

# TERASAKI SHORE CONNECTION

陸上電力供給システム





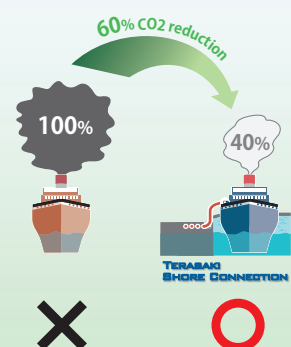
Terasaki proposes environmental protection that are part of a cleaner and brighter future.

未来につながる環境保全対策を提案します。

Environmental protection has been an echoing topic over the last decade and, within all of the talk, ship emissions have been cited as a major source of pollution. So, knowing a thing or two, Terasaki is doing something about that.

The Terasaki Shore Connection protects port environments by supplying moored ships with electrical power from shore, thus allowing ships to shut down onboard generator engines and, in the process, reduce harmful emissions from the ship's power systems. Moreover, the Terasaki Shore Connection can decrease CO2 emissions by about 60%.

環境への配慮は近年重要な課題となっており、主な汚染源の一つとして船舶の排出ガスが挙げられます。陸上電力供給システムとは、停泊時に船内発電機エンジンを停止し、陸上側より必要な電力を供給することにより、船側から排出される環境負担物質を減少させ、港の環境を守るシステムです。また、このシステムを導入することで、船舶からのCO2の排出量が約60%削減可能です。



## World No.1 Accepting order record (over 200 orders)

採用実績世界No.1 (200隻以上)



Container ship



Container ship



Container ship



Bulk carrier

# Environmental measures undertaken in major areas around the world

## 世界各国の主要な地域が取り組む環境対策



### North America 北米

Contact TERATEC (USA)



In California (USA), the California Air Resources Board (CARB) has introduced regulations for oceangoing vessels calling at ports in the state. Other places like Alaska, Seattle and Canada are also running or planning shore-to-ship power supply systems.

カリフォルニア州では、CARB (California Air Resources Board) が同州の港に寄港する外航船舶に対して規制を導入。その他、アラスカ、シアトル、カナダでも陸上電力供給システムの稼働や計画が進められている。

#### CARB Regulation

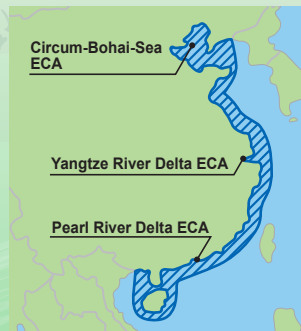
Airborne Toxic Control Measure for Auxiliary Diesel Engines Operated on Ocean-Going Vessels At-Berth in a California Port.

- Applicable to container, passenger and refrigerated cargo vessel visiting California Ports
- Vessel in-use operational requirements
  - 80% of fleet shall meet the onboard auxiliary diesel engine operational time limits from 2020.
  - 100% of fleet shall meet the onboard auxiliary diesel engine operational time limits from 2021.
- Bulk carriers, RORO ships and tankers are also expected to adopt the Regulation from 2025.



### China 中国

Contact TERASAKI ELECTRIC (SHANGHAI)  
Contact TERASAKI ELECTRIC (CHINA)



The Chinese government has announced regulations to major harbor.

中国政府は主要な港湾に対して規制を発表。

#### The Prevention and Control of Marine Pollution from ships.

< 交通运输部关于印发船舶大气污染物排放控制区实施方案的通知 >

2019年1月1日及以后建造的中国籍公务船、内河船舶(液货船除外)和江海直达船舶应具备船舶岸电系统船载装置。2020年1月1日及以后建造的中国籍国内沿海航行集装箱船、邮轮、客滚船3千总吨及以上的客船和5万吨级及以上的干散货船应具备船舶岸电系统船载装置。

The Chinese public service vessels, inland waterway vessels (except for tankers) and vessels engaged in direct voyages between the sea and the river constructed on and after January 1st, 2019 should have onboard devices for the use of shore power.

The Chinese container vessels, cruise ships, RO-RO ships, passenger ships at 3,000 gross tonnage and above as well as dry bulk cargo ships at 50,000 gross ton level and above engaged in domestic coastal voyages constructed on and after January 1st, 2020 should have onboard devices for the use of shore power.



