Alternators for Marine Applications
Delivering in all environments, all the time

Like you, we understand the challenges of operating in the marine environment. And through our experience, we’re able to help you determine the best course.

For over half a century, countless vessels have relied on the dependability of STAMFORD and AvK alternators and the technical skills from our support teams.

As an industry leader in advanced alternator design, we have a proven track record of delivering dependable products for the marine, offshore and oil and gas markets.

Through our experience, we understand the complexities and challenges you face integrating alternators and generator sets into marine vessels. Whether for shaft propulsion, auxiliary power, diesel electric propulsion, hybrid or variable speed systems, you can rely on our support to help you win in marine.

Our customers benefit from active support throughout the project life cycle - including preparation of specifications, alternator selection and sizing, installation, testing and commissioning, after sales service and maintenance.

Marine alternators designed and built by us offer efficient power generation, superior durability and longevity.

STAMFORD PM7 alternator

STAMFORD Marine Range
High-quality, durable alternators utilising wire-wound technology for marine main power and auxiliary generator sets and shaft alternators:

- 4-6 pole / 1,000 - 1,800 rpm
- Power range: 5 - 2,000 kVA
- Voltage range: 220 – 690V at 50 & 60Hz

STAMFORD and AvK marine alternators can be found operating on vessels across all our oceans, seas and waterways.

- Diesel-electric propulsion systems
- Power Take Off (PTO) shaft alternators for economical generation of electrical power
- PTO/PTI (Power Take In) shaft alternators operating as auxiliary propulsion drive systems
- Self-starting Power Take Home (PTH) shaft alternators for emergency propulsion
- Auxiliary and onboard power supply
- Compliant to Fixed Water Based Local Application Fire Fighting Systems (FWBLAFS)

AvK DSG 99 alternator

AvK Marine Range

Robustly engineered bar wound alternator designed to meet the challenges of the most arduous applications and environments. AvK alternators can be customised to meet specific customer needs:

- 4-10 pole / 600 - 1,800 rpm
- Power range: 1,000 - 10,000 kVA
- Voltage range: 380 – 13,800V at 50 & 60Hz
# Marine Alternator Specifications

**Key**
- **●**: Standard
- **∆**: Option

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Marine Shaft Alternators

For main propulsion power, **STAMFORD** and **AvK** offer a comprehensive range of modular based alternators in the range 100 to 10,000 kVA, 4 to 10 pole, which can be customised to meet specific customer needs and application demands. AvK marine alternators from Cummins Generator Technologies are made of a rigid and robust steel construction, typically with form (bar) wound stator coils and flat copper rotor windings that can withstand high levels of vibrations and load variations.

With more active material, STAMFORD and AvK alternators are robustly engineered to meet the challenges of the most arduous marine environments and to integrate into a variety of marine propulsion systems.

### Bakker Sliedrecht Reference

**Seven Atlantic, Diving Support Vessel**

**Where:**

Launched at the IHC Merwede yard in Hardinxveld-Giessendam, Netherlands. Operating in the North Sea based in Aberdeen, Scotland.

**Specified:**

- 6 x AvK DIG 156 alternators and
- 1 x AvK DSG 86 alternator

**Purpose:**

Diving support vessel for saturation and air diving support work.

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### Technical Considerations

- If the alternator requires a self starting capability when in motor mode (Power Take Home - PTH): What is the starting method to be employed?

- During starting the electrical machines output shaft should be completely de-coupled from gearbox or prop drive shaft on board.

- What is the mode of operation in PTH? Emergency situation only, or more regular operation, such as harbour manoeuvering?

- Are there any special requirements for bearings, due to high angles of inclination, running speed, lubrication and cooling, etc...?

- What method of cooling should be specified?

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**PTO - Operation as shaft alternator for boardnet supply only**

- Auxiliary diesel generator sets can be stopped; reducing maintenance costs
- Boardnet powered by main diesel engine; reduces operating hours of auxiliary generator sets.

