We believe the purpose of company’s existence is to support its members and society by producing continuous values with help of technology and human resources. Our employees are the best resources we can rely on, so we value the talented upbringing of our workers. Since the foundation of company we have implemented this philosophy and we will continue to put forth all our effort to achieve our goals through expanding technology and maximizing our employees’ abilities.
Organization
Major Products
Financial Status
Certificate
Products
- Lighting
- Lighting Architecture
- Communication & Navigation System
- Electrical Switchboard & Console
- Nautical Instrument
- Sensor
- Underwater Vehicle

Our Valuable Customer
Worldwide Service Network

Worldwide Sales Network

Contents

1990-11
Selected as a defense industry company by the Ministry of National Defense.

1992-03
Signed a technical license agreement with WIT & SOHN, Germany.

1995-08
Nominated as one of the most prominent medium-sized enterprises with advanced technologies by the Ministry of Commerce and Industry.

1996-06
Co-developed with KORDI an unmanned underwater vehicle (UUV) for deep sea exploration at 6,000m depth in the ocean successfully.

2001-01
Established design research center for interior lighting equipments in Seoul.

2002-02
Developed LED flat lighting equipments.

2007-02
Completed the development of new explosion proof lighting equipments for land use.

2008-07
Developed LED lighting for indoor use.

2009-06
Awarded "Industrial Service Medal" on the 47th taxpayer's day.

2010-01
Expanded & moved DAEYANG Instrument Co., Ltd. to Noksan factory.

2013-03
Awarded "Industry development of LED & International competitiveness improvement by minister of Ministry of Trade, Industry and Energy".

2013-04
Expanded & moved DAEYANG Instrument Co., Ltd. to Noksan factory.

2014-03
Awarded "Industrial Service Medal" on the 47th taxpayer's day.

2015-03
Expanded & moved DAEYANG Instrument Co., Ltd. to Noksan factory.

1990-11
Awarded "Industrial Service Medal" on the 47th taxpayer's day.
Daeyang is an industrial leader in marine lightings, communication systems, power systems and nautical instruments. Based on over 40 years of experience in marine and shipbuilding industry, our superior products are acknowledged by various customers throughout the world. Customer satisfaction is our first and only priority and we put endless effort to meet the highest standard. With heavy investment (10% of annual turnover) on research and development, our R&D center is one of the most famous research centers in the industry for its innovation and capability of product development. We operate in various sites around Busan, Korea and have oversea liaison offices in Japan, North & South America, Europe, China, South Asia and Australia for immediate response to the customers’ demands.
Major Products

**Lighting**
- Indoor Lighting
- Outdoor Lighting
- Navigation Light & Signal Light
- LED Lighting
- Hazardous Area Lighting
- Receptacle & Switch
- Reefer Container Receptacle
- Lighting Architecture

**Underwater Vehicle**
- Remotely Operated Vehicle (ROV)
- Autonomous Underwater Vehicle (AUV)
- Deep Sea Unmanned Underwater Vehicle (UUV)
- Mine Disposal Vehicle (MDV)

**Nautical Instrument**
- Anemometer & Anemoscope
- Rudder Angle Indicator
- Weather Information System (WIS)
- Whistle

**Sensor**
- Temperature Sensor
- Pressure Sensor
- Weather sensor

**Panel & Switchboard**
- Main Switchboard
- Emergency Switchboard
- Power Distribution Panel
- Engine Control Console
- Bridge Control Console
- Switchboard for Train

**Communication & Navigation**
- Integrated Communication System (ICS)
- Refrigerated Container Monitoring System (RCMS)
- Power Cable Transmission System
- Integrated Navigation System (INS)
- Electro-Magnetic Speed Logs (EM-LOG)
- Deaousing/Deforming System
- Ship Shore Communication Link System (SSCLS)

**Financial Status** April, 2017

- **Total assets** 205,061
- **Sales volume** 154,239
- **Total assets** 2014: 190,704
  - Sales volume: 139,940
- **Total assets** 2015: 205,061
  - Sales volume: 154,239
- **Total assets** 2016: 227,620
  - Sales volume: 174,948
- **Capital** 2014: 4,784
- **Capital** 2015: 4,784
- **Capital** 2016: 4,784

(Units: Million won)
Daeyang Electric Co., Ltd. is a manufacturer of various equipment for marine and shipbuilding industry. To ensure our promises for best quality to customers, Daeyang has been certified with quality management system for production, inspection and service.