### EU

Contact TERASAKI HAMBURG OFFICE



Container ship and passenger ship-ports are exploring shore-to-ship power supply systems. Systems are already up and running in Sweden and Germany, while under planning in Belgium.

コンテナ船・客船港湾等でも陸上電力供給システムの検討が行われている。スウェーデン、ドイツではシステムが既に稼働し、ベルギーでは計画が進んでいる。

## Advantage



*Operation on ship and shore can be performed by a single person*  
船側の操作は1名にて可能であるため、陸側設備との接続が容易に行えます



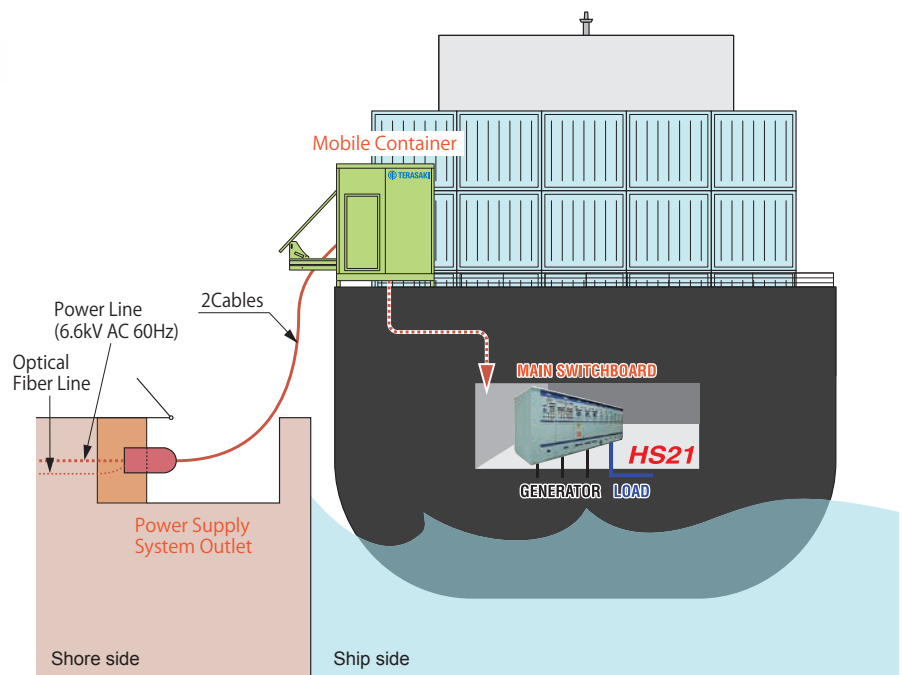
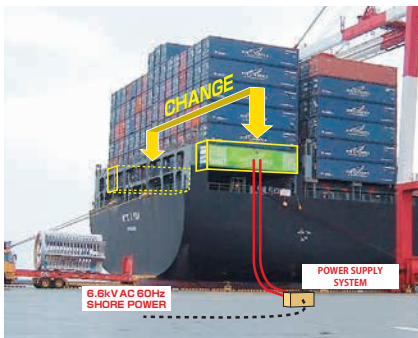
*Available the 3 hour time limit for shore power visits*  
3時間ルールにも容易に対応が可能です

### Mobile Container Type モバイルコンテナ方式

Patent acquired

- Easy loading and unloading of equipment for a route change, suitable for remodeling into an in-service ship
- Easy blackout-free power switching between ship and shore with one push of a button
- CSC approval has been acquired
- Global standard as recognized by many major shipping companies
- 航路変更時の設備搭載／撤去を柔軟に対応でき、就航船への改造に最適
- ワンプッシュで船内電源と陸上電源を無停電で簡単切替
- CSC 承認を取得
- 数多くの大手船社が認めた世界標準

### Example of system introduction 導入例

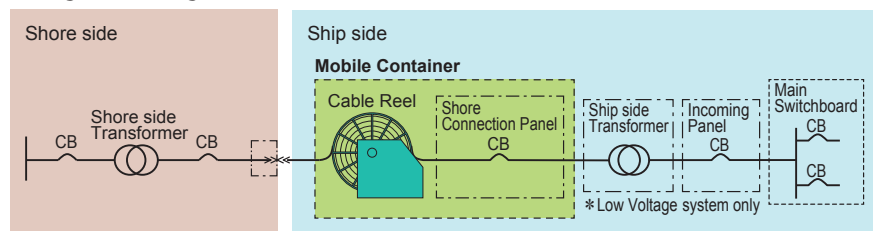


### System Configuration システム構成

Equipped with Shore connection Panel and Cable Reel in a container.

