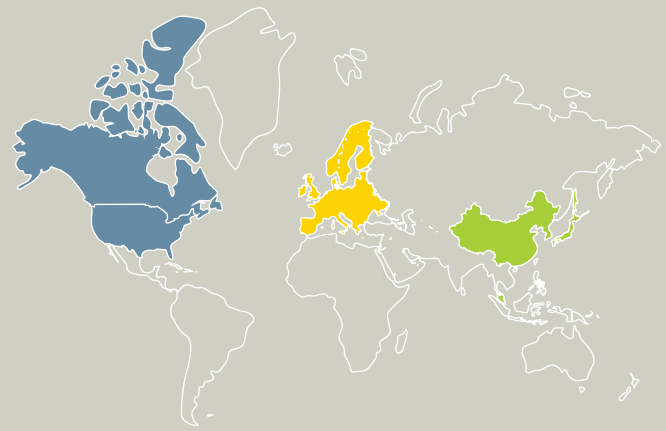
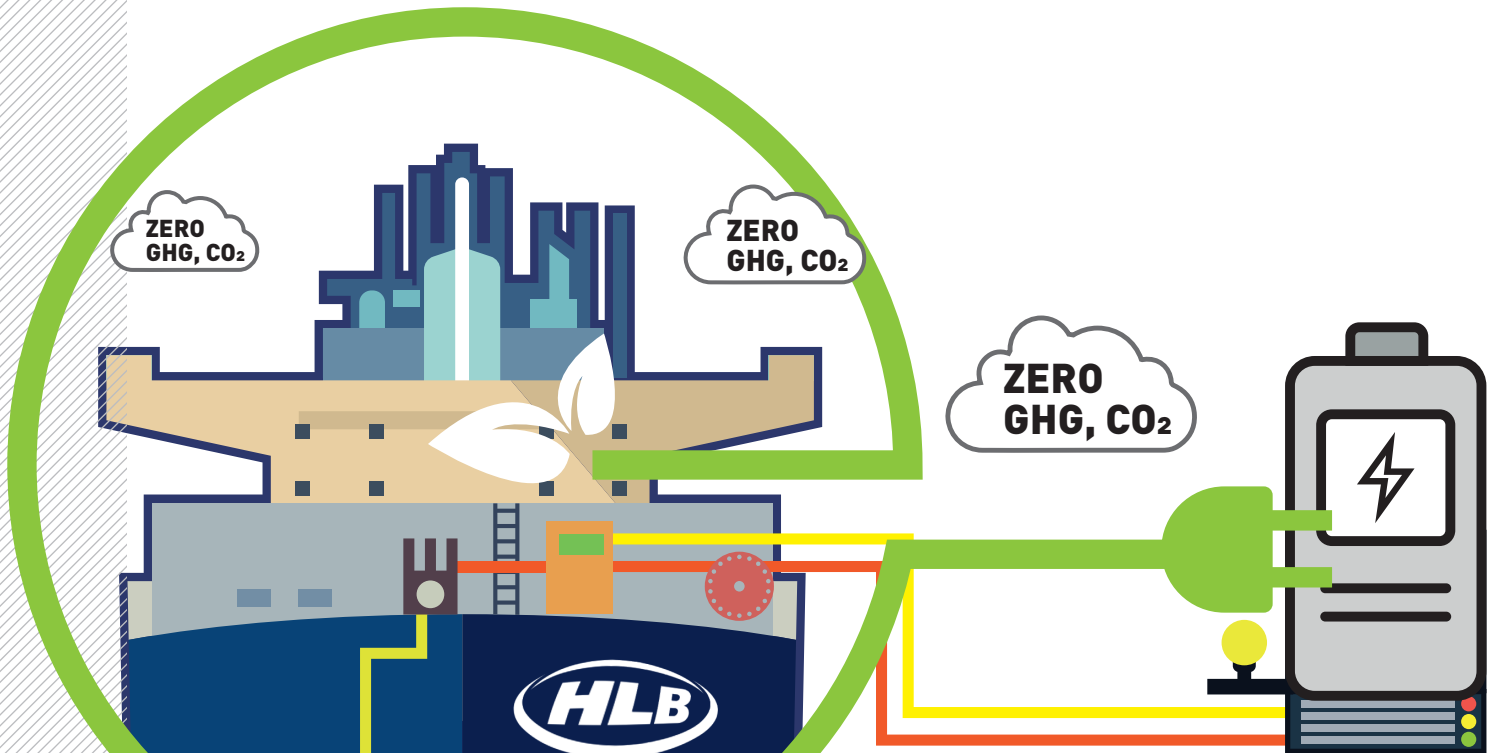


HLB's AMP RETROFIT TOTAL SOLUTIONS

(from designing to commissioning)



U.S.A.