**Quality Management**

**HSE Management**

Our company concerns the health(H), safety(S) and environment(E) as the most basic factors in our policy.
Assurance

Daeyang products have been guaranteed by cumulating the relevant certificates from various organization including CE, UL, IECEx bodies, ATEX, Classification Society all over the world, and so on.

• Explosion Proof Certificate

CML (ATEX)  UL  Baseefa(ATEX)  LCIE(ATEX)

Sira (ATEX)  KGS  KOSHA  KRH  KTL

• Class Approval

RMRS  ABS  KR  LR  BV

SERCONS  NK  RINA  CCS  DNV  KS
We are continuously searching the lighting solution based on our cumulated experience and understanding for the lightings. As a result, we can provide the top-notch lighting solution including lighting architecture, lightings, controllers, switches, and plugs to our valuable customers from all industrial fields. For an optimized lighting solution, we are always considering both economic and technical aspects with strict quality control program which is certified for international standards.
NEW

Lighting Technology

We are endeavoring to lead the lightings industry through the sustained R&D effort in developing up to date lighting technologies. Based on our recent effort on the application of LED as a new lighting source in 2012, the world first full LED lighting ship was built with our LED lightings. We, surely, can supply all sort of LED lightings which could be replacements of traditional lightings including special lightings to meet customers’ inquiry.
**Indoor Lighting**

- Surface Ceiling Light: FL-W5-TH
- Recessed Dampa Ceiling Light: FL-NFD
- LED Ceiling Light: LED-W5
- LED Decorative Recessed Ceiling Light: LEB-NF
- LED Decorative Recessed Ceiling Light: LEB-NL
- LED Surface Ceiling Light: LEB-NS
- LED Down Light: LECO118NF-G / LECO118NF

**Outdoor Lighting**

- Surface Ceiling Light: FL-W5-U
- Surface Ceiling Light: FL-W5-PC
- Pendant Light: F9H
- LED Dome Light: LECO09-U
- Suez Canal Search Light: PC-K
- High Pressure Sodium Flood Light: PF-425I

**Navigation Light & Signal Light**

- Warning Light: IW-01
- Signal Light: IS-F/D-0
- Signal Light: IS-P
- Morse Key: MK-S
- Portable Daylight Signaling Light: DDS-64ABC
- Masthead: A2L-5M06H
- Port: A2L-5P04H
- Starboard: A2L-5T04H
- Towing Light: A2L-5Y04H

**LED Navigation Light**
Hazardous Area Lighting

Explosion Proof Fluorescent Ceiling Light
FL-220/240edgBu

Explosion Proof Recessed Ceiling Light
FL-220/240WFedg
FL-220/240WFedgBu

Explosion Proof Fluorescent Ceiling Light
FL-220/240edgG
FL-220/240edgBuG

Explosion Proof LED Bulb Light
EXLED-1AG

Explosion Proof LED Down Light
EXLED-1AD

Explosion Proof LED Down Light
EXLED-18G

Explosion Proof LED Down Light
EXLED-18D

Extreme Low Temperature Light
(500W Explosion Proof Halogen Flood Light)
PFS0hRT2BS1-226UWM2

Extreme Low Temperature Light
(400Wx2 Explosion Proof Sodium Flood Light)
PF425nRT2BI-226UWM2W

Explosion Proof Light
PF-40SBX2
Lighting Architecture

Daeyang is providing a total lighting solution including optimal lighting design and documentation for a number of complex offshore structures, such as Drillships, FPSOs constructed at all major shipbuilding yards. All works on the lighting architecture for offshore structures are implemented on the basis of our cumulated experiences to meet the customers’ requirement.

For designing adequate and relevant lighting architecture, we are performing lighting simulation to find the optimal arrangement of luminaires considering space, power consumption, economics, installation, and maintenance. By a token of our total lighting solution, we can help customers to consider all lighting equipment from drawing level in any design stages, which surely can save time and money of our valuable customers.