Shore connection Panel 及びケーブルリールをコンテナ内に装備

- Single line diagram 単一線図



# Easy connection & Easy operation 簡単接続！簡単切替！



**Equipped with various safety devices**  
数々の安全装備を搭載しています



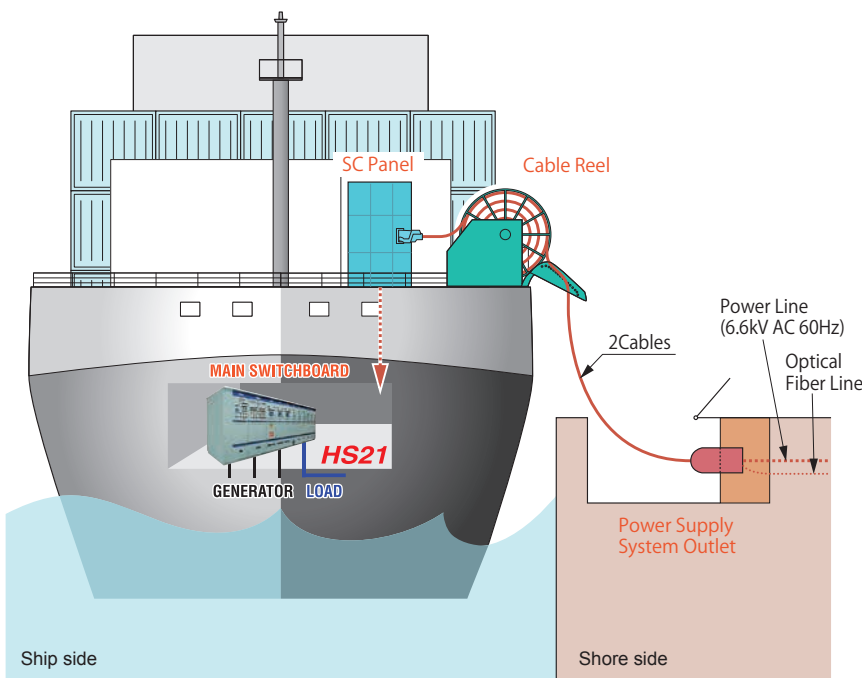
**Adopted Medium-voltage marine distribution board HS21**  
船用高圧配電盤 HS21 を採用しています

## Fixed Type 固定方式

Patent acquired

- Highly reliable standard system with an excellent track record
- Easy blackout-free power switching between ship and shore with one push of a button
- Max 55m-cable reel can be loaded.
- Power receiving preparation time is shortest.

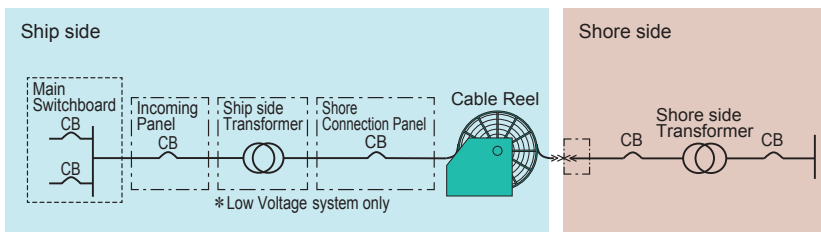
- 高信頼性・高実績のスタンダードシステム
- ワンプッシュで船内電源と陸上電源を無停電で簡単切替
- 最長 55m のケーブルリール搭載可能
- 受電準備時間が最短



## Example of system introduction 導入例



- Single line diagram 単一線図



## System Configuration システム構成

Equipped with Shore connection Panel and Cable Reel in an accommodation.

Shore connection Panel 及びケーブルリールを居住区に装備

## Main Feature



The key features of the Terasaki Shore Connection are a direct result of Terasaki's years of technological development of industrial and marine power systems.