Europe

Asia



HLB's AMP retrofit total solutions

CONTENTS

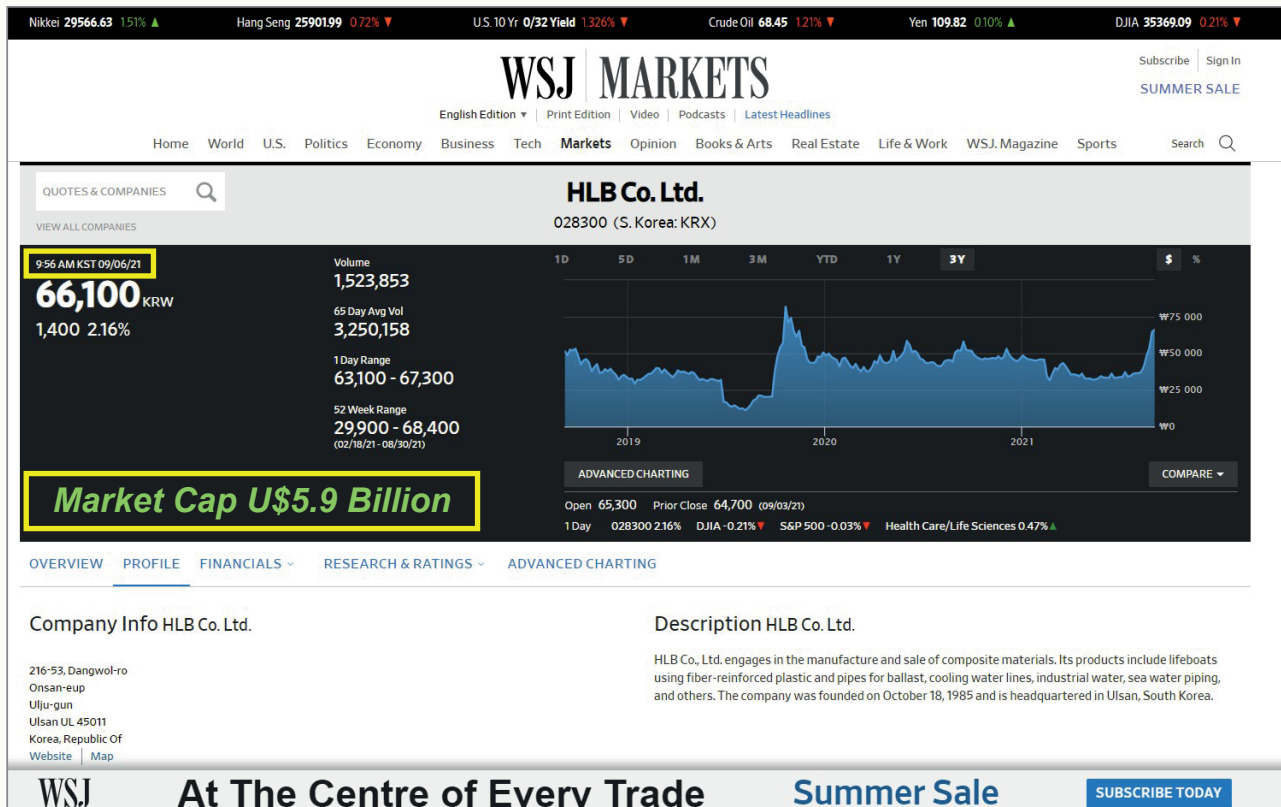
COMPANY INFO (COMPOSITE MATERIAL DIVISION)	1. General information	002
	2. Business fields	003
	3. Sales revenue	003
	4. Brief history	004
	5. New business (Maritime GHG reduction subject)	005
TAILORED AMP TOTAL SOLUTIONS	1. Supply scope & work flow	006
	2. Supplying details	007
	3. Project requirements	008
	4. Product configuration	010
	5. Containerized AMP types	010
	6. Packaged AMP types	011
	7. Simplified cable reel comparison table	011
	8. Transformer	012
	9. High voltage switchboard	013
	10. AMP plug	014
	11. AMP socket	014
	12. Installation of equipment	015
REFERENCES IN AMP		016
REFERENCES IN AMP AT PORT & ON VESSEL		017
REFERENCES TO SHIPYARDS		018
REFERENCES TO SHIPYARDS		019
CUSTOMERS		020

COMPANY INFO(COMPOSITE MATERIAL DIVISION)

1. GENERAL INFORMATION

 Established	 Employees	 Location
1975 As one of the Hyundai group companies (Separated now)	Office 60 Production 35	1st Lifeboat / Pipe : Ulsan, KOR 2nd Pipe : Ulsan, KOR 3rd Pipe : Ulsan, KOR

- Stock listings : 028300, KOSDAQ, Seoul, Korea
- The only Class certified manufacturer of Lifeboat & GRE pipe in Korea
- Supplying 3 major local shipyards : Hyundai HI, Samsung HI, DSME(Daewoo)
- Overseas business with Japan (shipyards, engineerings) Greece (owners), Singapore(Repairing)
- Affiliates : Electrical instrumentation(Elec), Power Plant Busway system & damper (Power), Bio(Pharma)