Human Factors Design

Human Factors involves the application of knowledge about human characteristics, capabilities, limitations, expectations, and needs to the design and development of equipment, products, plant and systems.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Recommended lighting levels</th>
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<tbody>
<tr>
<td>• Dining room : 300lx</td>
<td>• Dining room : Adjustable range 150-400lx</td>
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<tr>
<td>• Lounges : 300lx</td>
<td>• Lounges : Adjustable range 150-320lx</td>
</tr>
<tr>
<td>• TV Room/Cinema : 300lx</td>
<td>• TV Room/Cinema : Adjustable range 40-320lx</td>
</tr>
<tr>
<td>• Library : 500lx</td>
<td>• Library : Adjustable range : 300-600lx</td>
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</tbody>
</table>

Human factors

Design requirement

- Illumination of specific tasks
- Illumination for dark adaptation
- Glare from light sources
- Reflected glare
- Brightness ratios
- Lighting fixtures and controls
- Workstation illumination

Illumination level study

Space Composition & 3D Modeling

• 3D modeling works based on architectural drawings
Lighting Control System

Daeyang offers consultants, system integrators and electrical installers for a comprehensive product range with DALI & KNX, in order to meet the challenges posed to complex lighting control system.

Scene 1  
Dining Mode  
- Group 1, 2, 3, 4: 100%  
- Group 5: ON  
- Group 6: OFF

Scene 2  
Dining Preparation Mode  
- Group 1: 70%  
- Group 2: 100%  
- Group 3: 0%  
- Group 4: 50%  
- Group 5: ON  
- Group 6: OFF

Scene 3  
Tea Time Mode  
- Group 1: 70%  
- Group 2: 70%  
- Group 3: 100%  
- Group 4: 100%  
- Group 5: ON  
- Group 6: OFF

Scene 4  
Night Mode  
- Group 1: 0%  
- Group 2: 0%  
- Group 3: 100%  
- Group 4: 100%  
- Group 5: ON  
- Group 6: OFF

Illuminance Calculation Area Setting & Lighting Arrangement
- Illuminance arrangement & calculation area setting
- Illuminaire selection & illuminaire adjusting work

Simulation & Rendering
- Optimization & review
- Illuminance distribution simulation and review

Report
- Illuminance calculation data sheets
- Lighting arrangement drawings
- Illuminance data sheets
- Luminaires specification sheets
- Luminaires specification drawings
Communication & Navigation System

Communication systems and navigation systems for naval ships and commercial vessels.

Communication systems for naval vessels:
- ADICS-21
- DICS-32
- WIRAS-III

Navigation systems for naval vessels:
- EM-LOG
- DRT

Electronic systems for commercial ships:
- SSCLS
- RCMS
- STC
- ECDIS

Thruster control systems for both inland navigation and on board all types of sea going vessels:
- Deck-mounted azimuth propulsion units
- Well-mounted azimuth propulsion units
- Retractable azimuth thrusters
- 360 degree steerable Shallow Draught Thrusters
- Tunnel thrusters
ADICS-21
Advanced Digital Integrated Communication System

ADICS-21 consists of an Internal Communication System, an External Communication System, an Announcing System, a Wireless Interior Communication System, and a Data Link System applied to any type of medium or large naval ship or submarine. The high speed optical network of ADICS-21 has high reliability and survivability as the ring structure including the dual redundancy routes, and serve gigabit Ethernet network.

As a tactical voice/audio network, the time-division multiplexing technology through 155Mbps(STM-1 standard) optical network provides a maximum of 2048 user channels simultaneously for voice or data transmission by using a non-blocking network switching technology.

In addition, ADICS-21 provides a high speed optical ethernet as an option, a variety of applicable data communications, and flexible interoperability for various demands of communication system and requirements of naval ships and submarines. More than 30 optical network systems have been delivered to naval ships and submarines.

ADICS-21 integrated communication system contains the following subsystems by customer selection.