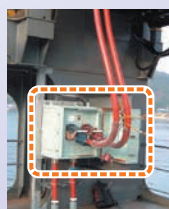
積み重ねた技術力を活かした当社製品のポイントです

### Point

- The operation of the system on the ship only needs a single person, which allows easy connection between ship and container.
- 船側の操作は1名にて可能であるため接続が容易



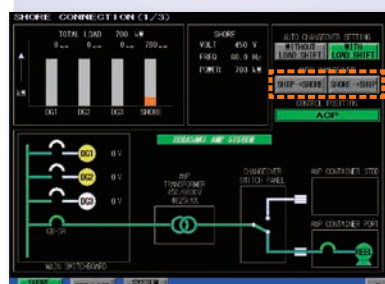
Cable hoisting device  
ケーブル昇降装置



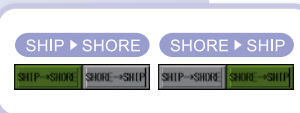
Ship side facility  
船側設備

### Point

- Blackout-free power switching between ship and shore is possible with one push of a button.
- ワンプッシュで船内電源と陸上電源を無停電で切替可能

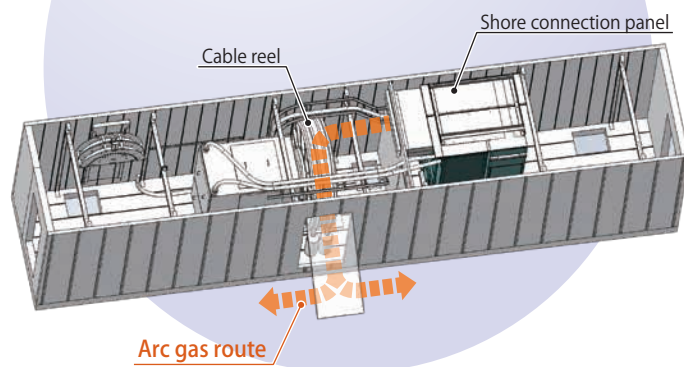


Programmable Operation Display



### Point

- Arc gas routes are designed in consideration of safety.
- 安全を配慮したアークガス経路の設計



Arc gas route

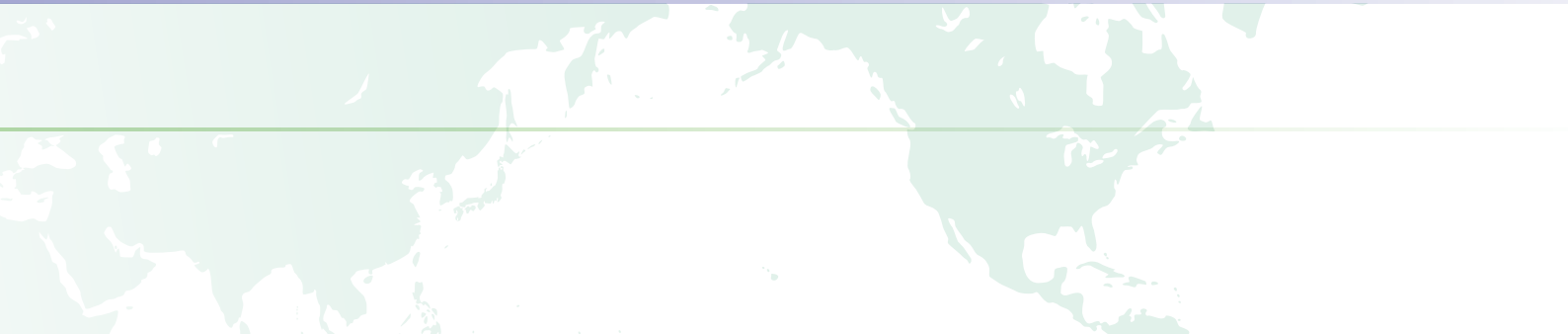
### Switchboard

- Medium-voltage marine distribution board HS21 employed for shore connection panel, which is highly reliable and with an excellent track record (also applied to shore connection panel in the container)
- Shore connection panel には高信頼性・高実績の船用高圧配電盤 HS21 を採用 (コンテナ内高圧盤にも適用)



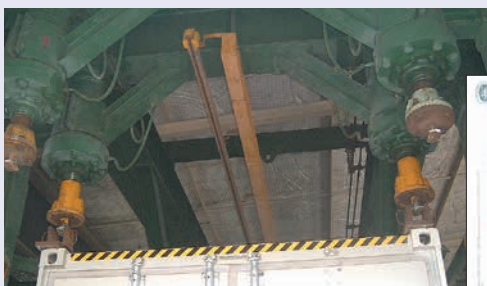
Arcing due to internal fault test  
HS21 内部アーク短絡試験

