

M3 Speed governor and overspeed protective device

(1971)

(Rev.1

1984)

(Rev.2

1986)

(Rev.3

1990)

(Rev.4

June 2002)

(Corr.1

Aug 2003)

(Rev.5

Feb 2006)

(Rev.6Nov 2018)

M3.1 Speed governor and overspeed protective device for main internal combustion engines

3.1.1 Each main engine is to be fitted with a speed governor so adjusted that the engine speed cannot exceed the rated speed by more than 15%.

3.1.2 In addition to this speed governor each main engine having a rated power of 220 kW and above, and which can be declutched or which drives a controllable pitch propeller, is to be fitted with a separate overspeed protective device so adjusted that the engine speed cannot exceed the rated speed by more than 20%. Equivalent arrangements may be accepted upon special consideration. The overspeed protective device, including its driving mechanism, has to be independent from the required governor.

3.1.3 When electronic speed governors of main internal combustion engines form part of a remote control system, they are to comply with UR M43.8 and M43.10 or M47 and namely with the following conditions:

- if lack of power to the governor may cause major and sudden changes in the present speed and direction of thrust of the propeller, back up power supply is to be provided;
- local control of the engines is always to be possible, as required by M43.10, and, to this purpose, from the local control position it is to be possible to disconnect the remote signal, bearing in mind that the speed control according to UR M3.1, subparagraph 4-3.1.1, is not available unless an additional separate governor is provided for such local mode of control.
- In addition, electronic speed governors and their actuators are to be type tested according to UR E10.

Note:

The rated power and corresponding rated speed are those for which classification of the installation has been requested.

Note:

1. The requirements introduced with M3 Rev.6 are to be uniformly implemented by IACS Societies for speed governors and overspeed protective devices:
 - i) when an application for certification of the device is dated on or after 1 January 2020; or
 - ii) which are installed in new ships contracted for construction on or after 1 January 2020.
2. The “contracted for construction” date means the date on which the contract to build the vessel is signed between the prospective owner and shipbuilder. For further details regarding the date of “contract for construction”, refer to IACS Procedural Requirement (PR) No. 29.
3. The “date of application for certification of the device” is the date of whatever document the Classification Society requires/accepts as an application or request for certification of an individual device.

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(cont)**M3.2 Speed governor, overspeed protective and governing characteristics of generator prime movers**

3.2.1 Prime movers for driving generators of the main and emergency sources of electrical power are to be fitted with a speed governor which will prevent transient frequency variations in the electrical network in excess of $\pm 10\%$ of the rated frequency with a recovery time to steady state conditions not exceeding 5 seconds, when the maximum electrical step load is switched on or off.

In the case when a step load equivalent to the rated output of a generator is switched off, a transient speed variation in excess of 10% of the rated speed may be acceptable, provided this does not cause the intervention of the overspeed device as required by ~~3.1.4~~ 3.2.5.

3.2.2 At all loads between no load and rated power the permanent speed variation should not be more than $\pm 5\%$ of the rated speed.

3.2.3 Prime movers are to be selected in such a way that they will meet the load demand within the ship's mains.

Application of electrical load should be possible with 2 load steps and must be such that prime movers – running at no load – can suddenly be loaded to 50% of the rated power of the generator followed by the remaining 50% after an interval sufficient to restore the speed to steady state. Steady state conditions should be achieved in not more than 5 seconds.

Steady state conditions are those at which the envelope of speed variation does not exceed +1% of the declared speed at the new power.

Application of electrical load in more than 2 load steps can only be permitted, if the conditions within the ship's mains permit the use of such prime movers which can only be loaded in more than 2 load steps (see Fig. 1 for guidance on 4-stroke diesel engines expected maximum possible sudden power increase) and provided that this is already allowed for in the designing stage. This is to be verified in the form of system specifications to be approved and to be demonstrated at ship's trials. In this case, due consideration is to be given to the power required for the electrical equipment to be automatically switched on after black-out and to the sequence in which it is connected. This applies analogously also for generators to be operated in parallel and where the power has to be transferred from one generator to another in the event of any one generator has to be switched off.

