

AMP

Alternative
Maritime
Power System



Panasia Group —

We are heading to the future
with eco-friendly solutions

WATER SOLUTIONS



Ballast Water Treatment System (UV type)



Measurement Control System



WTS for Exhaust Gas System (Chemical/ Membrane)

AIR SOLUTIONS



De-SOx System (Scrubber)



De-NOx System (SCR)



Engine Exhaust Recycling System (iCER)

ENERGY SOLUTIONS



Hydrogen Generation System



Carbon Capture and storage System (CCS/OCCS)



Fuel Supply System (LNG/Ammonia/Methanol)



Major Port AMP Installation and Regulation Status



NORTH AMERICA



Regulation Implementation

- January 1, 2021 New Regulation took effect
- December 1, 2022 Published Interim Evaluation Report
- **January 1, 2023** New requirements took effect for **container/reefer/cruise vessels**
- **January 1, 2025** New requirements take effect for **ro-ro and Southern California tanker terminals**
- **January 1, 2027** New requirement take effect for **Northern California tanker terminals**



EU



EU Commission proposes new guidelines for mandatory use of onshore power supplying by ships docked in the existing EU Directive (Directive 2014/94/EU) in October 2021 - **OPS will be established at TEN-T(Trans-European Transport Network) ports by end of 2025, Container Ships will be equipped with AMP facilities by January 2030.**



CHINA



The Air Pollution Prevention Act stipulates that new dock planning, design and construction should be equipped with an AMP system, already developed docks should be gradually converted into an AMP system, and ships entering the port should use AMP first.

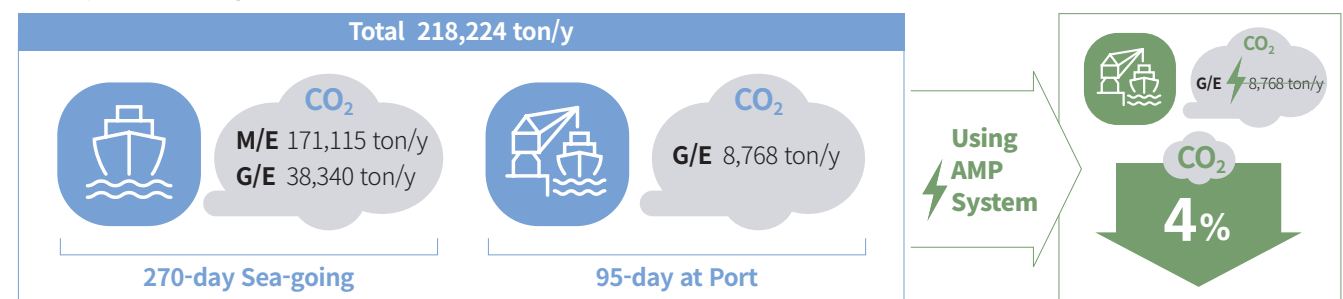
It is mandatory that the vessel installed AMP is called at the port which has onshore power supply system.

