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# M61 Starting Arrangements of Internal Combustion Engines

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## M61.1 Mechanical starting arrangements

M61.1.1 The arrangement for air starting is to be such that the necessary air for the first charge can be produced on board without external aid.

M61.1.2 Where the main engine is arranged for starting by compressed air, two or more air compressors are to be fitted. At least one of the compressors is to be driven independent of the main propulsion unit and is to have the capacity not less than 50 % of the total required.

M61.1.3 The total capacity of air compressors is to be sufficient to supply within one hour the quantity of air needed to satisfy M61.1.5 by charging the receivers from atmospheric pressure. The capacity is to be approximately equally divided between the number of compressors fitted, excluding an emergency compressor which may be installed to satisfy M61.1.1.

M61.1.4 Where the main engine is arranged for starting by compressed air, at least two starting air receivers of about equal capacity are to be fitted which may be used independently.

M61.1.5 The total capacity of air receivers is to be sufficient to provide, without their being replenished, not less than 12 consecutive starts alternating between Ahead and Astern of each main engine of the reversible type, and not less than six starts of each main non-reversible type engine connected to a controllable pitch propeller or other device enabling the start without opposite torque. The number of starts refers to engine in cold and ready to start conditions. Additional number of starts may be required when the engine is in the warm running condition. When other consumers such as auxiliary engines starting systems, control systems, whistle, etc., are to be connected to starting air receivers, their air consumption is also to be taken into account.

Regardless of the above, for multi-engine installations the number of starts required for each engine may be reduced upon the agreement with the Classification Society depending upon the arrangement of the engines and the transmission of their output to the propellers.

## M61.2 Electrical starting

M61.2.1 Where the main engine is arranged for electric starting, two separate batteries are to be fitted. The arrangement is to be such that the batteries cannot be connected in parallel. Each battery is to be capable of starting the main engine when in cold and ready to start conditions. The combined capacity of the batteries is to be sufficient without recharging to provide within 30 minutes the number of starts of main engines are required above in case of air starting.

M61.2.2 Electric starting arrangements for auxiliary engines are to have two separate batteries or may be supplied by separate circuits from the main engine batteries when such are provided. In the case of a single auxiliary engine only one battery may be required. The capacity of the batteries for starting the auxiliary engines is to be sufficient for at least three starts for each engine.

M61.2.3 The starting batteries are to be used for starting and the engine's own monitoring purposes only. Provisions are to be made to maintain continuously the stored energy at all times.

