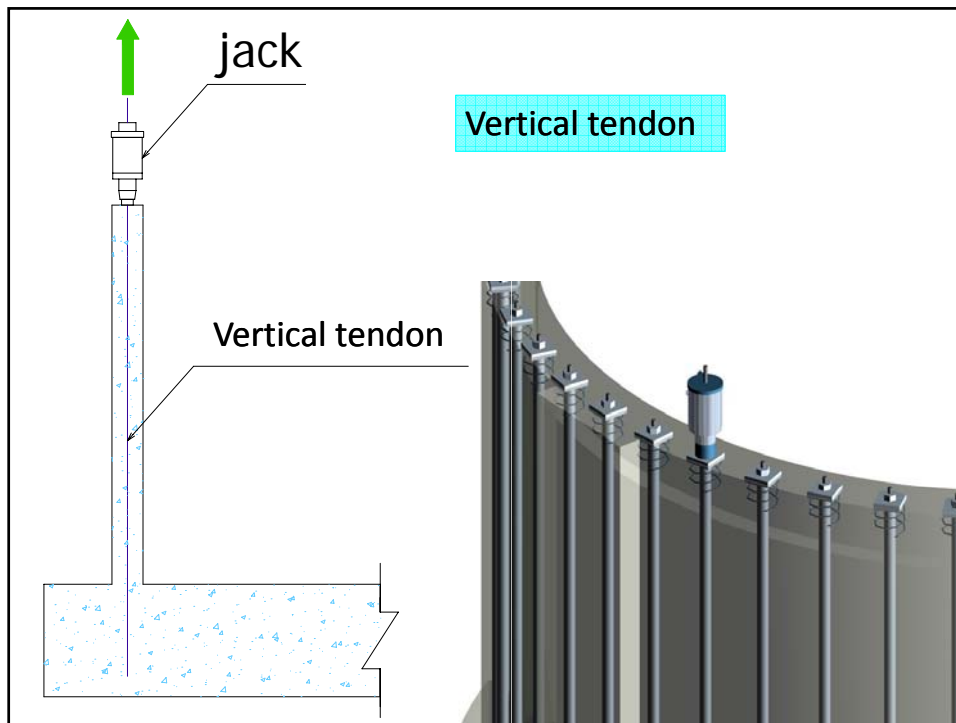
Comparable hydrostatic pressure

Allowance compressive stress

Hydrostatic pressure

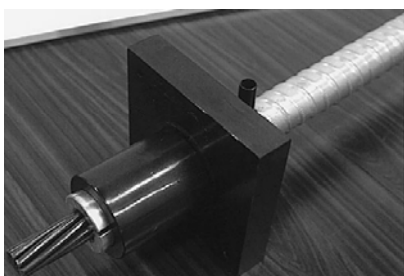
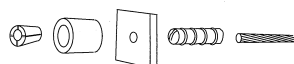
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Anchorage

Single strand system



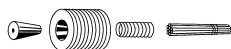
Normal PC bar



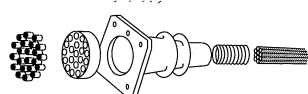
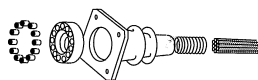
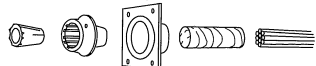
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Anchorage

Multi wire system

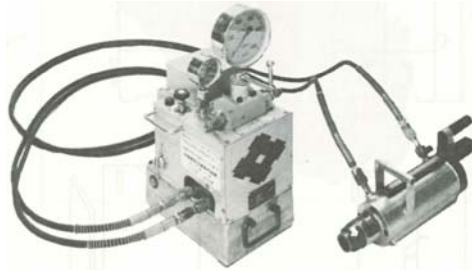


Multi strand system



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Prestressing device



Oil pressure pump

Jack (for PC strand)



Jack (for PC bar)

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Excising or ongoing tanks in Sri Lanka

Case 1. RC Tank: This was constructed in 1980's, abundant for many years, and rehabilitated very recently due to leakages. A circular reservoir with buttress, and capacity of 18000m³.



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Case 2. This was constructed in 2004. A rectangular large reservoir having considerably thick walls, and capacity of 18000m³.



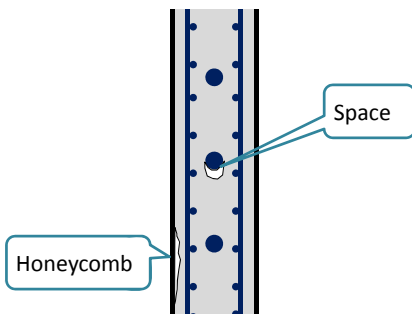
61

Construction

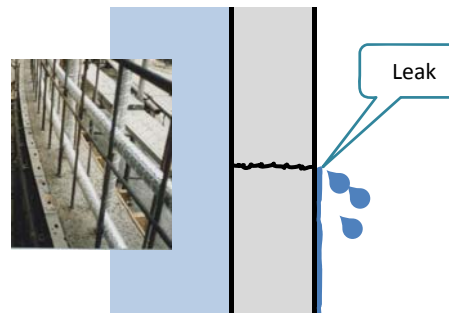
Cast concrete and Treatment of construction joint

Poor cast concrete

*PC Wall is thin.



Poor treatment of construction joint



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Case 3. Construction is ongoing. A circular PC reservoir, and capacity of 22,000m³.

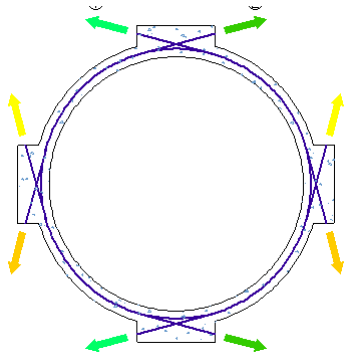


Construction of Ground Reservoir progress up to end of November 2013

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Construction

Pre-stressing



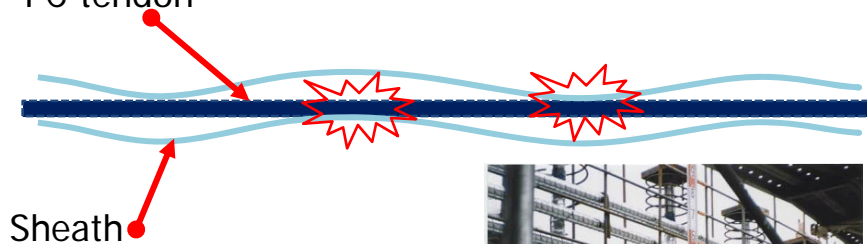
The appropriate number of the column depends on the radius of the tank. Bigger radius requires more column to strain the steel. In case 3, the radius of the tank is 50m, so it requires 6 or 8 columns to assure the pre stress effectively, and economically.

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Construction

Placement precision of sheath and PC tendon

PC tendon



Sheath

Prestress is short



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Construction

Handle the sheath with care

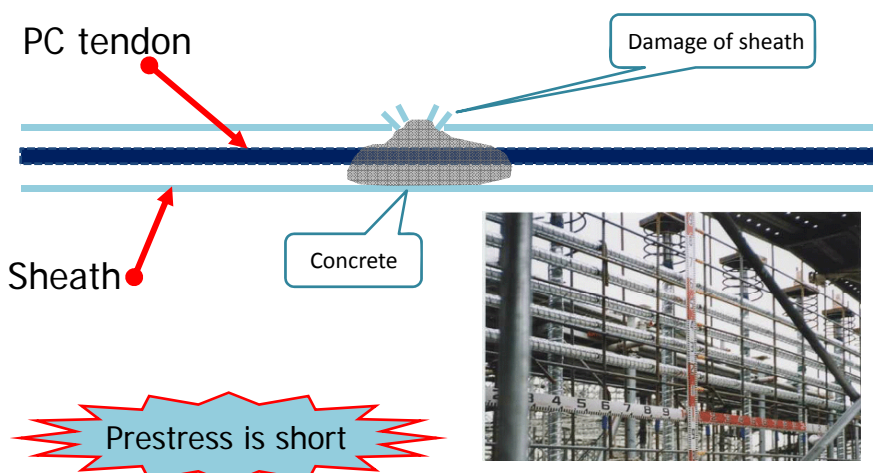
PC tendon

Sheath

Concrete

Damage of sheath


Prestress is short



The diagram illustrates the construction of a pre-stressed concrete tendon. It shows a central PC tendon (red arrow) surrounded by a sheath (blue arrow). A concrete layer (blue arrow) is shown between the tendon and the sheath. A callout box labeled 'Damage of sheath' points to a break in the sheath. A red starburst shape contains the text 'Prestress is short'. A photograph on the right shows a construction site with scaffolding and a crane.