Source : GreenVoyage2050 OPS Workshop

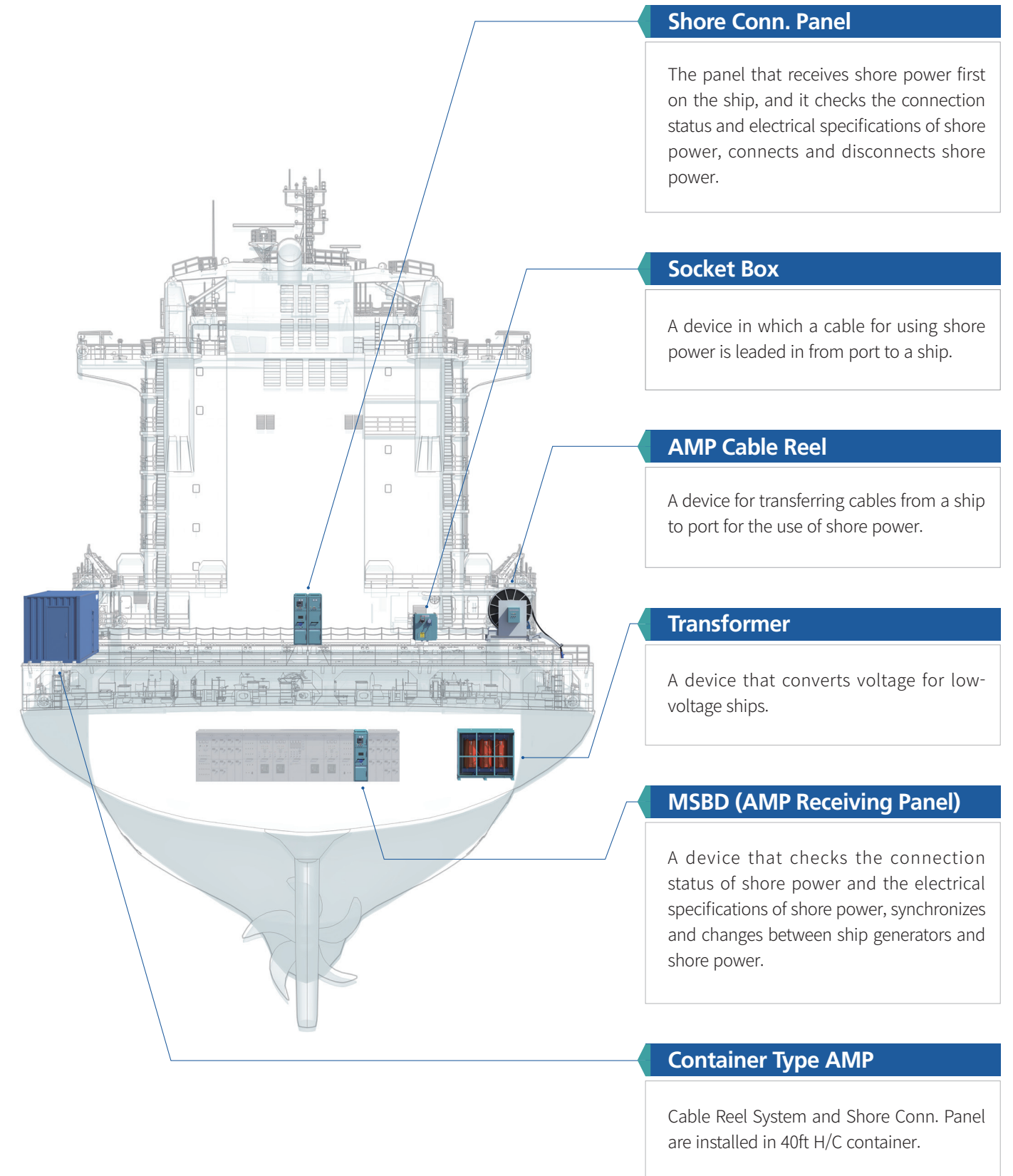
ADDITIONAL EFFECTIVENESS

*CII (Carbon Intensity Indicator) Regulatory aspects : Expected to reduce CO₂ emissions