# Easy connection & Easy operation 簡単接続！簡単切替！



## Container

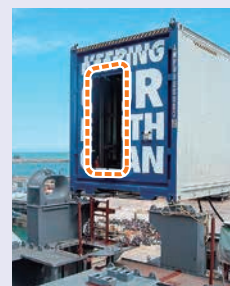
- CSC approval has been acquired (Container strength test has been passed)
- CSC 承認を取得（コンテナ強度試験をクリア）
- Emergency exits are provided.
- 非常口の確保



Container strength test  
コンテナ強度試験



CSC APPROVAL BY BV

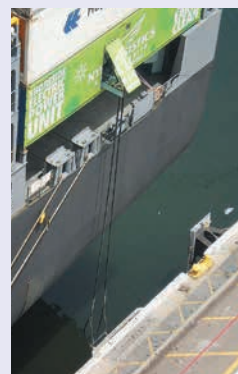


## Cable Reel

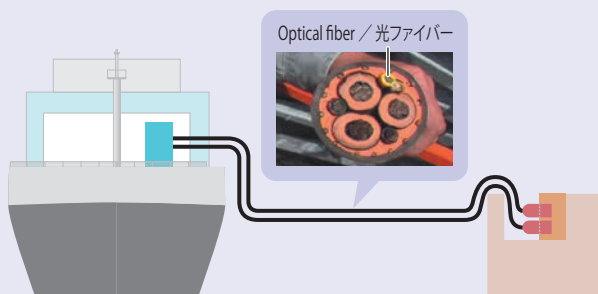
- Interference with deck equipment can be prevented as the connection cable is reeled out from a side of the container.
- ケーブルはコンテナ側面から繰り出されるため、甲板機械類との干渉が避けられます



- The effective length of the cable is **32m**, which is the longest in the industry.
- ケーブル有効長は業界最長の**32m**  
(Fixed Type:55m,  
Mobile Container Type:32m)



- Ship-to-Shore communication using optical fiber
- 光ファイバーを使用した船陸間通信による安全性の確保

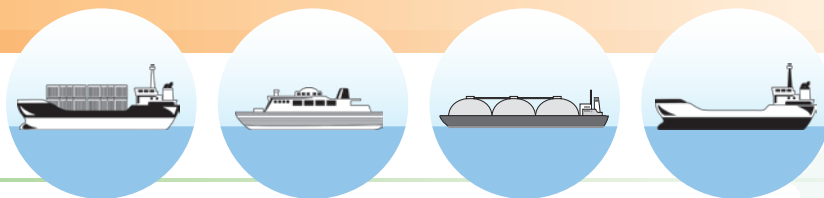


- The cable reel has already passed certification requirements including arc tests.
- 型式認定（アーク試験を含む）を取得したケーブルリールを搭載
- The cable can be wound manually at the fault of motor.
- 電動機故障時にも手動でケーブルの巻き取りが可能