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Arrangement of tendon



The four photographs show the arrangement of tendons in a construction site. The top-left photo shows workers on a platform with a sign. The top-right photo shows a worker holding a sign. The bottom-left photo shows a large number of tendons arranged in a curved pattern. The bottom-right photo shows a close-up of a tendon with a blue cap and a label.

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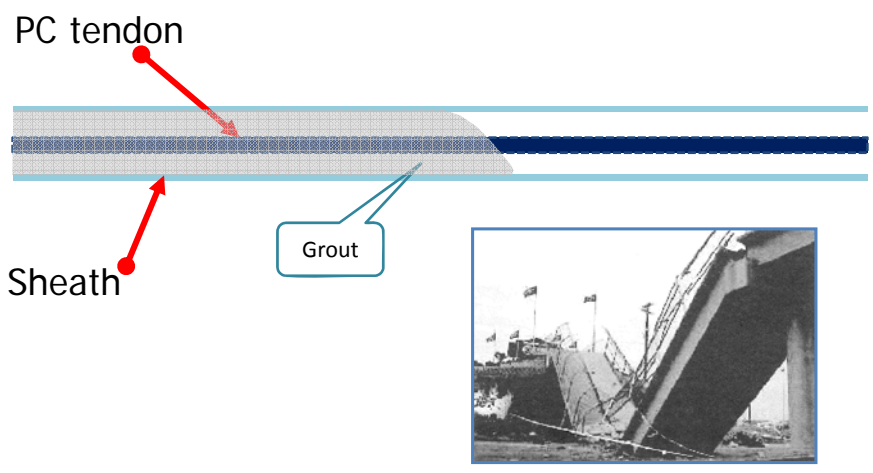
Construction

Grouting

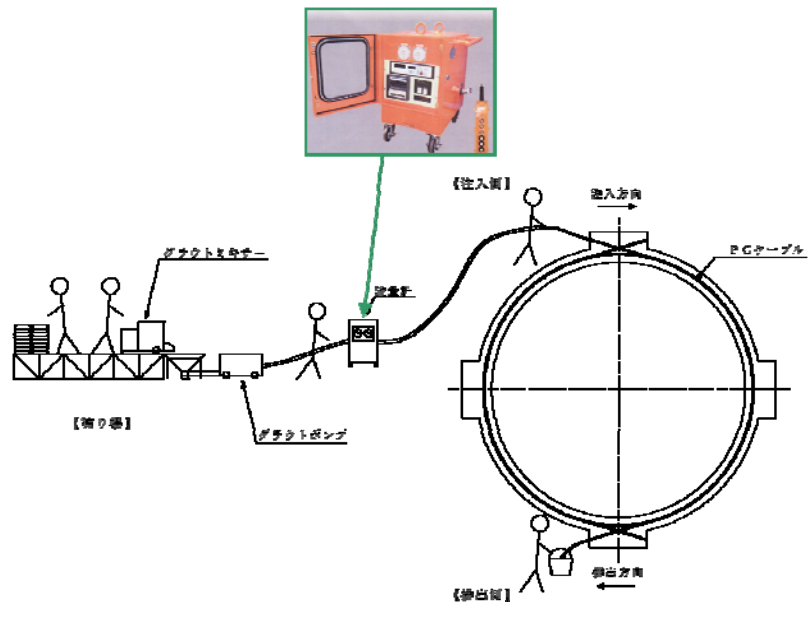
PC tendon

Sheath

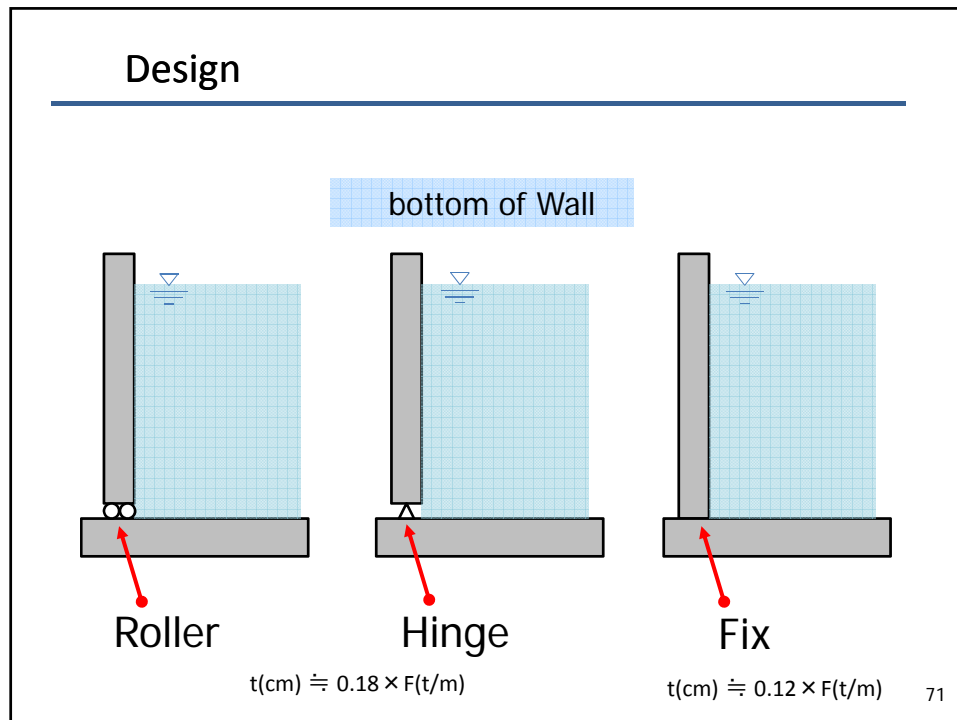
Grout



North Carolina pedestrian bridge 69



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Cost for PC work and PC related material

Rs. 2000/capacity of 1m^3

COVERAGE : Diameter / depth of water = 3 to 4

including :

- all necessary temporary platforms, ducts and reinforcing stools to keep in position
- anchoring systems
- tensioning of wires
- grouting of ducts after tensioning protection mortar

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Business Plan

- The Study Team commenced the preparatory work in the mid-September, 2013 and will complete the study by February, 2014.
- Pilot Demonstration Project
UNDER JICA FUND
- Donor assisted projects of NWSD (ODA)

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Objectives of the Pilot Demonstration Project

- Proof advantages of PC water tanks for the stakeholders.
- Demonstrate the whole process of construction of a PC water tank of ABE Nikko; planning, designing and construction.
- Transfer knowledge and skills on construction supervision of PC water tanks for NWSDB and local construction companies.
- Transfer knowledge and skills on designing of PC water tanks for NWSDB and local consulting companies.
- Establish technical standard of designing and construction of PC water tanks for NWSDB.

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Tentative implementation schedule

(based on last year's schedule)

- EOI: Early June, 2014
- Submission of proposal: End June, 2014
- Selection: July 2014
- Contract negotiation: Aug. 2014
- Commencement of the project: Sep. 2014
- Project period: 1 – 3 years

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PILOT DEMONSTRATION PROJECT UNDER JICA FUND

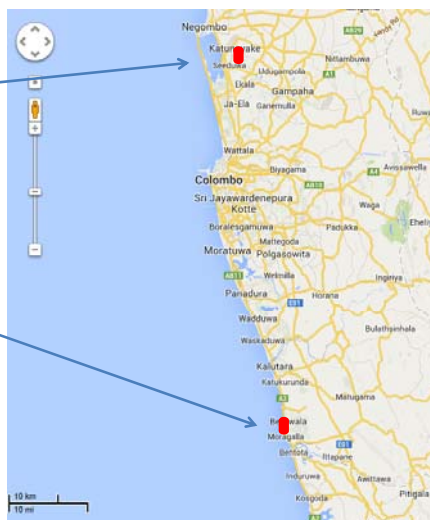
Item	Selection Criteria	
	Parameter Considered	Expected status
1	Capacity of the Tank/Reservoir	Shall be 2,000 m ³
2	Location	In or around Colombo District
3	Land availability	Shall already been acquired by NWSDB
4	Type of the planned tank	Shall be an on land Ground Reservoir
5	Usability of the tank	To be added to the system immediately