Ex) 24,000 TEU simple calculation of CO₂ emissions

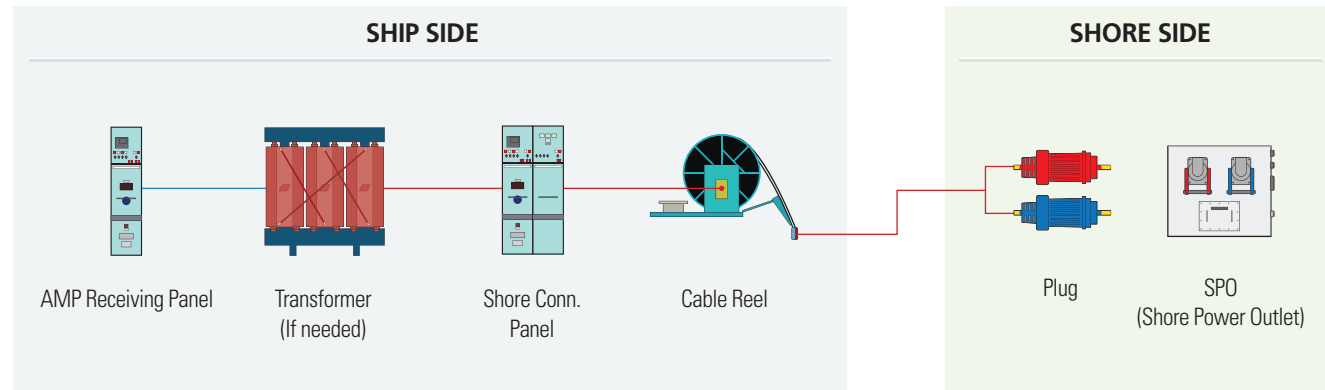


AMP System General Arrangement



AMP System Application

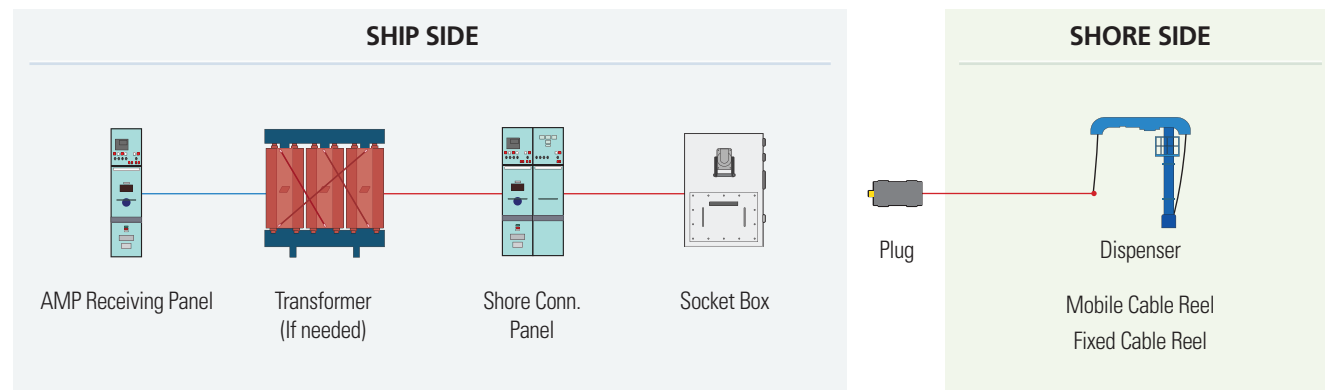
1. Cable Reel Type



• **Generally applied to Container vessel**

- The AMP cable management system (Cable Reel) is located onboard ship.
- Two parallel cables with three pilot conductors each shall be used for HVSC systems up to a maximum power demand of 7.5 MVA.
- Nominal voltage : 6.6kV

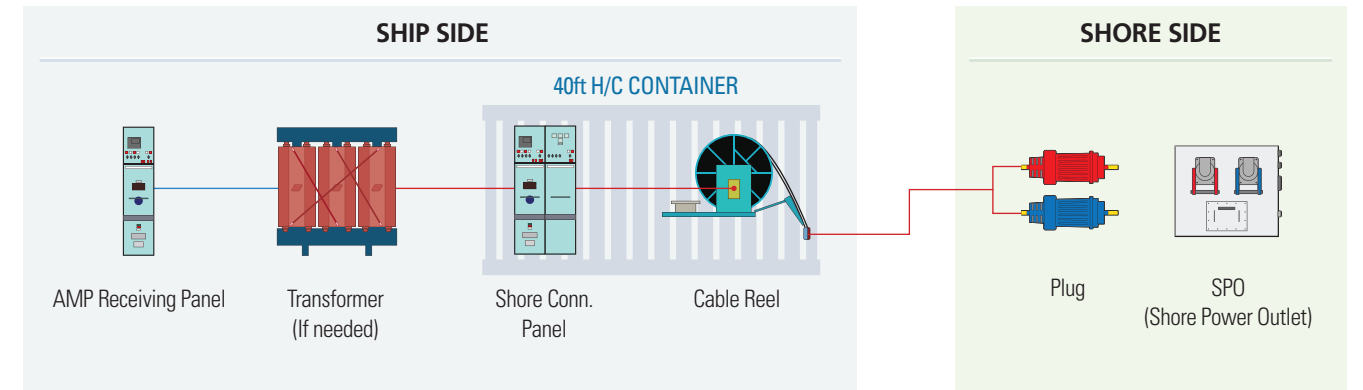
2. Soket Box Type



• **Generally applied to Ro-Ro, Tanker, LNGC, Cruise**

- The AMP cable management system is located ashore.
- The number and specifications of AMP cable sockets shall be applied differently for each type of ship.
- In case of LNGC, means shall be provided to facilitate emergency physical disconnection of the HVSC cables in the event of ESD-2 (movement of the ship away from the dock) being detected.
- Nominal voltage : 6.6kV or 11kV