- Internal Communication System
- Radio Communication System
- Public Address System
- Wireless Communication System
- Telephone System
- CCTV Network System
- Weather Information System
- Navigation Information System
- VoIP System
- Message Handling System
- Data Distribution Network
- Data Link Interfacing

System Introduction

ADICS-21 is a state-of-the-art digitalized Integrated Communication System (ICS) based on an optical communication network for newest naval ships or submarines in order to provide integrated communication environment involving naval tactical operations by using a variety of data and voice communications as below.
**EM-LOG**  
**Electro-Magnetic Speed Log**  
EM-LOG for the measurement of ship’s speed. This equipment indicates the speed of naval ships and voyage distance using the signal from a sensor reflected from ships to water surface.

**WIRAS-III**  
**Wireless Interior Radio Communication System**  
WIRAS-III is based on the digital TETRA and VoIP technology. And the central management system is normally installed in 19” standard rack. It consists of 1 to 4 transceivers for 3 to 15 user channels and VoIP telephone channels.

This system has various functions as follows:  
- Sending and receiving SMS  
- Individual call and Group call  
- Communicate with ICS  
- Communicate with PBX through gateway  
- VoIP communication through SIP protocol  
- Seven user channels simultaneously  
- 0.5 to 8 hours long time backup UPS (Option)

This system consists of the following devices:  
- Trunk Rack (WTR)  
- Dispatcher (WDT)  
- Radio Transceiver (WRT)  
- Mobile Terminal (WMT)  
- Network Manager (WNMS)  
- VoIP Telephone (WTP)  

**Typical System Configuration of WIRAS-III**
SSCLS
Ship Shore Communication Link System

1 | Perfect Compatibility

2 | Distributed Control System

Several independent function controllers are connected by CAN interfaced network.
• Overall system reliability is intact even when some components are faulty during operation.
• Modular design for facilitation in future system expansion.
• Applying functional redundancy.

3 | Easy User Interface

Easy to operate and to control system with intuitive touch LCDs.
• Provide three touch LCDs.
• If one touch LCD is faulty, user can use other LCDs as a replacement.
• Slave LCD can be used in separately main cabinet.

4 | Auto Wiring

Electrical pin connections are automatically selected by simple choosing of port/terminal name.

5 | Self-Diagnostics

Intrinsic self-diagnostic function for each component with controllers.

SSCLS System

Distributed Control System

• Overall system reliability is intact even when some components are faulty during operation.
• Modular design for facilitation in future system expansion.
• Applying functional redundancy.

Easy User Interface

Electrical pin connections are automatically selected by simple choosing of port/terminal name.

Self-Diagnostics

Intrinsic self-diagnostic function for each component with controllers.
Main Switchboard

The main switchboard is newly designed for commercial marine application. It has many advantages in design and is manufactured with compactness and ruggedness. The main switchboard meets the requirements of classification societies complied with IEC 439-1(Option).

Engine Control Console

The engine control console is continuously developed in design of hardware and software, and has several features with easy operation, monitoring and maintenance.

Group Starter

The group starter is a newly designed and manufactured for easy installation, space saving with high reliability and safety. Especially the layout of components and units provides easy operation and maintenance, and simultaneously compacts design provides less weight and requires less space for installation. The group starter meets the requirements of classification societies and complies with international standard(IEC).

The Emergency Switchboard

The Emergency switchboard is used for automatic start of emergency generator when power supply is the main switchboard fails. The panel consists of generator panel, feeder panel, emergency group starter panels and a shore connection box. The requirements of classification societies such as LRS, ABS, DNV GL, BV, NK, KR be with the emergency switchboard.
Product

Nautical Instrument

We keep taking advantage of boundless uses of sensor. We developed all kinds of sensors including thermometer, anemometer, smell sensor and environmental purity sensor for our daily life use.

Ultrasonic Type Wind Sensor

The ultrasonic Type Anemometer is a compact, self-contained, automatic station with no moving parts. The weather sensors and data acquisition computer are all contained in a single unit that is easy to install. Anemometer is ideal for severe and harsh environments aboard marine vessels. Anemometer offers the convenience of requiring no calibration or periodic maintenance.

Propeller Type Wind Sensor

Propeller Type Anemometer measures wind velocity and direction in real-time by rotation of transmitter. We can supply two kinds indicator-separated type or combined type.