76



Proposed locations of the Pilot Demonstration Project

- Katunayake
Bandaranaike International Airport
- Beruwala



77

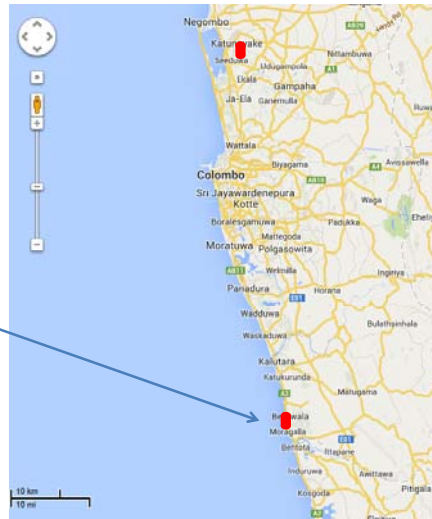
Design, cost and schedule of construction

- Beruwala 2000m³
- Katunayake 1000m³~3000m³

78

Proposed locations of the Pilot Demonstration Project

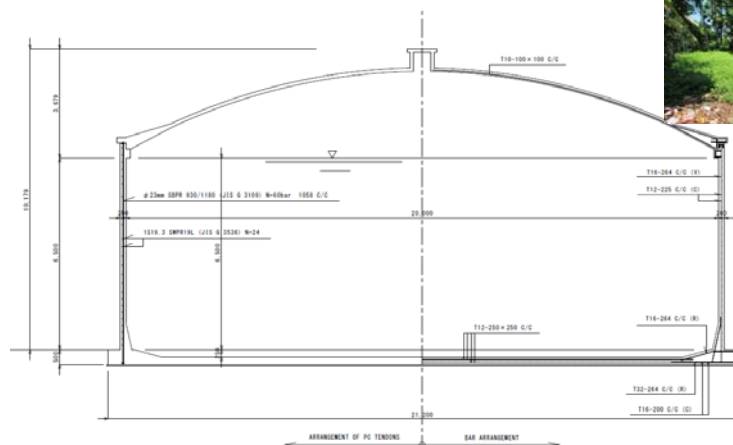
- Beruwala



79

Pilot Demonstration

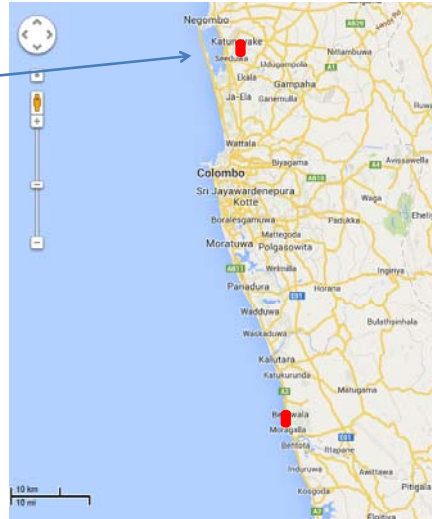
- Beruwala 2000(m³)



80

Proposed locations of the Pilot Demonstration Project

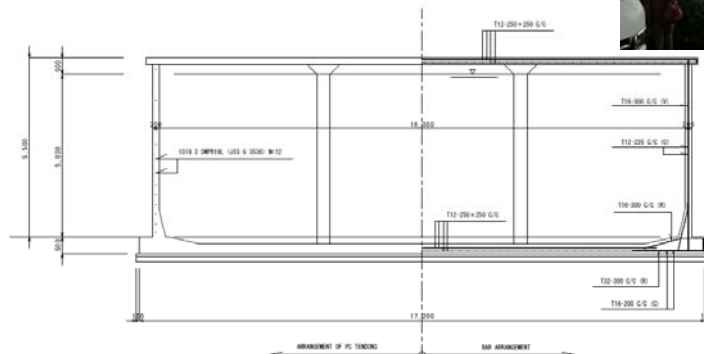
- Katunayake
Bandaranaike International Airport



81

Pilot Demonstration

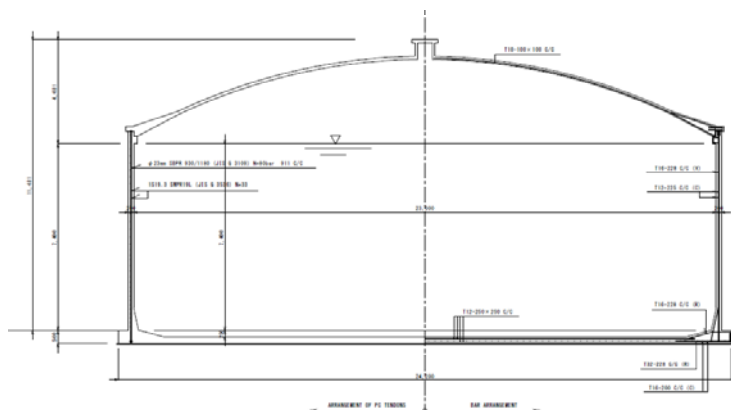
- Katunayake 1000m³



82

Pilot Demonstration

- 2000(m3) to 3000(m3)

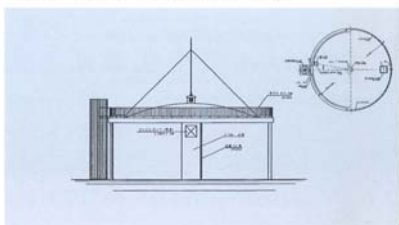


83



長野県・御代田町
平成9年度国庫補助御代田町配水池築造工事
容量 Ve=1,070m³ 内径 D=16.0m 有効水深 H=5.3m

No.190



水資源開発公団 豊ヶ浦用水送水路1号サージタンク工事
容量=1,500m³×2基 内径=16.5m 全水深=6.96m

No.80

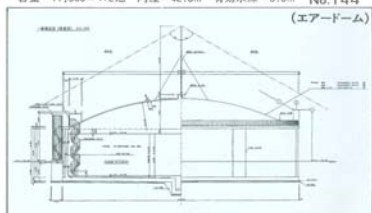
84

future business
ODA

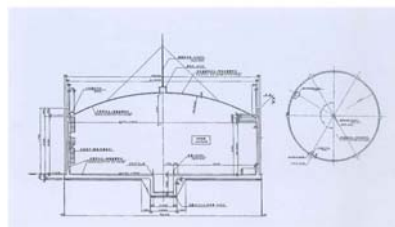
85



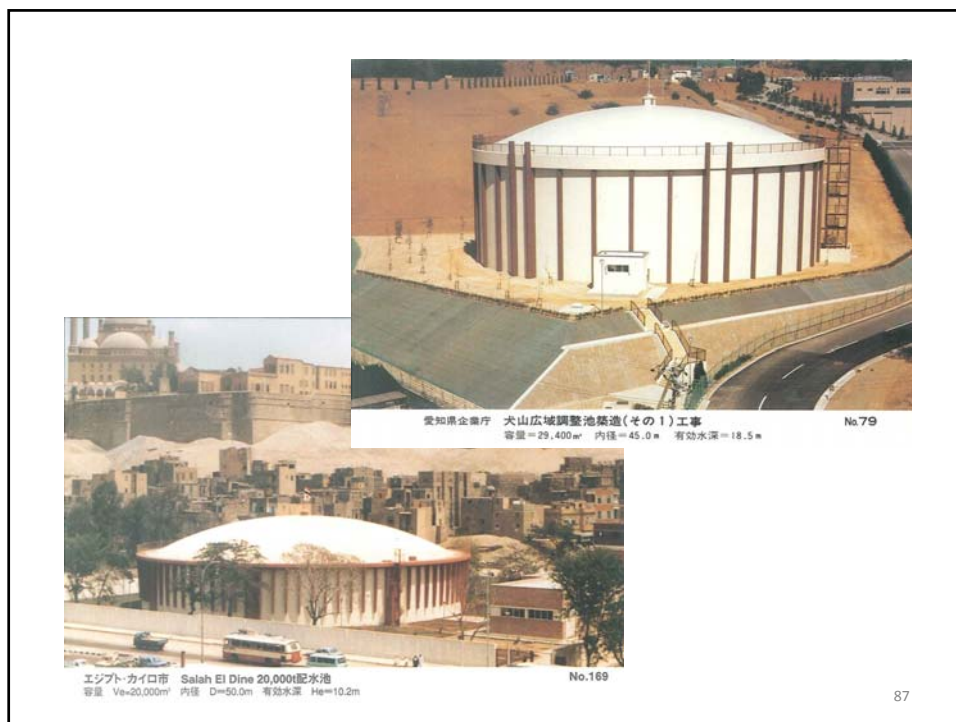
岐阜県・東濃用水道事務所 肥田調整池建設(PCタンク)工事
容量=11,500m³×2池 内径=42.8m 有効水深=8.0m No.144