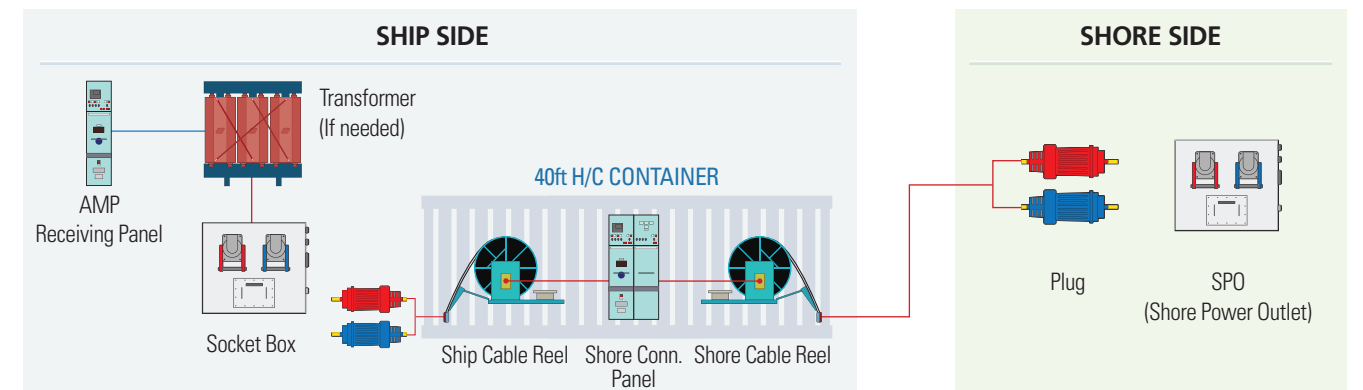
3. Fixed Container Type



• **Generally applied to Container vessel**

- The AMP cable management system (Cable Reel) and the Shore Connection Panels are installed in a 40ft H/C container which will be installed fixedly on the port or st'bd side of the ship.
- Two parallel cables with three pilot conductors each shall be used for HVSC systems up to a maximum power demand of 7.5 MVA.
- Nominal voltage : 6.6kV

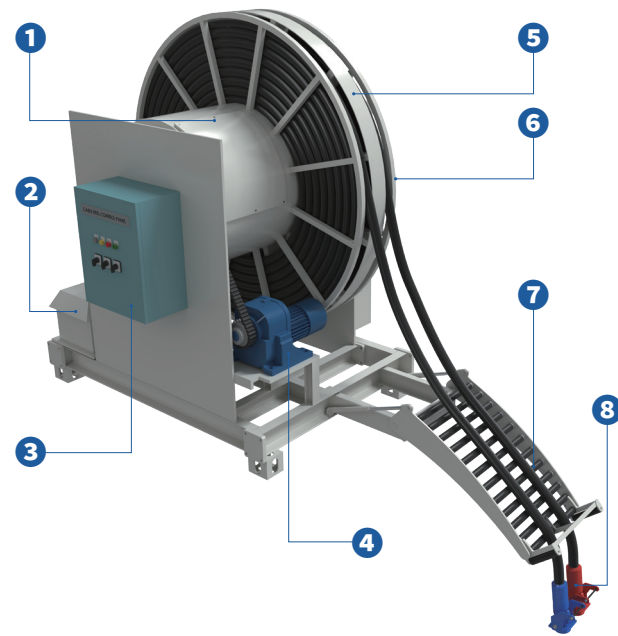
4. Movable Container Type



• **Generally applied to Container vessel**

- The AMP cable management system (Shore Cable Reel and Ship Cable Reel) and the Shore Connection Panels are installed in a 40ft H/C container which will be located on the port or st'bd side of the ship as a movable type.
- Two parallel cables with three pilot conductors each shall be used for HVSC systems up to a maximum power demand of 7.5 MVA.
- Nominal voltage : 6.6kV

AMP Cable Reel (Cable Management System)



