SMALL SHIPS CHARGE AHEAD

No shortage of advice for lithium-ion batteries specification

BY ALAN CARTWRIGHT

Emerging battery technology has been a hot topic in recent years. Prompted by developments in the small ships sector, the IMarEST has been involved with the development and improvement of the international Standards, classification societies' Rules and the UK Maritime and Coastguard Agency's Regulations and Guidance for the use and application of lithium-ion batteries (of all technologies and chemistries). This is through the work of the Small Ships Special Interest Group (SS SIG) and its contributory work with the British Standards Institute, which is the UK link to the International Standards Organisation (ISO). These draw upon Standards already in place, formulated by the International Electrotechnical Commission (IEC).

IMarEST members, as well as designers and builders, can find the relevant lithium battery technology Standards, Rules, Regulations and Guidance against which to build and equip their vessels – just as they have for all other aspects of design, construction and outfitting – prior to finalising their designs and their vessels entering service.

Collated by the SS SIG, the tables on these pages serve as a useful aide-mémoire to interested parties. ■

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STANDARDS

The following Standards for Lithium-Ion Batteries have been developed and promulgated by the ISO, the IEC and IMO:

STANDARDS	DESCRIPTION
ISO/TS 23625:2021	ISO Technical Specification for design, construction and use of Lithium-Ion Batteries in Small Craft. Used by Notified/Approved Bodies for RCD/RCD Certification. These will be superseded by ISO 23625 when published. Available from BSI and other sources for ISOs.
ISO/FDIS 23625	Final draft version of ISO 23625, the approved version of the Standard, for possible publication late 2024. This will supersede ISO/TS 23625. This final draft Standard is available from BSI and other sources for ISOs.
IEC 62619:2022	Latest version of the IEC's Standard for design, construction and safety testing of Lithium-Ion Batteries and associated battery management systems for use in portable industrial applications (including maritime). The Standard includes impact and acceleration force testing. Invoked in ISO 23625.
IEC 62620:2014	Latest version of the IEC's Standard for design, construction and electrical testing of Lithium-Ion Batteries' charging and discharging and the marking of the batteries. Invoked in ISO 23625.
IEC 62133-2:2017	Latest version of the IEC's Standard for design, construction and electrical testing of individual Lithium-Ion Cells that may make up a battery pack. Invoked in IEC 62619, IEC 62620 and ISO 23625.
UN Standard 38.3	Transportation Testing for Lithium Batteries and Cells.

CLASSIFICATION SOCIETY RULES FOR TYPE APPROVAL

The following Classification Society Rules are applicable to ships being designed to class Rules or maintained under Classification Society Certification. Other classification societies may develop and publish Type Approval Rules, as use of lithium-ion battery technology increases:

CLASS RULES	DESCRIPTION
BV Type Approval Rules	Bureau Veritas Rules for the Type Approval of Lithium-Ion Batteries, for use in ships. Tests involved for certification include those required in IEC 62619:2022, IEC 62620:2014 and IEC 62133:2017.
DNV-CP-0418 Type Approval Rules	Det Norse Veritas Rules for the Type Approval of Lithium-Ion Batteries, for use in ships. Tests involved for certification include those required in IEC 62619:2022, IEC 62620:2014 and IEC 62133:2017.
LR Type Approval Rules	Lloyd's Register Rules for the Type Approval of Lithium-Ion Batteries, for use in ships. Tests involved for certification include those required in IEC 62619:2022, IEC 62620:2014 and IEC 62133:2017.
RINA Type Approval Rules	Registro Italiano Navale Rules for the Type Approval of Lithium-Ion Batteries, for use in ships. Tests involved for certification include those required in IEC 62619:2022, IEC 62620:2014 and IEC 62133:2017.

REGULATIONS

The following IMO and UK MCA Regulations are applicable to the carriage as cargo of lithium-ion batteries and systems in ships, and to the use of lithium-ion batteries in UK flag vessels operating anywhere in the world and Overseas Flag vessels working in UK waters, as applicable to workboats, small commercial vessels and other small ships:

REGULATIONS	DESCRIPTION
IMO IMDG Code	IMO Dangerous Goods Code. Lithium-Ion Batteries are considered to be Class 9 Dangerous Goods, for transportation. Testing and certification to UN 38.3 and UN 3480/UN 3481 are required, prior to transportation and declaration of DG provided to shippers, by consigners.
UN 3480 and UN 3481	United Nations Regulations for transportation of Lithium-Ion Batteries, invoked by IMO for shipping by sea. UN 3480 provides for transportation of batteries on their own (or in power packs) and UN 3481 provides for batteries installed within equipment or other systems (such as laptops, etc).
MCA Workboat Code Edition 3	UK Regulations for certification of workboats. Annex 1 provides regulations for design, construction, installation, examination and certification for vessels propelled by electrical or hybrid diesel-electrical systems.
MCA Sport and Pleasure Vessel Code, Edition 2 (Draft)	UK Regulations at draft stage (publication and in force expected late 2024/early 2025) for certification of sport and pleasure vessels in commercial operation. Annex 1 provides regulations for design, construction, installation, examination and certification for vessels propelled by electrical or hybrid diesel-electrical systems. Regulations will replace the technical standards provided at MGN 280(M).

MARITIME GUIDANCE

The following Classification Society and UK MCA Guidance has been published and is applicable to the use of lithium-ion batteries and systems in ships of all sizes and types, and to workboats and small commercial vessels. Further guidance may be available from other classification societies and MCA-approved Certifying Authorities.

GUIDANCE	DESCRIPTION
ABS Guidance	American Bureau of Shipping Guidance: Use of Lithium Batteries in the Marine and Offshore Industries – February 2020.
LR Battery Installations – a Lloyd's Register Guidance Note	Battery Installations – Key Hazards to Consider and Lloyd's Register's Approach to Approval – Second edition, January 2016.
MCA MGN 550 (M+F) Amendment 1 January 2024	UK Maritime and Coastguard Agency MGN outlining hazard identification and risk assessment approach to selection and installation of lithium-ion batteries in ships, workboats and small commercial vessels, for services or propulsion purposes. This MGN is invoked in the MCA Workboat Code Edition 3 and others.
MCA MGN 664 (M+F)	UK MCA MGN providing requirements for approach to assessment of ships', workboats' and SCV systems, where innovative technology is used. For electrical propulsion systems, in ships and other vessels not covered by the Workboat Code Edition 3, the approach requires a robust and documented hazard identification and risk assessment procedure to selection and installation of lithium-ion batteries in all ships.

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