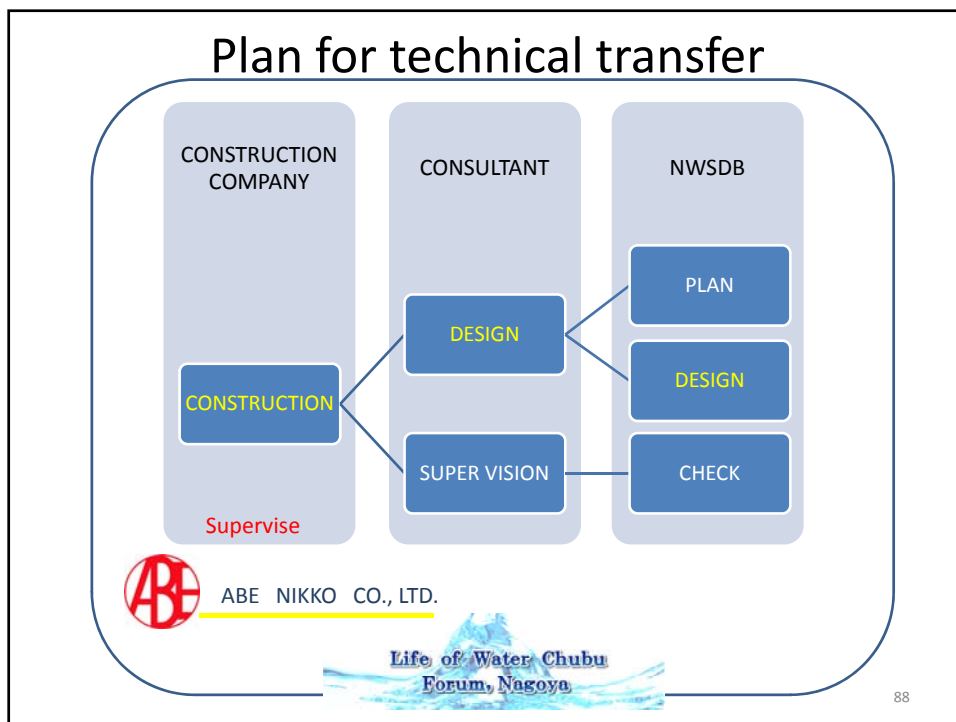
愛知県・全農庁
三ヶ峰広域調整池築造(その2)工事
容量 V=7,500m³ 内径 D=33.0m 有効水深 He=9.0m No.178



86



87



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Plan for future collaboration with Life of Water, Chubu Forum

Professor, Chubu University

Masao Yamada

First of all,

*“Life of water “ Chubu Forum , Nagoya will
assist **ABE** to develop the future plan
in Sri Lanka.*

“Life of Water” Chubu Forum, Nagoya

Development of Chubu-region ~ Sustainable Development Management ~

Nagoya – Chubu Region: Specialists In Water Control

Home to Japan's root
~ 3,000m high mountain range

Wide ranging members of the
“Life of Water” Chubu Forum

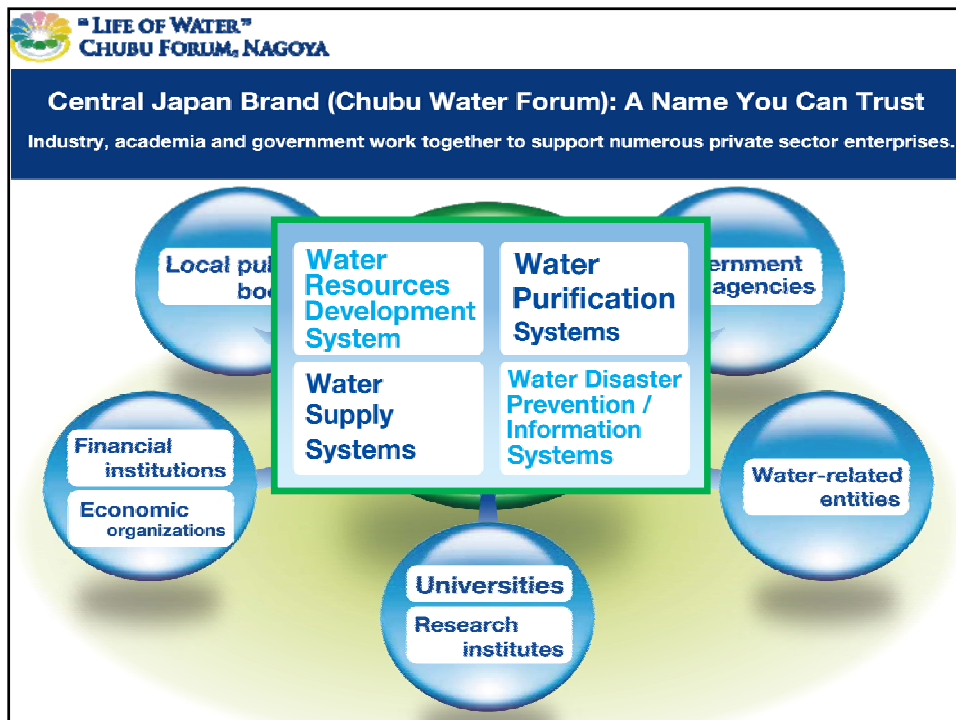
- Economic / financial organizations
- Local government
- Businesses
- Marx/technicians
- Consultants
- General contractors
- Electrical power companies
- Distribution companies
- Research and research institutes
- Public officials
- Central government


Chubu Region population
10 million

Area
60 times larger than Singapore

goya – Chubu Region has a very mountainous geography and available water with respect to the amount of rainfall. This has led to the development and maintenance of sustainable water management systems across the region as a whole, encompassing management of dams, rivers, irrigation, and tap and wastewater facilities, allowing the region to thrive in its unique natural environment while at the same time being one of Japan's foremost urban centers.

The “Life of Water” Chubu Forum comprises a total of 109 business and other organizations, and is capable of offering both low-tech and hi-tech solutions for energy usage, water circulation, as well as the establishment, management and operation of various water-related facilities. The Forum's wealth of experience and technology can help you achieve sustainable development of your community's water resources too!





Life of Water Chubu Forum, Nagoya

- The forum consists of more than 100 enterprises and organizations, including national and local governmental organizations and academia, based in Chubu region (central Japan).
- With competitive water treatment technology, operation know-how on flood control and water utilization, and/or capability of solutions to various water problems, they promote and support activities to develop a “Japanese Water Major”.

Description of Slow Filtration Technology Designed for Villages 100 Year History of Nabeya Ueno Water Purification Plant

Is slow filtration technology sustainable?

- Benefit 1** Little machinery
- Benefit 2** Low energy consumption
- Benefit 3** Low cost
- Benefit 4** Good tasting water
- Benefit 5** Durable

**Constructed in 1914,
the Nabeya Ueno Water Purification Plant
has been providing Nagoya City with
good tasting drinking water for nearly 100 years.**




Specification of slow filtration ponds
(Nabeya Ueno Water Purification Plant, Nagoya City)

Number of ponds	Number of ponds: 14
Average filtration area	Average filtration area: 2,878m ² /pond
Standard filtration speed	Standard filtration speed: 4m/day
Filtration capacity	Filtration capacity: 140,000m ³ /day





Nagoya possesses the special expertise to seamlessly combine slow filtration with rapid filtration.


“LIFE OF WATER”
CHUBU FORUM, NAGOYA





METAWATER
 メタウォーター



 安部日鋼工業



 愛知時計電機



 azbil


 兼工業



 中日本建設
 コンサルタント



 水ing



 テスコ



 豊田通商


Other support members


 前澤工業

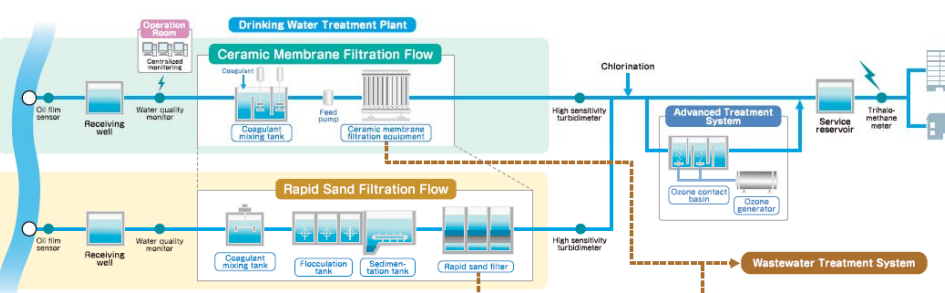

 三菱電機


 第一環境


 名古屋環未来研究所



METAWATER



Origin of the company's name

The word "meta" in METAWATER is a prefix meaning "transcendence" and "change". The nuances of "meta" include the company's commitment to make a continuous effort in taking on new challenges and to keep advancing as a business in order to pass on "water", a limited resource on our planet, to future generations.