- 1 Slip Ring Case**
 - 6.6kV 800A x 4P + AC220V 20A x 8P
 - Material : Galvanized SS275
- 2 Resistor** • Galvanized SS275
- 3 Control Panel** • Galvanized SS275, IP56
- 4 Motor & Reducer** • AC440V, 3PH, 60Hz, 7.5kW x 6P
- 5 Cable Drum**
 - Ø 2650 (2 rows, 2 cables) based on winding length of 60m
 - Material : Galvanized SS275
- 6 Power Junction Box** • Galvanized SS275, IP56
- 7 Guide Roller** • Galvanized SS275, Hydraulic cylinder
- 8 Plug for AMP cable**

| Specification | |
|------------------|------------------------------------|
| Winding length | 60m (45m+2 Dead turn+1 spare turn) |
| Hoisting length | 45m |
| Winding speed | max. 12m/min |
| Winding torque | 600kg·m |
| Protection class | IP56 |
| Painting color | MUNSELL No. 7.5BG 6/1.5, 175µm |

Features

- Encoder + inverter control enables more precise cable automatic tension control in real time.
- No periodic replaceable parts for easy maintenance.
- When adjusting the **Torque value**, it can be modified immediately through the **Control panel HMI** without the need for additional equipment.



Shore Conn. Panel

| | |
|--------------------------|--------------|
| Rated Voltage | 7.2kV / 12kV |
| Rated Current | 630~2000A |
| Rated Frequency | 60Hz |
| Short-time Current R.M.S | 25kA x 3s |
| Protection Degree | IP42 |



AMP Receiving Panel

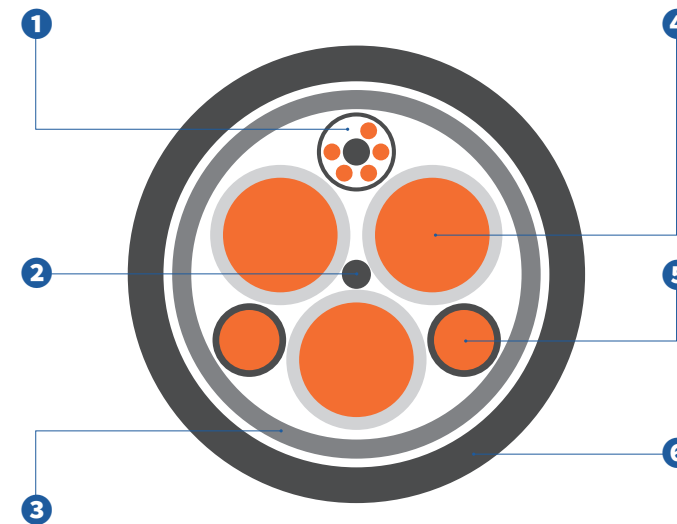
| | |
|-------------------|-----------------|
| Rated Voltage | 450V / 7.2kV |
| Rated Current | ~6300A / ~2000A |
| Rated Frequency | 50 or 60Hz |
| Protection Degree | IP42 |
| AMP Control | Semi-auto |



Socket Box

| | |
|-------------------|---------------------|
| Rated Voltage | 7.2kV / 12kV |
| Rated Current | 350A x 2 / 500A x 1 |
| Material | SUS316L |
| Space Heater | AC220V, 200W |
| Protection Degree | IP56 |
| Weight | Approx. 250kg |

AMP Cable (6/10kV)

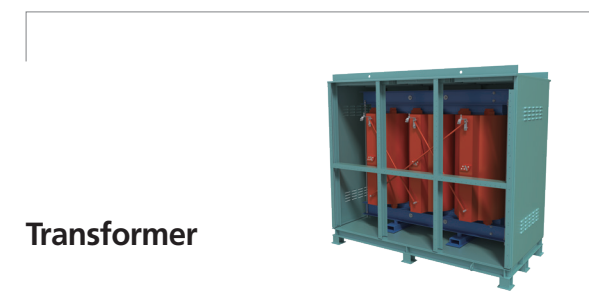


- 1 Pilot element cores (5x2.5mm²)**
 - Conductor : Tinned copper wire (Class 5)
- 2 Center filler**
 - Semi-conductive strength filler core
- 3 Inner sheath**
 - Thermoplastic compound
- 4 Power cores (3x185mm²)**
 - Conductor : Tinned copper wire (Class 5)
- 5 Grounding cores (2x50mm²)**
 - Conductor : Tinned copper wire (Class 5)
- 6 Outer sheath**
 - Thermoplastic polyurethane (TPU)

| Characteristic | |
|---------------------------------|---|
| Working voltage | 6/10(12)kV |
| Temp.range | -40~80 |
| Resistant | oil, sea air & sea water, UV and Ozone, non-hygroscopic |
| Overall diameter(max.) & weight | 74.9mm, 9.951kg/m |
| Tensile stress(N) | 11,100 |