2. BUSINESS FIELDS



**Lifeboat / Engine /
Maintenance**



**Supplied over
7K lifeboats**



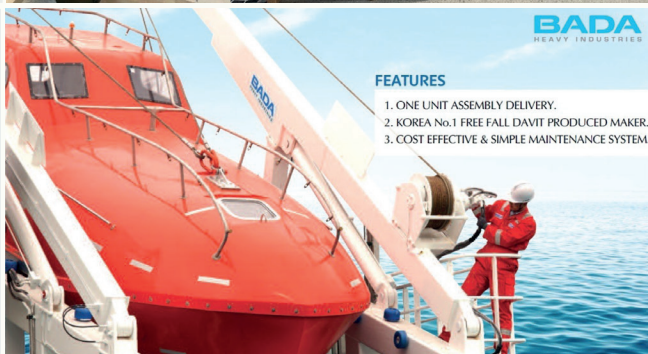
**Glassfiber
Reinforced Pipe**



- 400 SOx scrubber lines
- 70 Ballast lines



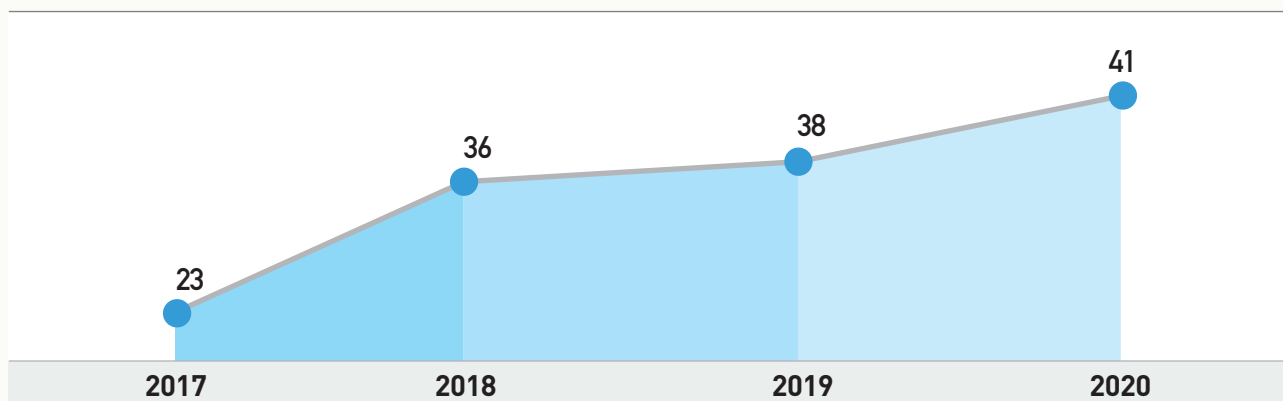
Davit / Crane



- Lifeboat davit
- Handling equipment

3. SALES REVENUE

Mil US \$



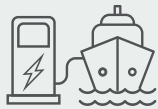


COMPANY INFO(COMPOSITE MATERIAL DIVISION)

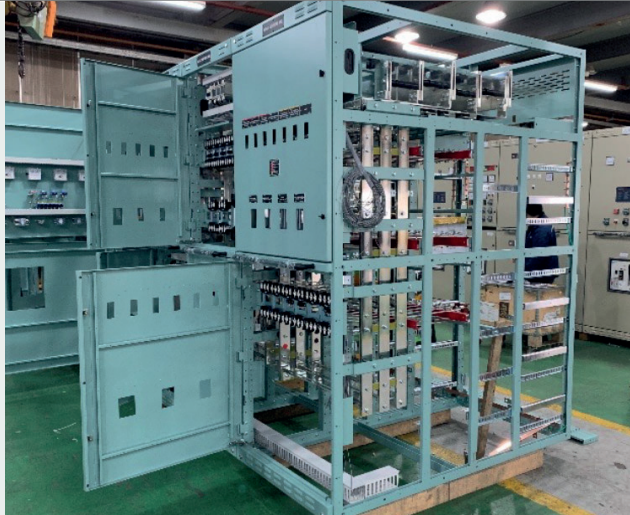
4. BRIEF HISTORY

1975	Established as Kyungil Industry in Hyundai group
2000	Took lifeboat biz from Hyundai & established Hyundai Lifeboats Co., Ltd
2010	Selected World's First class Product by Ministry of Knowledge & Economy
2013	Launched Composite Materials Div.
2014	Supplied over 6K lifeboats / Started exporting pipes to Japan shipyards
2017	Pipe registered at 3 big shipbuilders in Korea
2018	New building GRE SOx lines to Japan / Contracted Greece agent for retrofit SOx lines
2019	Supplied SOx lines to Almi Tankers, Byzantine, Chandris, Olympic, Pantheon, Pleiades, Seenergy, TMS, Trafigura
2021	Delivered Hydrogen fuel cell & Batt propulsion boat / Started full packaged AMP system sales