Business description


1. Manufacturing and sales of electrical and mechanical equipment for water, wastewater and solid waste treatment systems
2. Engineering, procurement and construction of water, wastewater and solid waste treatment plants
3. Operation & maintenance service and management of water, wastewater and solid waste treatment plants

METAWATER

Ceramic Membrane Filtration System

The unique features of ceramic membrane element, such as high mechanical strength and resistance to chemicals, facilitate the ideal system design that meets the needs of every water treatment plant.

- Safe and high quality water
- Stable operation
- High water recovery rate
- Easy operation & maintenance
- Low operation cost




Ceramic membrane element

Packaged filtration systems



Stationary system




Mobile system

METAWATER

Ozone Generation System

With more than 100 units delivered and in operation to date, METAWATER's ozonation system demonstrates its product development capabilities and client acceptance. This system features a glass-lined ozone generator tube with remarkably low breakage rates, coupled with an advanced high-efficiency, low-harmonics power supply system that provides our clients with utmost in assured performance.


- High-efficiency ozone generator tube
- System design assuring high reliability
- Harmonic control



Electrical Equipment

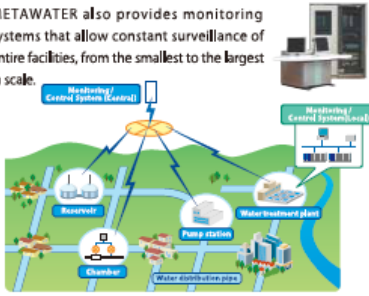
An Extensive Line of Products

- Electrical panels
- Power receiving systems
- Transformers
- VFD equipment
- Operation monitoring and control systems



Monitoring System

METAWATER also provides monitoring systems that allow constant surveillance of entire facilities, from the smallest to the largest in scale.



NGK INSULATORS, LTD.

NGK Insulators responds to the world and the future needs through ceramic technologies.

Business: Manufacture and sale of electric power related equipment including insulators, and of industrial ceramic and beryllium copper products; and plant engineering



1919

NGK Insulators is founded out of a desire to localize the production of "special high-voltage insulators," a key component in the modernization of Japan.

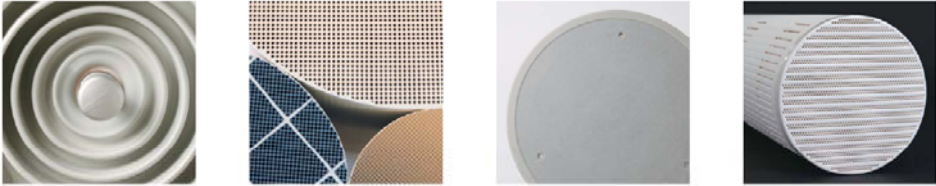
A piece of the insulator that started the production of NGK Insulators (1919)

Workers put the finishing touches on insulators in the early days.

The first formal lab is set up at the factory of company headquarters (1929)

One of the first "special high-voltage insulators" to be produced in Japan.


NGK INSULATORS, LTD.



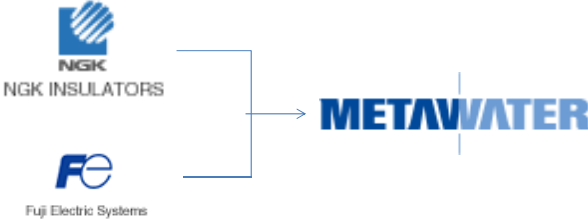
Power Business | Ceramic Products Business | Electronics Business | Research & Development

They offer a line-up of ceramic products, led by automotive exhaust gas purifiers, which serves a broad range of industries and provides smart solutions for modern requirements such as environment protection and energy conservation.


They carry out research and development to look beyond the horizon of what is currently considered possible in the "triple E" areas (ecology, energy and electronics) with the aim of creating new technologies and products for a new age.


 **NGK INSULATORS, LTD.**

In 2008, NGK Insulators, Ltd. established "METAWATER Co., Ltd." as a joint venture with Fuji Electric Co., Ltd.



[一覧に戻る](#)





 **Scope of Works -Comprehensive Water Solution Business-**

 **Municipal Water**  **Public Wastewater**  **Sludge**  **Industrial Water and Wastewater**  **Aquarium and Amusement Park**

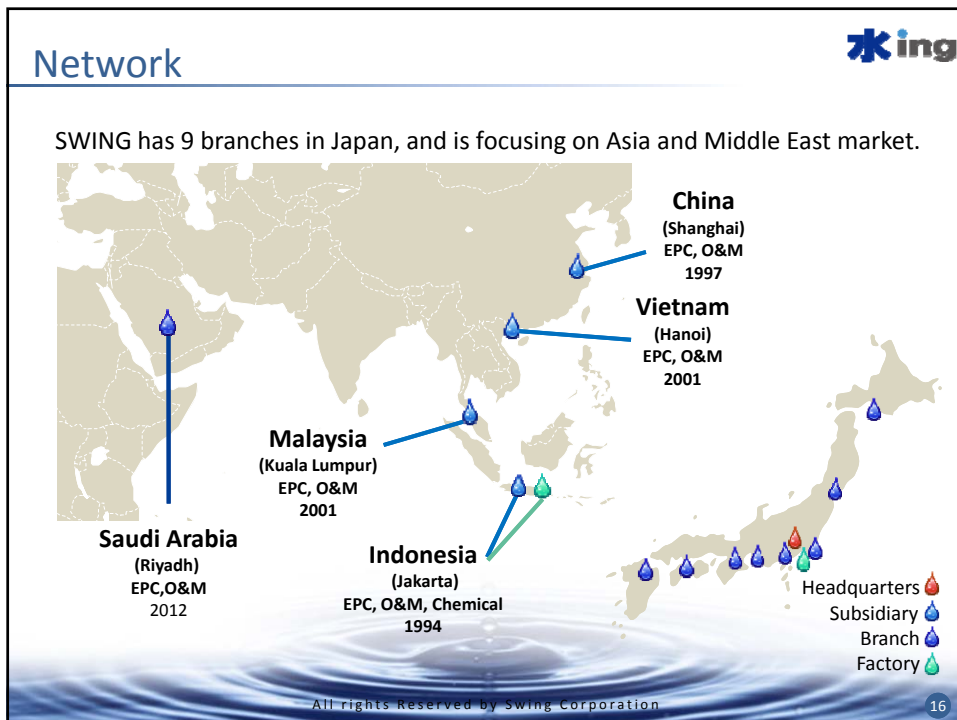
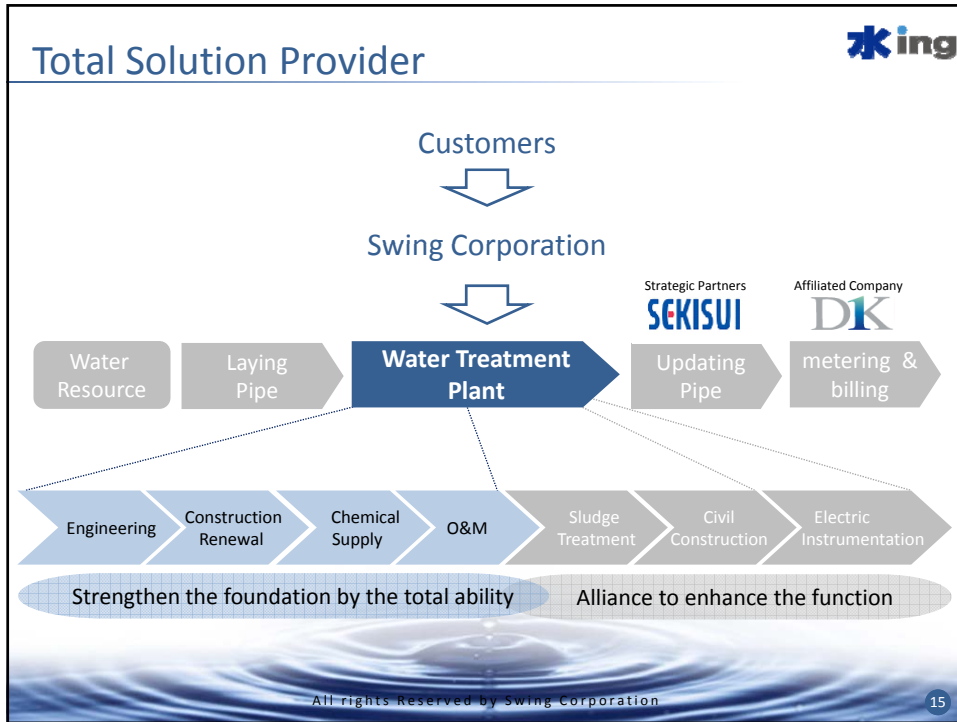
From planning, designing and constructing of facilities to managing business operations,