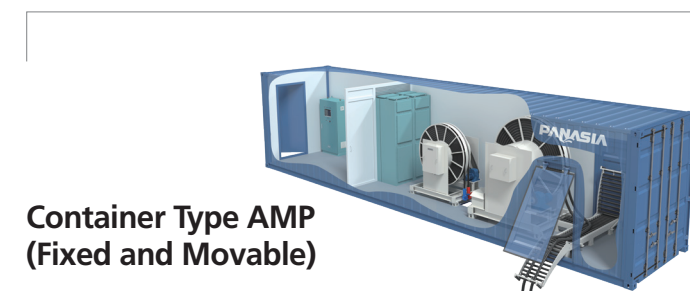
Features

- It has resistance to **sea air and sea water**, which are difficult to confirm in other company specifications, which increases the life expectancy of AMP cable, which requires resistance to the external environment.
- **AMP Cable tensile strength is 11,100N**, about 1,000~2,000N higher than other companies, and a more stable relaxation system can be implemented.
- **Use TPU (Thermoplastic Polyurethane) for AMP cable outer sheath material**, which is twice as long as other rubber products. (assuming the same usage environment)



Transformer

| | |
|-------------------|----------------------|
| Rated Voltage | 6.6kV or 11kV / 440V |
| Rated Power | Customizable |
| Insulation Class | F |
| Space Heater | AC220V, 100W |
| Protection Degree | IP23 |
| Winding Material | AL |



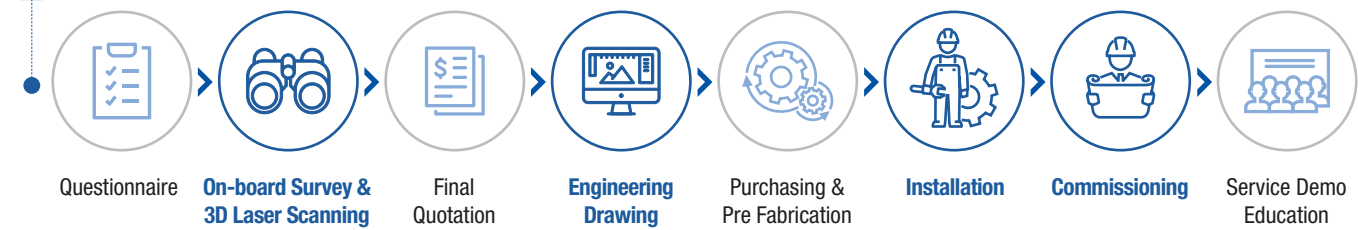
Container Type AMP (Fixed and Movable)

| | |
|---------------|---|
| Container | 40ft H/C |
| Component | <ul style="list-style-type: none"> <li style="width: 50%;">• Shore cable reel <li style="width: 50%;">• Ship cable reel <li style="width: 50%;">• Shore connection panel <li style="width: 50%;">• Reel control panel <li style="width: 50%;">• Smoke detectors etc. |
| Certification | CSC (International Convention for Safe Containers) |