5. NEW BUSINESS (MARITIME GHG REDUCTION SUBJECT)



**AMP
(Cold Ironing)**



Partnering with
top-notch
makers in Korea



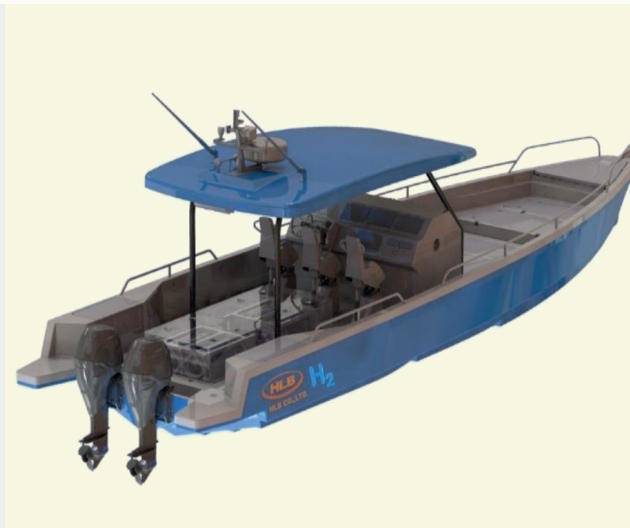
**Battery
propulsion vessel**



Delivered Jul,
2021 to Ansan City



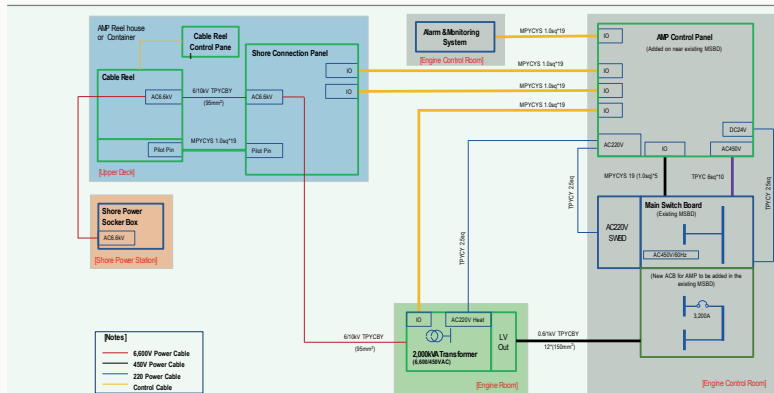
**Hydrogen
fuel cell vessel**



Delivered Jun,
2022 to Ulsan City

TAILORED AMP TOTAL SOLUTIONS

1. SUPPLY SCOPE & WORK FLOW



①

- System Design
- Engineering
- Onboard inspection

②

- LV Panel Modification

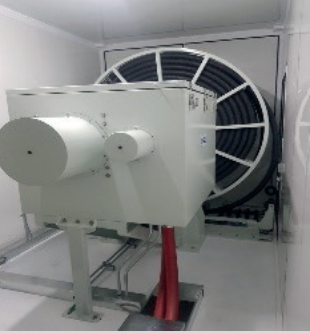
③

- Place AMP system :
 - 6.6Kv Change over panel
 - Incoming ACB (AMP control panel)
 - Cable reel
 - TR

④

- Equipment Installation
- Cabling
- Commissioning

2. SUPPLYING DETAILS

	➤ Full packaged AMP retrofit Project	• System design • Product supply • Installation / Commissioning • Maintenance
	➤ 6.6KV Shore connection - switch gear	▶ 2 or 3 functional unit of AMP HVSB (AMP incomer 1FY + Bus riser 1FU) • Rated V : 6.6Kv • Rated Capacity : 2.5MVA • Rated Frequency : 60Hz • Rated short time withstand V : 25KA/1sec • Degree of protection : IP42
	➤ Transformer	▶ Basic data • Phase, Frequency : 3ph, 60Hz • Rated capacity : 2.5MVA • Rated V : 6600 / 440v • Degree of protection : IP23 • Winding material : Aluminum
	➤ Cable reel - Electrical motor with encoder - Cable guide roller - Remote control - Transmitter fiber optical	▶ Electrical motor with encoder : 3.7Kw, 440v, 60Hz, 4P ▶ Transmitter fiber optical • Multi mode, 12core, 40Trun • Degree of protection : IP55 • Reeling cable : 185sq, 120sq • Plug & socket..: Proconnect / 3PX5

TAILORED AMP TOTAL SOLUTIONS

3. PROJECT REQUIREMENTS



① Electrical wiring diagram



② Electrical load analysis



③ Maker's drawing of the Main Switch Board



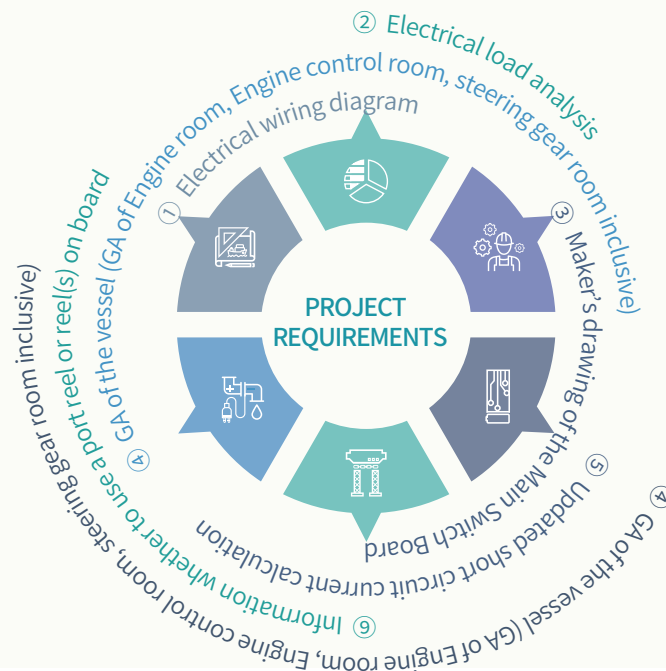
④ GA of the vessel (GA of Engine room, Engine control room, steering gear room inclusive)