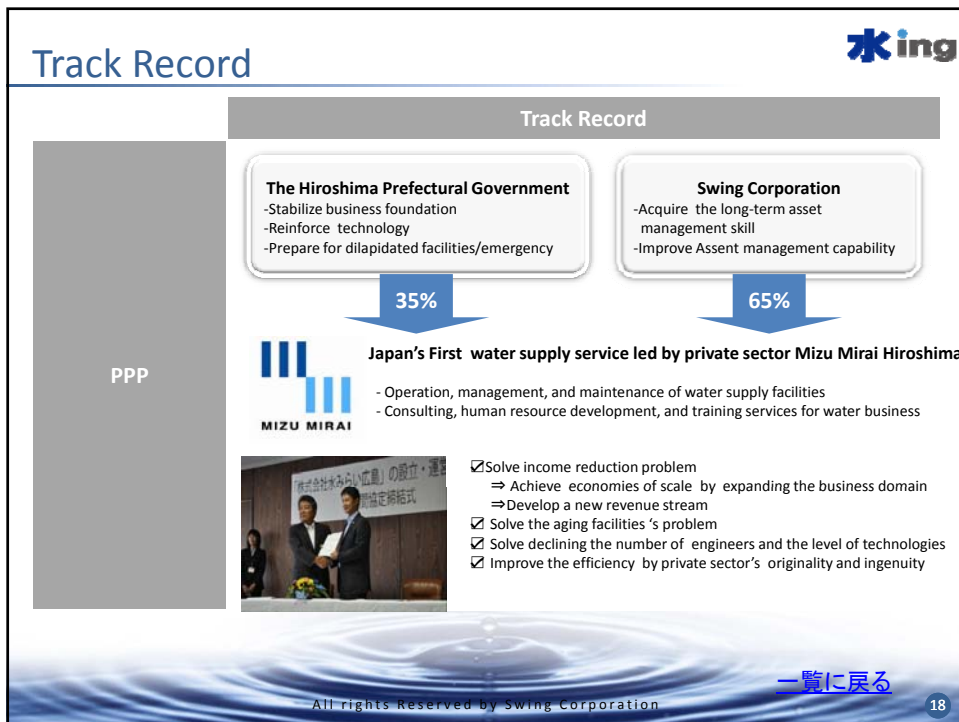
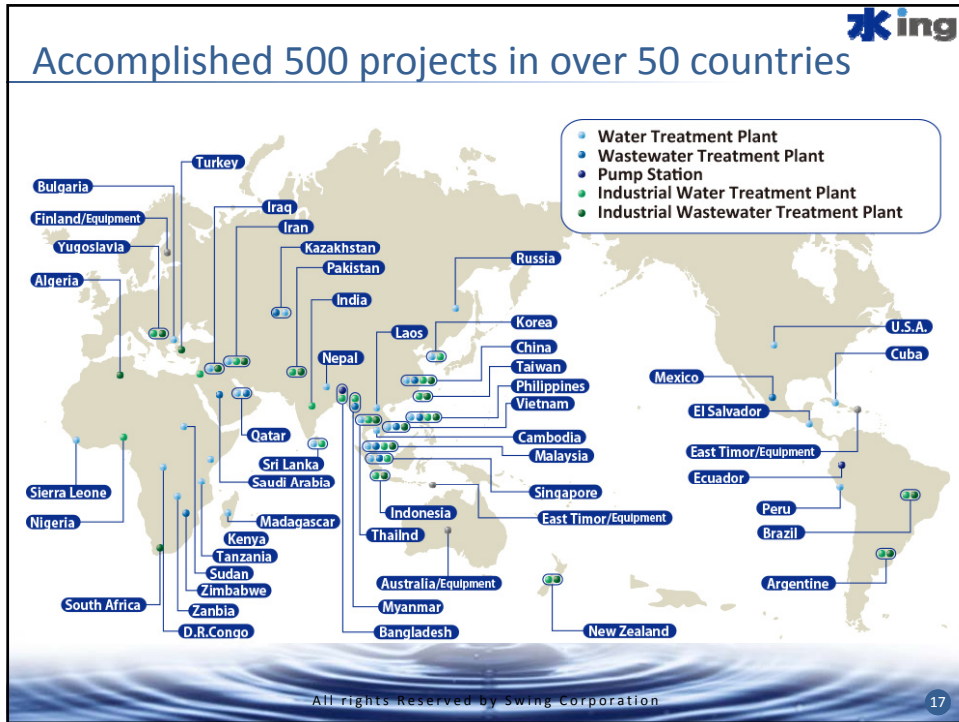
 **Design and Construction**  **Operation and Maintenance**  **Business Management (Investment)**

Swing continues to expand and grow.

 **Biomass**  **Human Waste Septic Tank Sludge**  **Landfill Leachate**  **Sea Water Desalination**  **Chemicals**

All rights Reserved by Swing Corporation 14





Pioneer of the PC Technology



ABE NIKKO KOGYO CO.,LTD.

ABE NIKKO's unique technologies, major one being the PC tanks, are attracting attention also from overseas. The PC tank is an abbreviation of a "pre-stressed concrete tank", and means a water storage tank made of the concrete that had been compressed beforehand to resist the pressure or tensile stress caused during service. The PC tank is made of the high-strength concrete that is several times stronger than conventional concrete.



(Prime Contractor/Dai Nippon Construction)

Pioneer of the PC Technology



ABE NIKKO KOGYO CO.,LTD.

PRESTRESSED CONCRETE TANK



Water supply systems are indispensable in maintaining and enhancing social infrastructure. In order to bring about a new style of city life and enable mankind to explore the living environment of tomorrow, they provide safety of high quality with outstanding water-tight and durable features of Prestressed Concrete. The share of PC tanks is No.1 in Japan. They have a proven track record of 5000 tanks or more.

Pioneer of the PC Technology
 ABE NIKKO KOGYO CO.,LTD.

Characteristics of PC tank

I. COMPLETE WATER TIGHTNESS (leak-free structure)
The PC tank is reinforced by high-strength steel wires and bars (PC tendons) placed in the vertical direction, and in the horizontal direction. That is, a compression stress is introduced beforehand to prevent the induction of tensile stress (arise with water pressure)which is a weak point of concrete. Therefore, the pre-stressed concrete is free from crack and water leakage.

II. LOW CONSTRUCTION COST
Since the cylindrical tank which is rational form can reduce the material to be used, it is economical. Because the cylindrical PC tank can make a water level more high , it can store mass water in narrow land.


III. RUST-FREE AND CORROSION-FREE
Because the concrete has water resistance in itself, the steel materials which are Reinforcing bars and PC tendons, etc. are completely protected from corrosion caused by the infiltration or leakage of water.




[一覧に戻る](#)


Company Profile

More than **115** years of experience as a manufacturer



Over **1,600** employees
Turnover **495** million USD






12 plants (Including Taiwan, Vietnam & China)
22 Branches & Sales Offices

Ranked **No.1** for water metering & gas metering in Japan

Technological innovation capability




Copyright © 2013 Aichi Tokai Denki Co., Ltd.


Aichi Proposal


To improve the non-revenue water issue, Aichi offer the following products:


Dry Type Water Meter SD




- Readable positioning
- Easy-to-read display
- Equivalent to Class C
- Robust construction
- 3,000,000 pieces of SD in service










Battery Powered Electromagnetic Water Meter SU



- 10 year battery life
- Submergible (IP68)
- Light Weight
- No moving Parts
- Sampling rate of 0.5 second







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From Japan to the world



Aichi will challenge to meet the customers' needs in the world

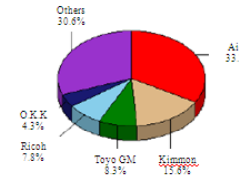
[一覧に戻る](#)

Copyright © 2013 Aichi Tokai Denki Co., Ltd.