# Variety 多様化するニーズへの取り組み

## Variety



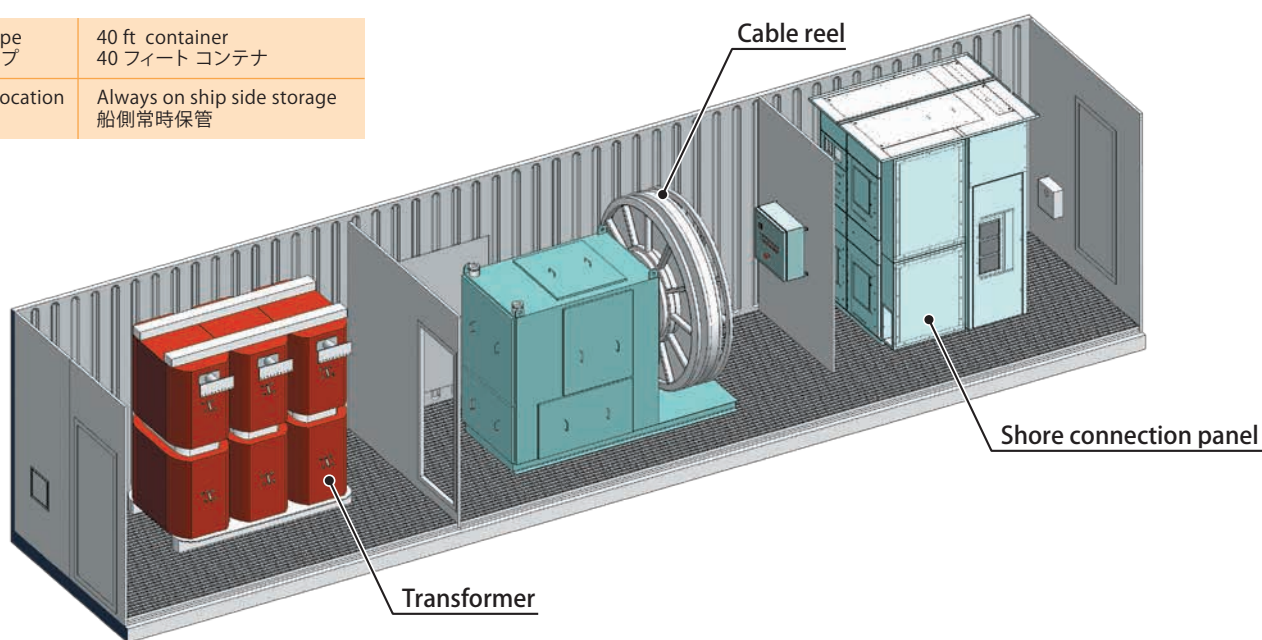
*Terasaki proposes solutions to customer issues.*  
お客様の課題を解決するソリューションを提案します

Space saving

### Container With Transformer (Fixed Type) 変圧器搭載型コンテナ方式 (固定型)

The transformer is neatly packaged in a space-saving container.  
変圧器を搭載したコンテナ方式が省スペース化を実現

Container type コンテナタイプ	40 ft. container 40 フィート コンテナ
Installation location 設置場所	Always on ship side storage 船側常時保管



### Frequency Converter Facility 周波数変換器搭載設備

Area expansion

The container also carries a frequency converter that enables use in regions around the world.

あらゆる地域で使用できるように周波数変換器をコンテナ内に搭載

Container type コンテナタイプ	12 ft. container 12 フィート コンテナ
Main circuit 主回路	Input : 200V AC 50Hz Output : 450V AC 60Hz Output rating : 125kW 入力 : 200V AC 50Hz 出力 : 450V AC 60Hz 出力定格 : 125kW
Control method 制御方式	IGBT Converter (PWM control) 自励式電圧 PWM 制御



### Testing Facility 陸上試験設備

Reliability

The equivalent level of testing required for California ports can be easily conducted.

カリフォルニア湾で実際に要求される同等の試験を容易に実施

Container type コンテナタイプ	20 ft. container 20 フィート コンテナ
Tests 試験項目	Commissioning tests Coupling tests  <ul style="list-style-type: none"> <li>Automatic tension control test of cable reel</li> <li>ケーブルリール張力自動制御試験</li> <li>Power change-over test under loading condition</li> <li>実負荷による電源切替試験 他</li> </ul>