⑤ Updated short circuit current calculation

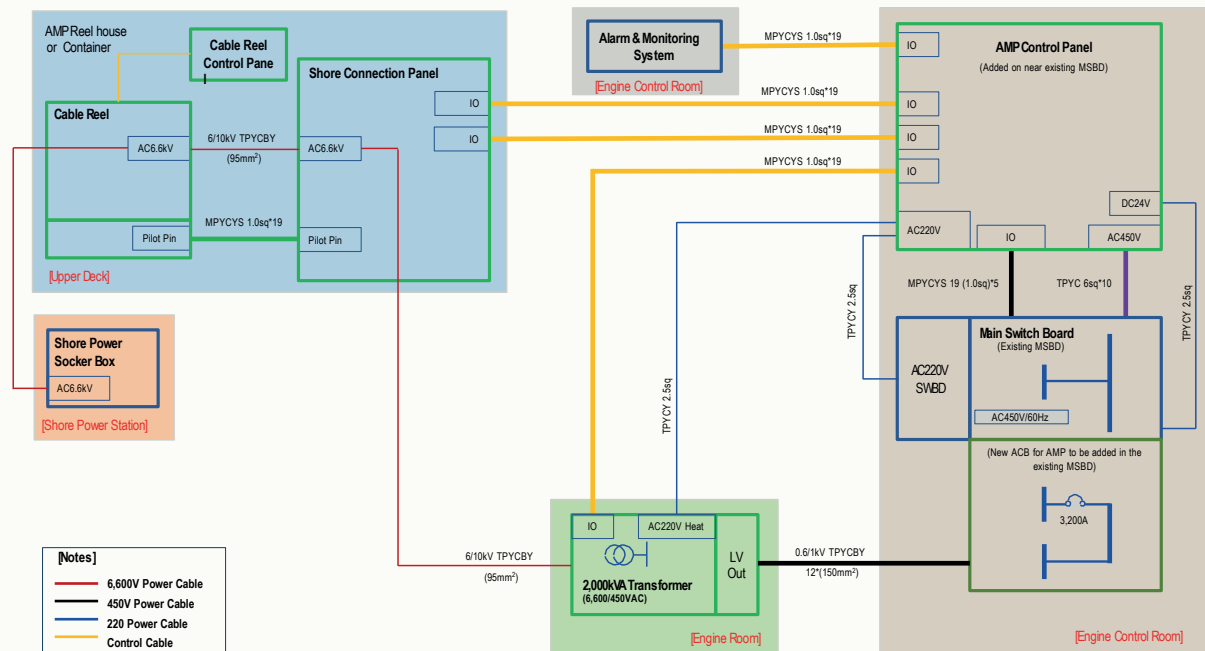


⑥ Information whether to use a port reel or reel(s) on board

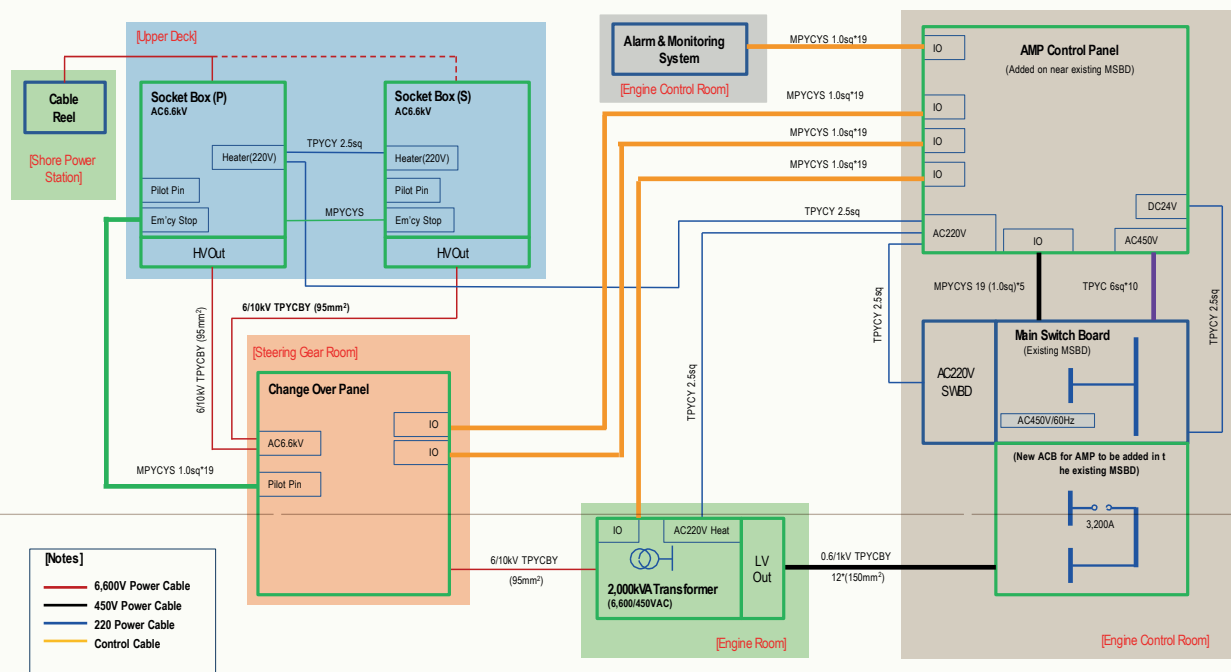


⑥ Information whether to use a Port reel or Reel(s) on board

⑥- A. Cable Reel on board



⑥- B. Using a Port Cable Reel



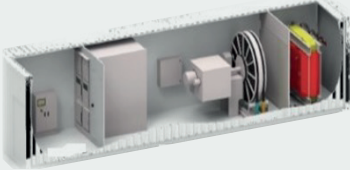
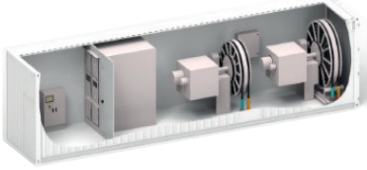
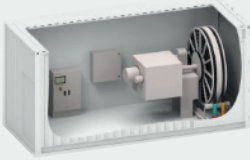
TAILORED AMP TOTAL SOLUTIONS

4. PRODUCT CONFIGURATION

※ AMP equipment can be packaged in a container or without a container or inside the vessel where it's available

Equipment	Capacity
Cable Reel	185sq, 120sq
Transformer	3Ph, 450V/6600V, 4500KVA, F Class
6.6kV Switch Board	2.5MVA, AC6.6KV, 60Hz, 25KA/1sec

5. CONTAINERIZED AMP TYPES

Container types	Equipment configurations	Type features
Type 1 (IP56)	Cable reel + TR + 6.6kV SWBD 	Fully equipped
Type 2 (IP56)	Cable reel + 6.6kV SWBD 	Requires options
Type 3 (IP56)	Cable reel 	Requires options

6. PACKAGED AMP TYPES

Items	Port Reel	AMP Reel Shelter	AMP Reel No Shelter	Remarks
Shelter	N	Y	N	IP42 for shelter
Cable reel	N	Y	Y	