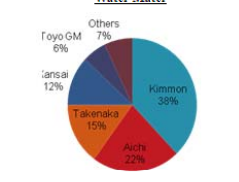


Water Meter Lineup

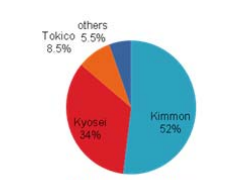
Market Share In Japan



Water Meter

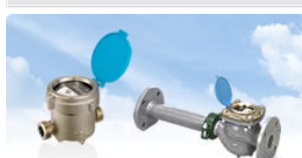


Gas Meter




Gas Pressure Regulator

Direct Reading Water Meter




The eye friendly ergonomics designed indicator, which enables to see the number clearly in dark and feel less halation under sunshine.

Electronic Water Meter




Electronic intelligent water meter being composed of 8 bit telegraphic communication output, LSI, LCD and Lithium battery.

Water Meter with Pulse Transmitter




The direct reading conventional water meter with the replaceable pulse transmitter.

Battery Operated Electromagnetic Water Meter



MGB12A is the intelligent meter with high-dimensional fusion technology.




ACCURACY ASSESSMENT OF ASIAN LOCAL MADE METERS (not by US,EU Manufacturers located in ASIAN)

Tested by Kimmon R&D Group 2 dated 01/09/2011

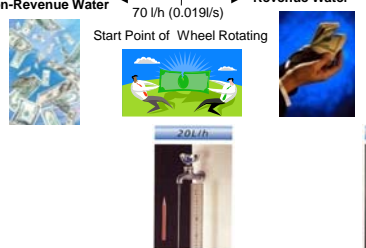
Average Test Result of 1st & 2nd Test

Manf.-A Local Purchased Class-A Meter 15mm Accuracy

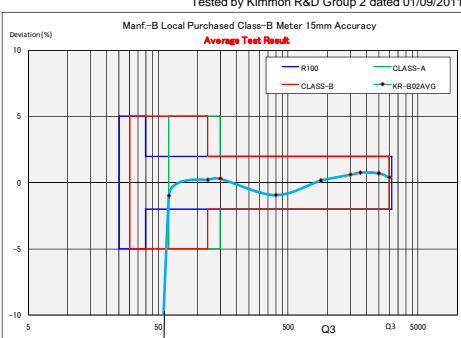


Not Working = Non-Revenue Water ← 70 l/h (0.019l/s) → Revenue Water

Start Point of Wheel Rotating

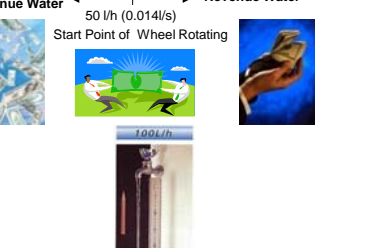


Manf.-B Local Purchased Class-B Meter 15mm Accuracy



Not Working = Non-Revenue Water ← 50 l/h (0.014l/s) → Revenue Water

Start Point of Wheel Rotating



PERFORMANCE OF KIMMON METER

MODEL NO. : NKDA13 15mm Class-C Tested by Kimmon Calibration Center

Flow Rate (L/h)	Q1				Q2				Q3				Q4	
	15	25	40	60	120	400	890	1500	2500	3125				
Brand New	-2.50	0.13	0.33	0.29	0.10	0.71	0.46	0.37	0.19	-0.06				
After Intermittent Test	-6.81	-1.46	-0.96	-0.60	-0.19	0.56	0.65	0.58	0.31	0.19				
After Continuous Test	-8.71	-1.80	-0.60	-0.75	-0.12	0.63	0.73	0.54	0.35	0.21				

Note :
Even accuracy is not specified low flow rate of Class-C range, our wheel starts to rotate for counting at approx. 8 liter/h (0.002liter/s) !

Min. NRW

Endurance Test

Test Procedure

1. Continuous Flow Test (C-Test)
Q4 x 100 Hr

AND

2. Intermittent Flow Test (I-Test)
Q3 (15 sec. Flow <-> 15 sec. Stop)
x 100,000 times

Acceptance Condition

After Endurance Test, Deviation to be,

1. Q1 - Q2 : 3% or Less

AND

2. Q2 - Q4 : 1.5% or Less

Long Lifetime
with
High Accuracy

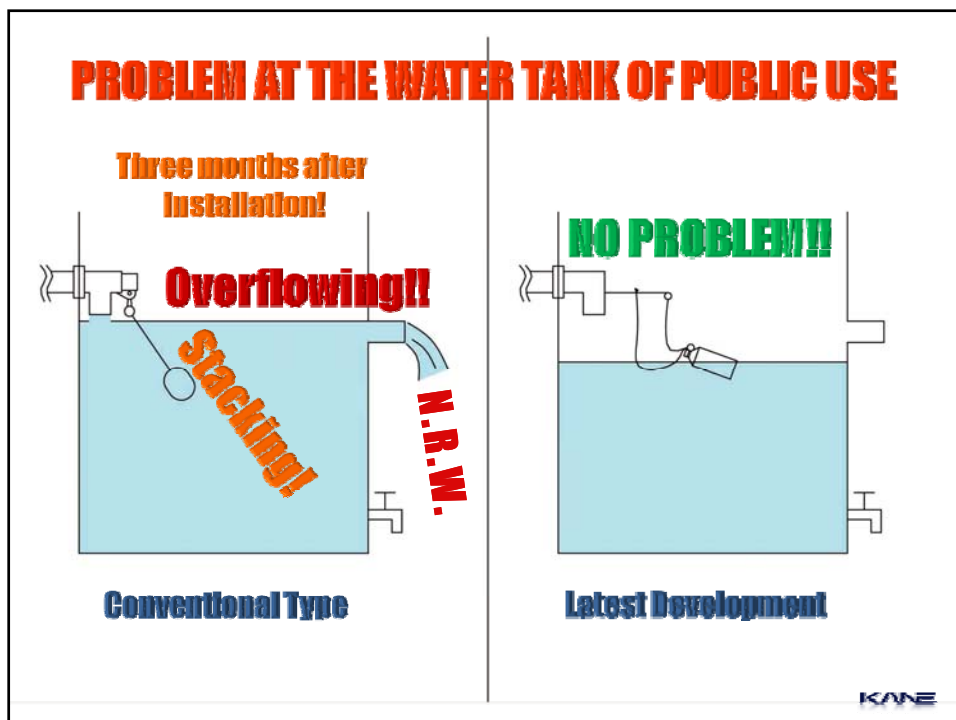
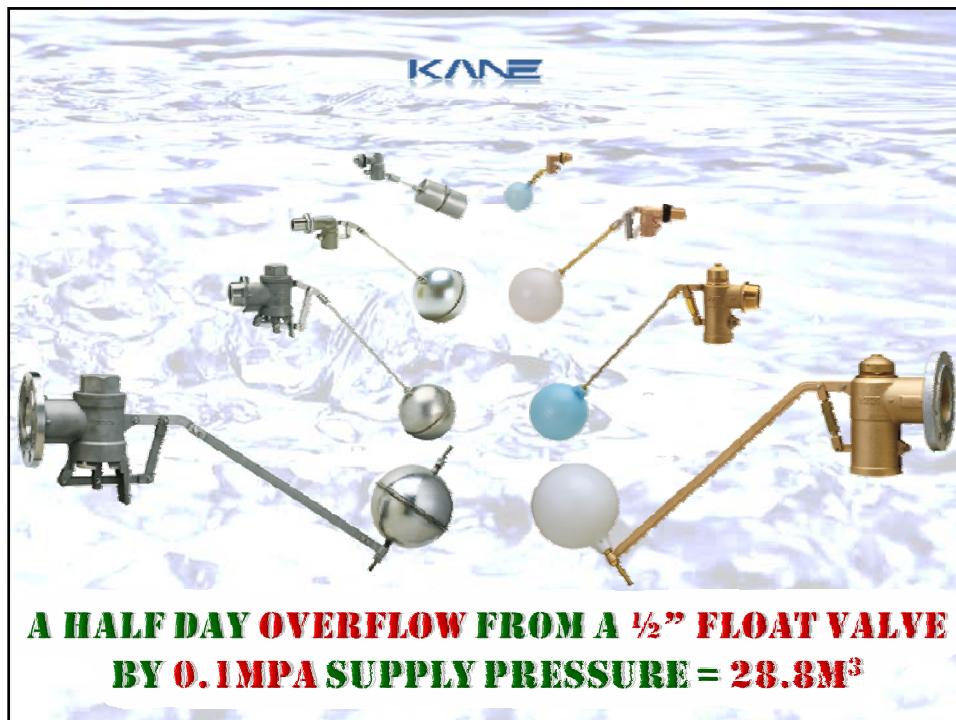
5L/h

10L/h

一覽に戻る

THE LATEST, MOST RELIABLE FLOAT VALVE FOR PUBLIC WATER DISTRIBUTION

THE NO. 1 FLOAT VALVE MANUFACTURER KANE KOGYO CO., LTD.