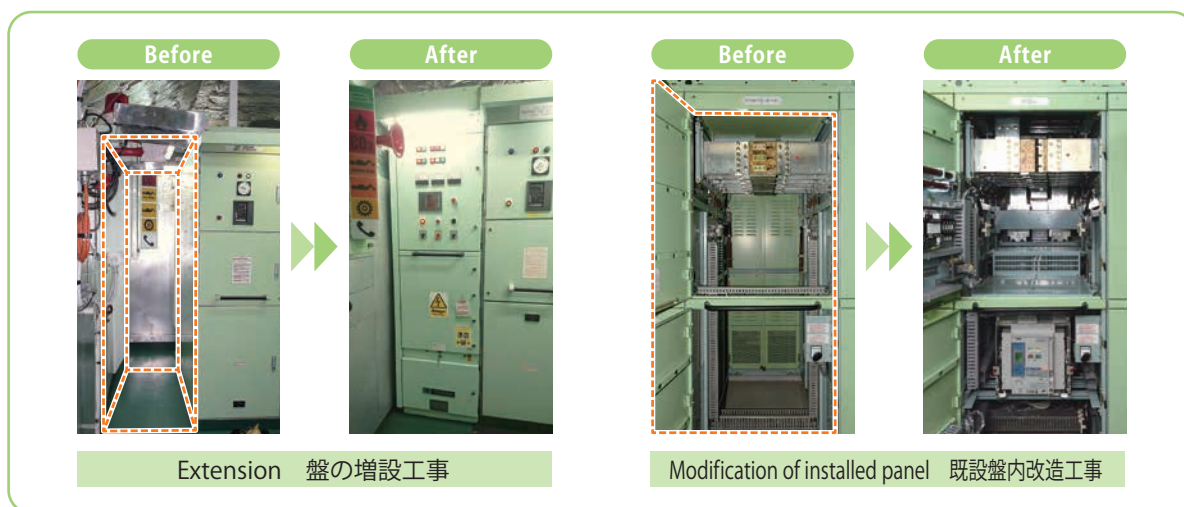


## Retrofit



**Modifications to other brands of power distribution panel.**  
搭載・配置されている自社製以外の配電盤に対しても改造工事が可能です

### Sample of Modification 改造工事例



Vessel investigation  
and Meeting  
調査・打合せ

Construction  
(11days)  
工事  
(11日)

Commissioning  
(3days)  
コミッショニング  
(3日)

Total: 14days (2weeks)

Scheduling image / スケジュールイメージ



#### ●Contact

#### TERATEC (USA) INC.

21151 S. Western Avenue, Suite 214, Torrance, CA 90501, USA.  
Tel: +1 310 755 2517  
E-Mail: teratec.usa@gmail.com

We have engineers who can correspond to inquiry about shore connection system in California state, power receiving test and urgent response stationed in Los Angeles on the West Coast of the USA.

カリフォルニア州における陸上電力供給システムに関する問合せ・受電テスト及び緊急対応を実施できるエンジニアがアメリカ西海岸のロサンゼルスに駐在しています。

# Specification 仕様一覧表

Specification		Mobile Container Type	Fixed Type	Optional
Standard		IEC/ISO/IEEE 80005-1		
Classification		ABS/DNV GL/LR/NK/BV and others		
Supply voltage	Shore side	6.6kV AC		11kV AC, 450V AC, others
	Ship side	6.6kV AC, 450V AC		Others
Supply frequency Shore side / Ship side		60Hz *		—
Power changing method		Blackout-free		—
Ship needed power		6MW / 8MW		On request

NOTE : \*...Consult with Terasaki when applying 50 Hz.

Application		Mobile Container Type	Fixed Type	Remarks
Cable connection		2 cables	2 cables	Only connect 2 cables on shore.
Cable operation	Shore side / Ship side	1 person	1 person	
Cable plug / socket		One-touch	One-touch	
Power changing		One-push	One-push	
Equipment loading onto in-service ship		○	△	※1
Compatibility with either side of ship		○	△	※2
High-voltage shore connection panel		HS21	HS21	Approved for up to 12 kV AC.
Ship-to-Shore communication		Serial communications (Optical fiber)	Serial communications (Optical fiber)	
Detection circuit for removed high-voltage connector		○	○	
Automatic tension control		○	○	※3
Automatic power recovery system		○	○	※4
Countermeasures against high-voltage arcing accident		○	○	HS21 Standard
Effective length of cable from ship to shore		32m (MAX)	55m (MAX)	
Sharing with other ships		○	—	

NOTE : ※1 Terasaki's mobile container shortens the time required to modify ships for shore power supply.

船側の改造工事期間の短縮にはモバイルコンテナ方式を採用することが最適です。

※2 Terasaki's mobile container can also be moved between port and starboard to accommodate berthing requirements.

既に設置されたモバイルコンテナを移動して反対側で使用可能です。

※3 The cable reel automatically adjusts the cable length to the draft.

ケーブルリールの長さは喫水の高さに応じて自動で調整します

※4 If a blackout occurs on shore, ship's generator engine automatically starts and power supply back to onboard systems.