3-Cup Type Wind Sensor & Indicator

The 3-Cup Type Wind Tracker, wind speed and wind direction indicator offers big performance in a compact display. Wind speed is displayed in your choice of units: KNOTS, M/S. Maximum wind speed is saved on the display until reset by the operator. Wind direction information is clearly displayed on a circular compass pattern of LEDs. Multicolored segments give a quick visual indication of current direction and direction variability. Front panel brightness control allows adjustment for best viewing in any light.

Pressure Transmitter

MCP-1 series Pressure Transmitter is designed to operate in hostile environments and yet give the outstanding sensitivity, linearity, and hysteresis of a silicon. Applications are process control system and biomedical instruments as well as ship.

Temperature Sensor

The temperature resistance characteristic of platinum wire is internationally utilized for measuring temperatures in the range of -200°C to 600°C. Platinum thermal resistance bulbs are known to be most suitable when used as temperature sensors which require extreme accuracy and stability.

Whistle

Air Horn

The air horn is a diaphragm sound transmitter operating on compressed air. The signal is released by an electromagnet or manually using a hand pull-rope.

Electric Horn

The electric horn is driven by an AC 3phase motor. An essential component is the piston inside the cylinder driven by an AC3phase motor via connecting rod, crankshaft and gearwheels.
Temperature Sensor for LNGC

Temperature Sensor for GTT NO 96

NO 96 Membrane System is a cryogenic liner directly supported by the ship's inner hull. This liner includes two identical metallic membranes and two independent insulation layers.

Application
1) IS/IBS/Liquid Dome Temperature
2) BHD/Trunk/Sec. Space Temperature
3) LNG Liquid Temperature
4) LNG Vapor Temperature
5) Glycol Water Temperature
6) Spray Inlet Temperature
7) Atmospheric Temperature

Specification
- Sensor type : RTD(Pt100Ω)
- According to IEC 60751
- R100/R0 = 1.3851
- R0 : Resistance value at 0 °C
- R100 : Resistance value at 100 °C
- t : Measuring temperature

<table>
<thead>
<tr>
<th>Operating Temperature</th>
<th>Class</th>
<th>Tolerance(°C)</th>
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<tr>
<td>-200 ~ 100°C</td>
<td>A</td>
<td>±( 0.15 + 0.002</td>
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Model

TTR-M (Dual)  TTR-M (Single)  Fitting Bracket  TTR-A11  TTR-LD

Temperature Sensor for GTT Mark III

MARK III Membrane System is a cryogenic liner directly supported by the ship's inner hull. This liner is composed of a primary metallic membrane positioned on top of a prefabricated insulation panel including a complete secondary membrane.

Application
1) IS/IBS/Liquid Dome Temperature
2) BHD/Trunk Temperature
3) LNG Liquid Temperature
4) LNG Vapor Temperature
5) Glycol Water Temperature
6) Spray Inlet Temperature
7) Atmospheric Temperature

Specification
- Sensor type : RTD(Pt100Ω)
- According to IEC 60751
- R100/R0 = 1.3851
- R0 : Resistance value at 0 °C
- R100 : Resistance value at 100 °C
- t : Measuring temperature

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<td>A</td>
<td>±( 0.15 + 0.002</td>
</tr>
</tbody>
</table>

Model

TTR-M (Dual)  TTR-M (Single)  TTR-M  Fitting Bracket  TTR-A11  TTR-LD
WIS-200
Weather Information System

Weather Information System measures Wind speed and direction, Air temperature, and Barometric pressure, Humidity, Rainfall(Option).

Performance
- Wind speed
- Wind direction
- Temperature
- Barometric pressure
- Relative humidity
- Rainfall(Option)

Outputs RS422/RS232

- Output rate: 1sec
- Units: m/s
- Serial output format: Daeyang protocol
- Serial output baud rate: 2400, 4800, 9600, 19200 or 38400 (Default: 9600)

Power
- Power requirements: 24Vdc (±20%) 4A

Environmental
- Operating temperature range: -40 ~ 70°C
- Storage temperature range: -50 ~ 80°C

Specification
- Wind speed range: 0 ~ 75m/s
- Wind speed accuracy: ±3%
- Wind direction range: 0 ~ 360°
- Wind direction accuracy: ±3°
- Temperature range: -40 ~ 60°C
- Temperature accuracy: 0.3°C
- Barometric pressure range: 600 ~ 1100hPa
- Barometric pressure accuracy: ±0.5hPa
- Relative humidity range: 0 ~ 100%RH
- Relative humidity accuracy: ±3%RH
- Rainfall range (Option): 0 ~ 250mm/h
- Rainfall accuracy: ±5%