**PTI - Operation as shaft motor for “booster” operation - no selfstart capability required**

- Additional propulsion power available
- Smaller main engine for “normal” operation lowers main engine costs
- Shaft alternator/motor to be started as normal PTO machine

**PTH - Alternator and start-up transformer (start-up system) individually engineered to customer requirements**

- Redundant power in case of main engine malfunction - self start capability required
- Shaft alternator to be started by the auxiliary generator sets

For technical assistance, please contact: applications@cummins.com
Marine Auxiliary Alternators

For a complete line up of marine auxiliary alternators, designed specifically for applications including emergency power, ship service power, harbour power, power take home and diesel electric propulsion, the STAMFORD and AvK ranges are unbeatable.

The Difference is Experience.

For all custom generator set configurations, our team of Customer Engineers specialising in marine applications are located in strategic regional offices. We are able to assist with engine/alternator matching to ensure maximum efficiency whether simply for emergency use or for use with shaft alternators for propulsion.

The Industry Standard

Compact in design STAMFORD alternators are easy to install and maintain for marine applications. A range of single and three phase voltages are available from either 6 or 12 wire reconnectable windings. 2/3 pitch main stator and damper windings make STAMFORD also suitable for parallel operation when equipped with suitable voltage regulator and quadrature droop kit. Most alternator models are fitted with a Permanent Magnet Generator (PMG) to power the excitation system as standard. The PMO/1 range is fitted with an Excitation Boost System (EBS) to provide short circuit maintenance and improved motor starting.

Fletcher Shipping Reference

FS Aquarius, Offshore Oil & Gas Vessel
Where: Peterhead, Scotland
Specified: 1 x STAMFORD PM7 alternator (replacement for failed non-STAMFORD alternator)
Purpose: Provide support services to the oil and gas exploration and production industries

Technical Considerations

- What is the duty cycle? Are the generator sets purely for emergency, or are they working in conjunction with shaft alternators to provide power for propulsion?
- It is important to understand the vessels power and propulsion system modes of operation.
- Are there any special requirements for bearings, due to high angles of inclination, running speed, lubrication and cooling, etc...?
- What method of cooling should be specified?

For technical assistance, please contact: applications@cummins.com
Diesel Electric Propulsion

Diesel Electric Propulsion (DEP) is not infant technology, and nor is our experience assisting customers integrate alternators and generator sets into DEP marine systems. With our expertise, global support networks and highly dependable product range, marine architects are consistently specifying STAMFORD and AvK alternators for DEP.

The global demand for Offshore Support Vessels (OSV), Platform Support Vessels (PSV) and Anchor Handling Tug Supply (AHTS) vessels incorporating DEP technology is increasing, and in response, we have developed our marine range to offer a reduction in both size and weight.

STAMFORD and AvK alternators have proven their suitability for continuous operation in the demanding offshore environment, and can operate both as auxiliaries for hotel loads and as a supply for Diesel Electric Propulsion Systems. They can handle the high currents that are seen in these high-power, low-voltage machines, and are perfectly suited to start large electrical machinery as seen on many vessels.

AvK DSG 125 and DSG 144 alternators save space and reduce capital expense
Talk to our application engineers to learn how our powerful AvK DSG 125 and 144 alternators can reduce overall footprint, with high-power, low-voltage power generation that OSVs and AHTSs require, in comparison with using a number of smaller-sized generator sets.

The AvK DSG 125 and DSG 144 are amongst the most powerful platforms in the market and are designed to be coupled to medium-speed engines of all major suppliers.

ESVAGT Reference

ESVAGT Carpathia, Emergency Response and Rescue Vessel

Where:
Built by the ASL-Marine yard in Singapore, ESVAGT Carpathia is a diesel electric vessel operating in the North Sea

Specified:
Propulsion power derives from five Cummins K19-CP generator sets featuring STAMFORD HCM5 alternators
Emergency power provided by 1 x Cummins 6C-CP generator set featuring a STAMFORD UCM27 alternator

Purpose:
Designed for extended periods at sea, the DEP system is well suited as the ESVAGT Carpathia spends much of its time in a stand by mode in which case it is not necessary to have all five of the six-cylinder main engines on line at the same time.

For technical assistance, please contact: applications@cummins.com
Increasingly our customers are looking to add flexibility to marine propulsion systems through use of hybrid configurations. Hybrid propulsion packages typically deliver fuel-savings for boat operators.