ブラックアウトした際には、自動で船側と陸側の電源が切り替わります

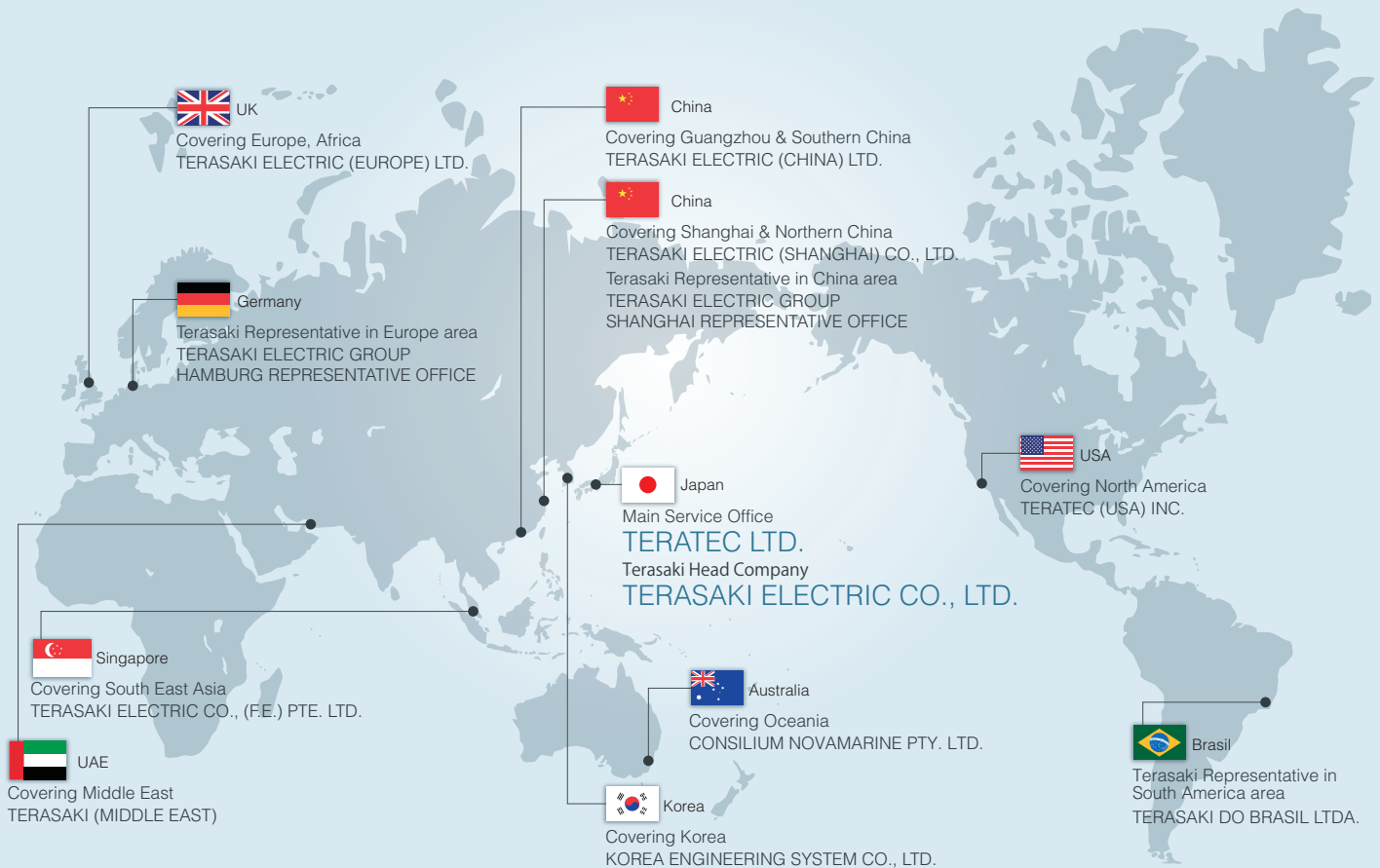
Mobile Container Specification			Remarks
Installation			Both sides (Port side and Starboard side)
Certification for container (tests)			Certified by CSC (Watertight test, Strength test)
Container size			40 Feet
Container dimension (mm)			Height: 2,896   Width: 2,438   Length: 12,192
Weight (kg)			Approx. 13,000
Type (Material)			Reefer container (Stainless steel)
Container stacking			Up to 9 containers can be stacked.
Connection work	Connection between ships	One-touch connection of cables reeled out from lower part of container	
	Connection between shore	One-touch connection of cables reeled out from a side of container	
Power receiving warning lamp			Equipped on a side of container   Call attention when receiving power
Ventilation			Natural ventilation
Container door			Both sides
Fire prevention / Emergency evacuation equipment			Fire extinguisher, smoke detector / Emergency exit

# Global Service Network

Wherever your vessel is, we have a service team within reach.


We provide Life Cycle Support to your vessels.

Terasaki Global Service Network (GSN) operates 24 hours a day.



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**Terasaki Representative in China area**



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