* Weather Information System Protocol
$DEWMS,xxx.xx,R,xx.xx,M,A,H,xxx.x,T,
xxxx.x,B,xxxx.x*[CS] <CR><LF>

* Rainfall Protocol
$RAINxxx.xMM*[CS]<CR><LF>
Daeyang supplies various types of sensors measuring temperature / pressure / humidity / ultrasonic flow as a module and as a system, which have been developed and manufactured on our own.
We have developed all the core technologies for the sensors such as MEMS(Micro Electro Mechanical System), SoC design, simulation and reliability test, etc. Recently, we developed the pressure sensors for ESC(Electric Stability Control) system for the automobile, and since 2014 we started to supply these sensors to HKMC and SYMC.

Pressure Sensor for Automobile

The pressure sensor modules ESC(Electronic Stability Control) is designed to provide optimal operation to control the brake power of wheels independently under the condition where the steering system does not work.

ESC System

Electronic Stability Control
Component of the Electronic Stability Control
1. ESC-Hydraulic unit with integrated ECU
2. Wheel speed sensors
3. Steering angle sensor
4. Yaw rate sensor with integrated acceleration sensor
5. Engine-management ECU for communication

Metal Thin Film Pressure Sensor

We developed pressure sensor for high temperature and high pressure area by using metal thin films, deposited by the sputtering system. This kind sensor has the excellent performances like linearity, reliability and safety for harsh environments.

MEMS Pressure Sensor

Daeyang's MEMS(Micro Electro Mechanical Systems) pressure sensor has excellent properties just because of using advantages of Si semiconductor with high sensitivity and the metal structure with high safety. Because of these characteristics, the operation range is wide from 1 bar to 1,500 bar and moreover.
Underwater Vehicle

Daeyang have been developing the unmanned underwater vehicle (UUV) since 1990; 400m depth semi-autonomous underwater vehicle (SAUV) on 2003, 6000m depth UUV on 2006, which is the fourth of the world, has been successfully developed. Currently, our underwater vehicles are being supplied to marine industry and to underwater research centers.

Haemirae (UUV 6000)
- Underwater station to support ROV & AUV
- Heading keeping control
- Deep towed camera function
- Localization with USBL system

UUV R 100
- Underwater camera, sonar, environmental sensor
- Automatic dynamic control
- Underwater hybrid navigation algorithm
- Communication system via tether cable

UUV A 100
- Development of technology for automatic control
- Design and application of hybrid navigation algorithm
- Development of technology for precise control of communication system

H-ROV
- 6-DOF motion control
- Heading keeping control (Heading, Depth, Altitude)
- Precise control through fiber optic telemetry
- Localization with USBL system
- Ship hull & infrastructure inspection
- Port & harbor security
- Mine countermeasures (MCM)
- Scientific research
Our Valuable Customer

Shipbuilding
- HHI
- HMD
- HSHI
- DSME
- SHI
- HHIC
- STX
- IMABARI
- SHIN KURUSHIMA
- TSUNEISHI
- JMU
- OSHIMA

Offshore
- MITSUBISHI
- ONOMICHI
- SUMITOMO
- KYOKUYO
- SANOYAS
- NAKAI ZOSEN
- MES
- SWS
- CHINA SHIPPING
- COSCO
- CSIC
- BOHAI
- NEW TIMES
- HUDONG ZHONGHUA
- YANGFAN
- TAIZHOU KOUAN

Industrial Plant
- HDEC
- DWENC
- DAEILIM
- GSENC
- SSSCNT
- SKEC
- HEC
- TOYO-ENG
- KHN
- KEPCO

Automobile & Railway
- HMC
- KMC
- SMC
- ROTEM
- MANDO

Telecommunication
- SK TELECOM
- SK PLANET
# Worldwide Service Network

<table>
<thead>
<tr>
<th>National</th>
<th>Company</th>
<th>Website</th>
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<tbody>
<tr>
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