Socket box	Y	N	N	For port reel use only
High Volt. SWBD	Y	Y	Y	
Transformer	Y	Y	Y	
LV IN panel	Y	Y	Y	

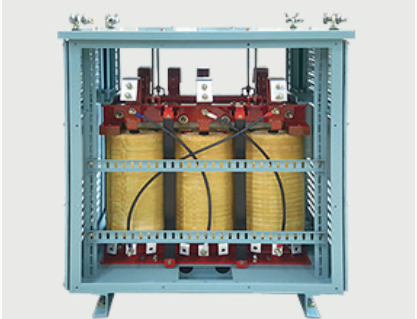
7. SIMPLIFIED CABLE REEL COMPARISON TABLE

Items	HLB	Cavotec	Remarks
Motor controller	Inverter type	Hydraulic type	Inverter type enables more precise control of tensioning the cables
Cable	LS Cable 	Partnered makers	120sq * 3c + 35 * 2c + 2.5sq * 10c + 12Fo * 40m ~ 50m
Socket & plug	Proconnect (FRA) The original standard	Cavotec	All standard
Other than Reel	• MSBD modification • HV panel, TR unit supply • Installation, Commissioning	• Mainly Cable Reel • Other equipment by agents, reps	HLB : Full packaged or single unit equipment & service, based on customer requests

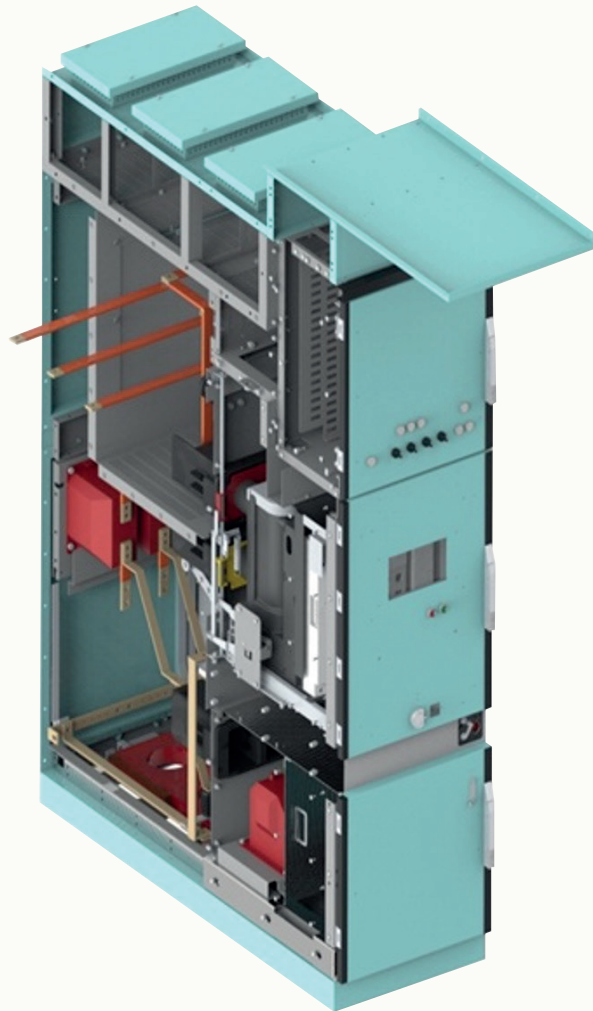
TAILORED AMP TOTAL SOLUTIONS

8. TRANSFORMER

Cast Resin TR		
 	Capacity	Up to 15MVA
	Rated Voltage	Up to 36kV
	Ph. Frequency	3PH, 50/60Hz
	Enclosure	IP00 up to IP44
	Cooling	AN, AF, Water Cooling
	Insulation Materials	Epoxy resin, Inorganic filler
	Winding Materials	AL. Option CU
	Standards	IEC 60076, ANSI C57, NEMA ST-20 & all ship's classifications