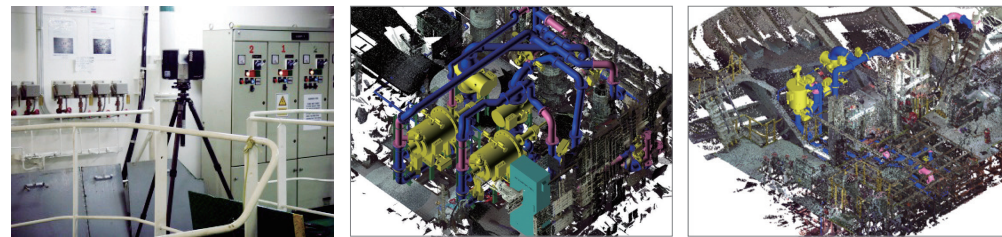


Retrofit Process

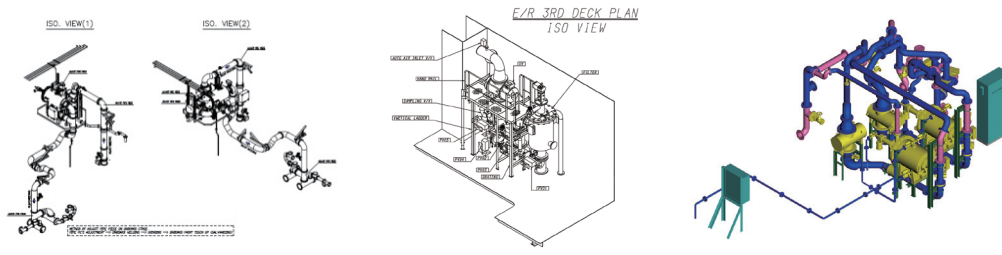
Contract



On-board Survey & 3D Laser Scanning



Engineering Drawing



Installation

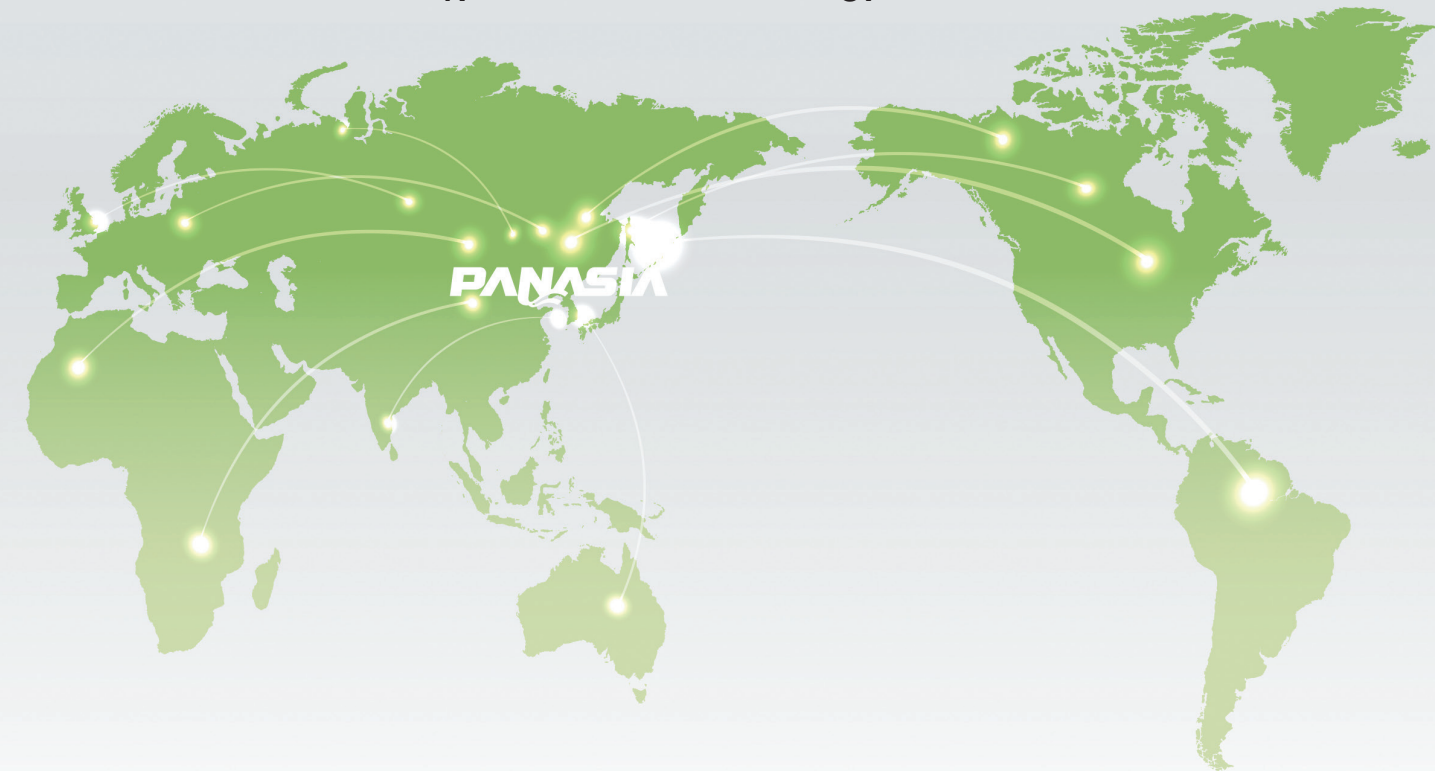


Commissioning



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To reflect PANASIA's corporate philosophy of seeking eco-friendly and sustainable value,
this booklet was printed with naturally biodegradable soy ink that makes paper recycling easier.

26th Apr. 2024