 **TESCO ASIA Co., Ltd.**
for the future of developing countries in Asia

- TESCO ASIA Co., Ltd. is established in June 2013

our ambition is...
to support the development of social infrastructure in Asian countries
We propose business which supports the continuous development of safety and stability in developing societies.

Our proposal is...
to provide a safe livable environment
especially with a stable water supply and appropriate waste management

Using a variety of Japanese technologies and managing techniques, we will develop solutions that optimally fit local situations

ex: We support to solve bottleneck such as water leakage and non-revenue water, major obstacles to the supply of safe water in many Asian countries

Origin of TESCO ASIA Co., Ltd.

- The TESCO Co., Ltd. Nagoya branch office started the overseas projects with a research project in Bangladesh in February 2012.
- TESCO ASIA Co., Ltd. took over the overseas projects from the TESCO Co., Ltd. Nagoya branch office in June 2013
- In September 2012, we exchanged ideas about non-revenue water measures with the Greater Kandy water supply project of NWSDB in Sri Lanka
- Demonstrated the newest electronic leak detector for water leakage in Kandy city in April 2013.

Our Work

Purpose of TESCO Co., Ltd. & TESCO ASIA Co., Ltd.

- Develop businesses with ODA and JICA's support.

Oversea performance of TESCO Co., Ltd. Nagoya branch office

- Feasibility Study for Medical Waste Treatment contracted with The Ministry of Foreign Affairs of Japan

: Bangladesh, December 2012 – March 2013

Overseas performance of TESCO Co., Ltd.


- Pilot project of non-revenue water Reduction

: Bangkok Thai Land, April-August 2011,
: Bangkok Thai Land, March-August 2013


- Operation & management

- Water Reclamation
: Amata City industrial estate, 2012-2022
- Wastewater Treatment Plant
: Amata Nakon industrial estate, 2008-2015
- Wastewater Treatment Plant
: Amata City industrial estate, 2011-2015

[一覧に戻る](#)

 **TOYOTA TSUSHO CORPORATION**

- **The newborn Toyota Tsusho Group aims at a new trading company group that make flexible ideas and an adequate proposal.**
 - Toyota Tsusho has been growing steadily together with the automotive business as the main axis. Tomen also has been developed with a wide range of business and customers in non-automotive field.
 - Two companies merged on April 1, 2006, and started as newborn Toyota Tsusho Corporation. The newborn Toyota Tsusho group, using the know-how of a global network and as the only trading company group that deeply involved in a idea of manufacturing, aim at a new trading company group that make flexible ideas and an adequate proposal.

 **TOYOTA TSUSHO CORPORATION**

Toyota Tsusho Corporate is developing the business in the seven divisions and the administrative supporting division.

Metals

Automotive

Chemicals & Electronics

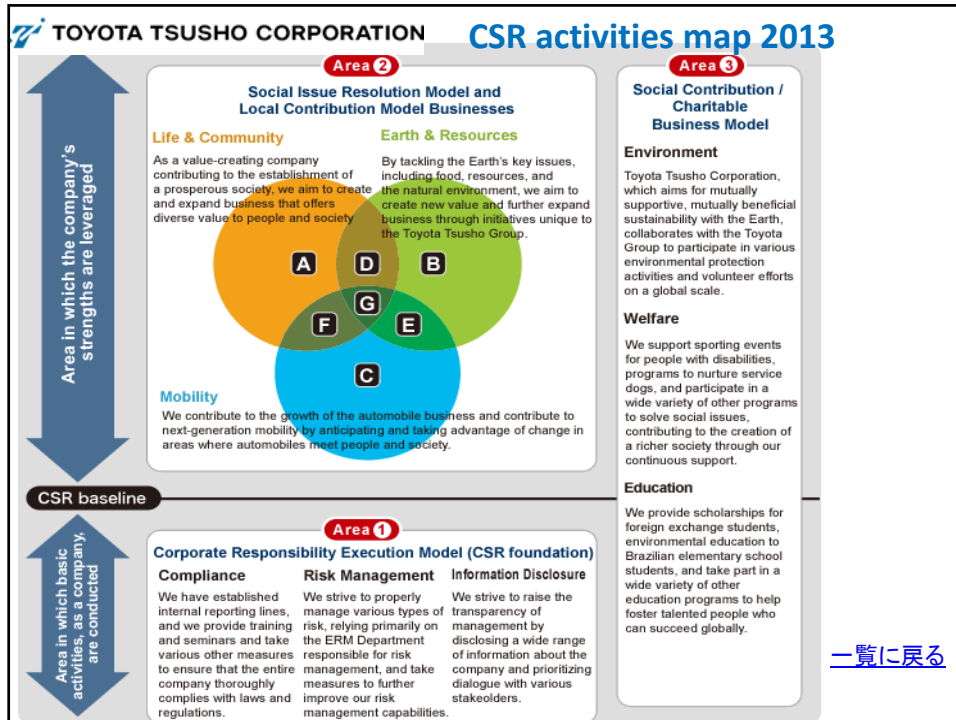
Consumer Products & Services

Global Production Parts & Logistics

Machinery, Energy & Project

Food & Agribusiness

Administrative



人・街・自然・いきいき
 中日本建設コンサルタント株式会社

NAKANIHON ENGINEERING CONSULTANTS Co.,Ltd.


- Since the establishment in 1964, they have dedicated in design of water supply and sewage systems and the waste disposal and treatment facilities.
- They are also member of the adhoc committee for promotion of NAGOYA WATER project in Sri Lanka, providing important assistance in the planning work.

人・街・自然・いきいき
中日本建設コンサルタント株式会社

NAKANIHON ENGINEERING CONSULTANTS Co.,Ltd.

Introduction of NAKANIHON

- Engineering consultant company
- Head office in Nagoya city
- Number of employee : 310
- Office : 35



人・街・自然・いきいき
中日本建設コンサルタント株式会社

NAKANIHON ENGINEERING CONSULTANTS Co.,Ltd.

Main Business of NAKANIHON

NAKANIHON Engineering Consultant's Engineering Department

- Department of Water Works And Building
 - Water Works
 - Building
 - Environmental Investigation and assessment
- Department of River and Sewerage Works
 - River
 - Sewerage Works
- Department of Transportation And Urban Design
 - Road
 - Railways
 - Bridge

[一覧に戻る](#)

Aqua Tech
水のマイエグフ

Maezawa Industries, Inc.

Business Lines:
Manufacture, sales, and installation of equipment and apparatus for water supply and sewage systems



[一覧に戻る](#)

MITSUBISHI ELECTRIC
Changes for the Better

Mitsubishi Electric Corporation

Water Treatment Systems

Ozone Generator



Mitsubishi Electric produces cost-efficient ozone generation water treatment systems of various sizes and capacities for industrial applications and municipal government use. These systems generate ozone more efficiently using less electricity. The ozone is used to purify river water or wastewater, eliminating bacteria that cause odor and color, and creating safe, clean water for reuse.

[一覧に戻る](#)

人と水をつなぐチカラ
DK 第一環境株式会社

DK Corporation

Water supply service	Environmental facilities
 <p>料金徴収業務 Water and sewerage fee collection</p>	 <p>除害設備 Abatement equipment</p>
 <p>給水装置管理 Maintaining water supply equipment</p>	 <p>中水道設備 Recycled wastewater facilities</p>
 <p>システム開発・運用 Operating and maintaining plant</p>	 <p>食品工場排水設備 Drainage facilities food factory</p>
 <p>施設運転・管理 Developing and operating system</p>	 <p>汚水処理設備 Sewage treatment facilities</p>
 <p>管路管理・他 and Others</p>	 <p>技術情報 ODAS・BCS Technical information</p>

[一覧に戻る](#)

Nagoya Research Institute of WA-Links for Future Development

PPP business support

strengthening of overseas expansion supporting program



Basin-wide economic development

Research on
 ・water cycle
 ・biological mechanism of water purification

Make the most of expertise and experience accumulated in the ISE-Basin area

Questionnaire

- ① Which in the presentation did you pay attention to?

- ② Please choose the company, which you want detailed documents/information.

Thank you