Dry Type TR		
 	Capacity	Up to 5MVA
	Rated Voltage	Up to 11kV
	Insulation Materials	Varnish, Nomex, Mica
	Basic Insulation	Air Natural(AN)
	Winding Materials	CU standard, AL option
	Standards	IEC 60076, IEEE C57.12.01, NEMA ST-20, KEPIC, CE

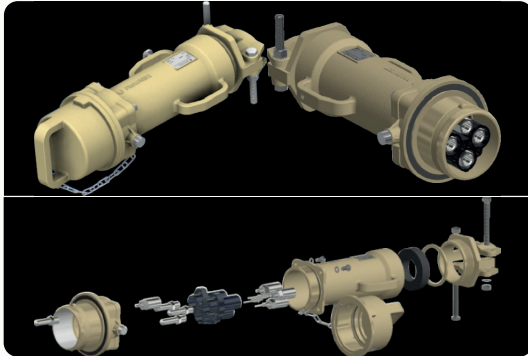
9. HIGH VOLTAGE SWITCHBOARD



-
- Designed to protect operators
 - Prevent spreading damages caused by systematic failure
 - Spatially efficient compact-chamber design
-

TAILORED AMP TOTAL SOLUTIONS

10. AMP PLUG



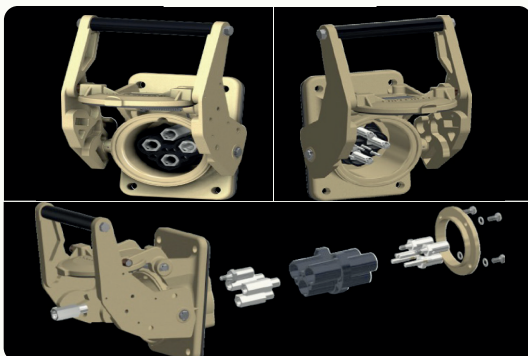
Mechanical Characteristics

- Marine grade housing, low magnesium & copper free alloy
- Stainless steel fastening
- Alloy copper, silver plated contacts
- Protection index between plug & socket IP67
- Pilot contact electrical interlocking

Electrical Characteristics

- Max insulation voltage : 7.2kV
- AC withstand with HD 629.1 S2 : 17.1kV
- Max current rating : 350A
- Contacts resistance : 1mΩ
- No. of poles : 3P + E + 3P max
- Cable terminal : Crimp or solder
- Optical fiber connection

11. AMP SOCKET



Mechanical Characteristics

- Marine grade housing, low magnesium & copper free alloy
- Stainless steel fastening
- Alloy copper, silver plated contacts
- Protection index between plug & socket IP67
- Pilot contact electrical interlocking

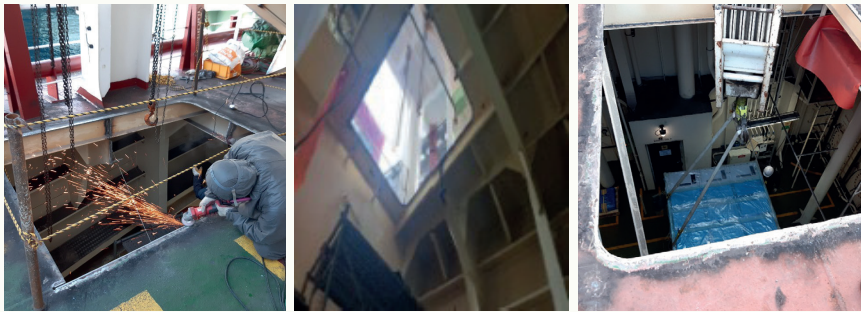
Electrical characteristics

- Max insulation voltage : 7.2kV
- AC withstand with HD 629.1 S2 : 17.1kV
- Max current rating : 350A
- Contacts resistance : 1mΩ
- No. of poles : 3P + E + 3P max
- Cable terminal : Crimp or solder
- High voltage shore connection system with IEC 60092-510
- Shore connection with IEC Norm 80005-1/FDIS

12. INSTALLATION OF EQUIPMENT

1

Cutting deck plate & putting equipment(Change-over panel & TR)



2

Welding deck plate and NDT test



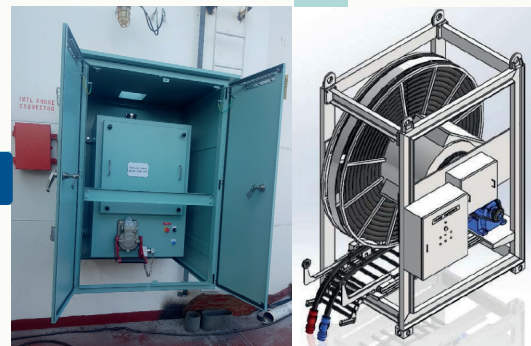
4

Sitting all equipment / Connecting HV to BUS bar in Change-over panel.
Connecting TR to MSBD, Installing AMP control panel in engine control room.