Hybrid propulsion systems comprise diesel electric, diesel mechanical and a combination of hybrid drive options enabling the ship to optimise power efficiency through use of a flexible choice of operational modes.

In addition to fuel savings, exhaust emissions are also limited, making hybrid systems environmentally friendly.

A wide choice of STAMFORD and AvK alternators are available to make the most of the benefits of hybrid propulsion systems. Our expert marine application engineers can help you specify which alternators from our range will reduce capital expenditure and operating costs. We can help you design a hybrid propulsion system to optimise the need for high generating capacity at cruising speeds whilst saving on machinery volume.

**Technical Considerations**

- Understand the electrical characteristics of the inverter loads connected to the generator sets.
- Is there a requirement for variable speed operations?
- Are there any special requirements for bearings, due to high angles of inclination, running speed, lubrication and cooling, etc...?
- Machine cooling method and specification?

**DOF Subsea Reference**

**Where:**
Savik, Norway

**Specified:**
2 x AvK DSG 144 alternators and
3 x AvK DSG 114 alternators

**Purpose:**
Hybrid power for the newly constructed Skandi Iceman AHTS offshore vessel

Visit www.genuine-stamford.com for more information
Protection and Insulation
All marine alternators for LV & MV are wire
wound and conform to Class H thermal
insulation. Open drip-proof enclosure protection
according to IP23 is standard. Optional air inlet/
outlet filters as well as higher IP protection
modes can be supplied for certain models.
Standard AvK design is open drip-proof in
accordance with IP23 SOLAS. All windings are
bar-wound and conform to Class F (MV/HV
alternators) or Class H (LV alternators) thermal
insulation. Air inlet/outlet filters as well as higher
protection up to IP55 can be supplied.

Cooling
A wide range of cooling systems are available
allowing an optimum choice for operating and
environmental conditions. Options include
top-mounted air-to-air (IC611 + IC616) or
air-to-water (IC611W) heat exchangers.

Bearings
Alternators can be equipped with either
antifriction or sleeve bearings subject to load,
speed and application. Sleeve bearings
provided are split type to permit easy access
for maintenance. Subject to frame size, speed,
ambient temperature and inclination they may
be auto-cooled or water-cooled, self-lubricated
or force-lubricated.

Alternator Protection
STAMFORD and AvK alternators are available
fully assembled with bearing and stator winding
detectors (RTDs) for protection against thermal
overload as standard or as an optional extra.

Rotor Construction
STAMFORD and AvK marine alternators have
the salient pole rotor construction, which when
combined with efficient ventilation and fan
designs enables better cooling of the rotor.
The rotor winding and insulation materials are
selected based on product and application
types to provide the customer with the best
products for marine applications.

Stator Construction
The stator core assembly consists of laminated
steel to reduce magnetic losses, improving
product efficiency. The slots and windings
are designed to provide the operator with the
flexibility of using the product at a wide range of
voltages. Insulation materials and winding style
are chosen depending on the voltage levels and
role within the marine power system.

Vacuum Pressure Impregnation
Depending on the application of the alternator,
vacuum pressure impregnation (VPI) is used as
the standard impregnation process on stator
and rotor windings. Resin Rich is alternatively
used, with both systems ensuring increased
machine life and reliability through excellent
dielectric properties, enhanced dimensional
and mechanical stability as well as superior
resistance against chemicals and/or moisture.
Epoxy resin is used within the VPI process on
STAMFORD and AvK alternators. Epoxy resins
offers the best possible base protection on
the winding.

Windings
Across the STAMFORD and AvK brands, you
can choose between wire wound and bar
wound alternators depending on the demands
of the marine application. The winding type,
insulation materials and winding pitch are
carefully selected to minimise losses, harmonics
while offering the capability to operate at a wide
range of voltages.