3

If using Port Reel, install socket box
If not, own cable reel on the vessel



5

Connecting 6.6Kv cable & test



REFERENCES IN AMP

No.	Year	Items	Customer
1	2013	• MSBD modification • COP/TR/Socket box supply • HV/LV cabling, installation, commissioning	Hanjin Shipping
2	2014 ~ 2016	• MSBD modification • COP/TR/Socket box supply • HV/LV cabling, installation, commissioning	Seaspan Ship Management
3	2015	• AMP Container (Cable reel)	Seaspan Ship Management
4	2016	• Matson Aloha Class AMP Cable Reel	• PSI(Philly Shipyard) • Korea Marine & Ocean Univ.
5	2017	• Matson Aloha Class	PSI(Philly Shipyard)
6	2018	• MSBD modification • COP/TR/Socket box supply • HV/LV cabling, installation, commissioning	APL
7	2018	• AMP Test Unit • AMP Shelter (SB, Cable Reel)	• PSI(Philly Shipyard) • Gunjang Energy Fuel Dock
8	2019	• Hanjin port SPO • AMP Container (SB, Cable Reel) • AMP Container (Cable Reel)	• BPA(Busan Port Authority) • BPA(Busan Port Authority) • Korea Ins. of Ocean Science & Technology
9	2020	• MSBD modification • COP/TR/Socket box supply • HV/LV cabling, installation, commissioning	KLC
10	2020	• Gamman port SPO • AMP Dispenser Type	• BPA(Busan Port Authority) • Korea Southern - Power Co., Ltd.
11	2021	• MSBD modification • COP/TR/Socket box supply • HV/LV cabling, installation, commissioning	STX Marine Service
12	2021	• MSBD modification • COP/TR/Socket box supply • HV/LV cabling, installation, commissioning	SM Line

REFERENCES IN AMP AT PORT & ON VESSEL

Gunjang Energy Fuel Dock



- Shelter for AMP
- AMP Capacity : 6.6KV 2MVA
- System : 6.6kv switchboard, Cable reel 440v switchboard

Busan Port Authority



- AMP Container
- AMP Capacity : 6.6KV 2MVA
- System : 6.6kv switchboard, Cable reel 440v switchboard

Korea Institute of Ocean Science & Technology



- AMP Container
- AMP Capacity : 440V 2MVA
- System : Cable reel

Korea Southern Power CO., LTD.



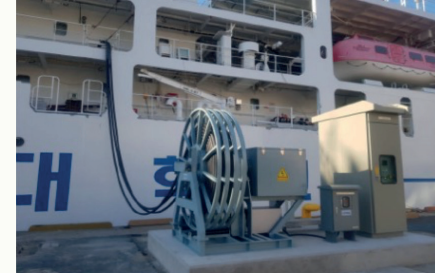
- AMP Dispenser type
- AMP Capacity : 440V 2MVA
- System : Cable reel, Dispenser

Seaspan



- AMP Container
- AMP Capacity : 6.6KV 7MVA
- System : Cable reel,

Korea Marine & Ocean University



- AMP Cable Reel
- AMP Capacity : 440V 2MVA
- System : Cable reel, 440v switchboard

ABB



OEM assembler

- LV Distribution board (450V, 690V)

Local service partner

- Installation & modification at site
- Modification & storage at factory

Schneider Electric



Licensed assembler & local service partner

- Prisma Plus & iPM LV Distribution board

Supplied 124 Prisma Plus & iPM panels for BP Clair Ridge



REFERENCES TO SHIPYARDS

No.	Year	Items	Q'ty	Shipyard
1	2015	• Switchboard(MSBD, GSP, LGSP, ESBD) • Console(ECC, BCC, CCC, BWC) • Etc.(DIST, TEST, W/HGB, GCP)	64 39 67	HMD
2	2016	• Switchboard(MSBD, GSP, LGSP, ESBD) • Console(ECC, BCC, CCC, BWC) • Etc.(DIST, TEST, W/HGB, GCP)	82 5 46	HMD
3	2017	• Switchboard(MSBD, GSP, LGSP, ESBD) • Console(ECC, BCC, CCC, BWC) • Etc.(DIST, TEST, W/HGB, GCP)	61 2 70	HMD
4	2018	• Switchboard(MSBD, GSP, LGSP, ESBD) • Console(ECC, BCC, CCC, BWC) • Etc.(DIST, TEST, W/HGB, GCP)	62 5 33	HMD
5	2019	• Switchboard(MSBD, GSP, LGSP, ESBD) • Console(ECC, BCC, CCC, BWC) • Etc.(DIST, TEST, W/HGB, GCP)	50 2 19	HMD

REFERENCES TO SHIPYARDS

Local shipyards (Hyundai HI, Hyundai Mipo Dockyard, Samsung HI, Daewoo SME)



Switchboard(MCC)



MV Switchboard



LV Switchboard



Emergency SWBD



Engine control console



Bridge control console



Bridge control console



Group control panel



CUSTOMERS





**WE INVITE YOU
TO THE
PROACTIVE
MARINE
BUSINESS
RUNNER!**