Automatic Voltage Regulator
A range of digital Automatic Voltage Regulators
(AVRs) designed to achieve maximum
performance are available to meet varying
application requirements. Typical AVR features
include:

- Voltage regulation in island mode (+/-0.5%)
- Reactive load sharing by static droop or
cross-current compensation
- Fast PID response for high-class regulation
characteristic current compensation
- U/f-characteristic for applications with:
  - Floating frequency
  - Under/over-excitation voltage protection
  - Excitation fault monitoring
Global Services

Technical Support and After Sales Service

Cummins Generator Technologies’ engineers are available to provide technical information to assist in selecting the correct alternator specifications that your job demands. We continue our support through commissioning and into after-sales service and support.

Our engineers are experienced professionals trained in electrical, electronic and mechanical skills. They in turn are supported by a worldwide spares and service network.

Our Global Service Network offers:

- 24 hour response to service emergencies - 7 days a week.
- Commissioning of generators on site.
- Onsite bearing maintenance and bearing condition monitoring.
- Onsite insulation integrity checks.
- AVR and accessories set up on site.
- Trained engineers available locally, speaking local language.
- Extensive aftermarket distribution for STAMFORD and AvK genuine parts.

Marine Classification Society Approval Testing

All our manufacturing plants have witness test facilities, enabling marine classification society inspection and test.

On certain marine societies we have type approval - which avoids the need for marine inspectors to inspect every marine alternator that we manufacture, thus reducing marine inspection costs and witness testing charges for our customers. Type approval also means we can reduce our lead times.

Commissioning Support

We have technicians and engineers available to attend vessel commissioning in support of our OEM customers. Their vast experience in generator set-up can help with setting up of control system parameters and on site problem solving.

Product Training

Product familiarity will ensure maximum productivity and optimum use of the alternator. Our Customer Support department offers product training courses for engineers, operators, service and support staff. Each course is individually tailored to suit the needs of the customer, the generator set builder and the end-user.

Product familiarisation courses, with a choice of training modules, including; alternator control systems, applications, trouble-shooting, maintenance or other specific requirements, are available.

Vibration Analysis

Alternators coupled to reciprocating engines are exposed to engine induced vibrations. We use design tools to analyse the impact of linear and torsional vibrations, and work with the engine or generator set builder to validate the design of the generator set, as well as to solve end-user vibration issues. This technology is key in enabling customers to improve the innovation and reliability of new and current product designs.
STAMFORD and AvK alternators meet the classification requirements of all major marine societies:

- American Bureau of Shipping (ABS)
- Bureau Veritas (BV)
- China Corporation Register of Shipping (CCRS)
- China Classification Society (CCS)
- Det Norske Veritas Germanischer Lloyd (DNV GL)
- Indian Register of Shipping (IRS)
- Korean Register of Shipping (KRS)
- Lloyds Register of Shipping (LRS)
- Nippon Kaiji Kyokai (NK)
- Registro Italiano Navale (RINA)
- Russian River Register (RRR)
- Russian Maritime Register of Shipping (RMRS)
- Turkish Loydu (TL)

Details on conformance to requirements of other societies and international marine safety standards can be obtained from our sales offices.

Spare Parts
According to classification requirements spare parts can be offered separately.

At Cummins Generator Technologies, it’s how we engage our customers every day that sets us apart. The unique combination of knowledge, dependability and innovation we bring to each customer relationship turns everyday service into excellent customer support. As a result we help our customers operate with greater efficiency, making it possible for them to compete more successfully throughout the world.

There for you™
Parts when **you need them**

Generator Solutions aims to be a one stop service for your generator needs. With local stocks held in each of its branches, we can offer same day and next day delivery of Genuine parts.

**We support Generator brands from:**

- mecc alte
- AvK
- STAMFORD
- Leroy Somer
- marathon

Our stores are regularly maintained to ensure when you need parts urgently, we can deliver.

Generator Solutions offer a 24 hour support line

Collect from us or we can deliver to you

Tell us about your requirements, we offer tailored packages or bespoke service kits, for projects and new contracts.

Choose your own bar-coded labels to suit your receiving process.

We take great pride in the quality of electrical machines always trying to ensure that we take care of our customers and their products.

**Contact Us:**

**Norway** - post@generatorsolutions.no

**Russia** - post@generatorsolutions.ru

**UK** - enquiries@generatorsolutionsas.com

**ALWAYS INSIST ON GENUINE**