3.2.4 Emergency generator sets must satisfy the governor conditions as per items 1 and 2 even when:

- a) their total consumer load is applied suddenly, or
- b) their total consumer load is applied in steps, subject to:
 - the total load is supplied within 45 seconds since power failure on the main switchboard
 - the maximum step load is declared and demonstrated
 - the power distribution system is designed such that the declared maximum step loading is not exceeded
 - the compliance of time delays and loading sequence with the above is to be demonstrated at ship's trials.

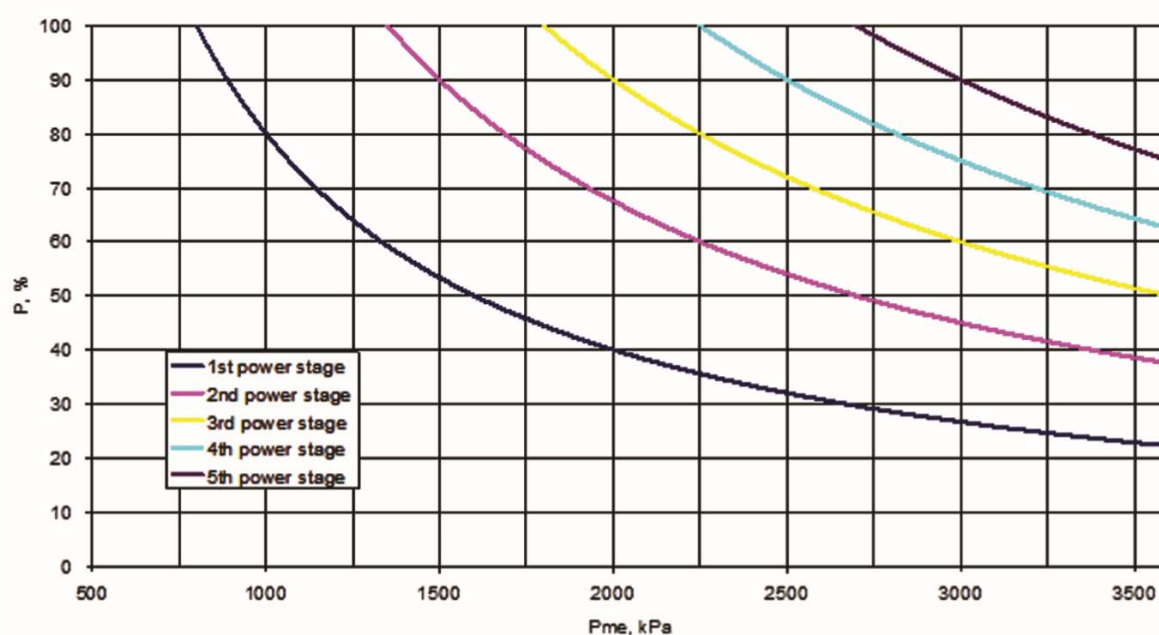
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3.2.5 In addition to the speed governor, each prime mover driving an electric generator and having a rated power of 220 kW and above must be fitted with a separate overspeed protective device so adjusted that the speed cannot exceed the rated speed by more than 15%.

3.2.6 For a.c. generating sets operating in parallel, the governing characteristics of the prime movers shall be such that within the limits of 20% and 100% total load the load on any generating set will not normally differ from its proportionate share of the total load by more than 15% of the rated power of the largest machine or 25% of the rated power of the individual machine in question, whichever is the less.

For an a.c. generating set intended to operate in parallel, facilities are to be provided to adjust the governor sufficiently fine to permit an adjustment of load not exceeding 5% of the rated load at normal frequency.



Legend:

P_{me} : declared power mean effective pressure

P : power increase referred to declared power at site conditions

1 : first power stage

2 : second power stage

3 : third power stage

4 : fourth power stage

5 : fifth power stage

Fig. 1: Reference values for maximum possible sudden power increases as a function of brake mean effective pressure, P_{me} , at declared power (four-stroke diesel engines)

Note:

For guidance, the loading for 4-stroke diesel engines may be limited as given by Figure 1.

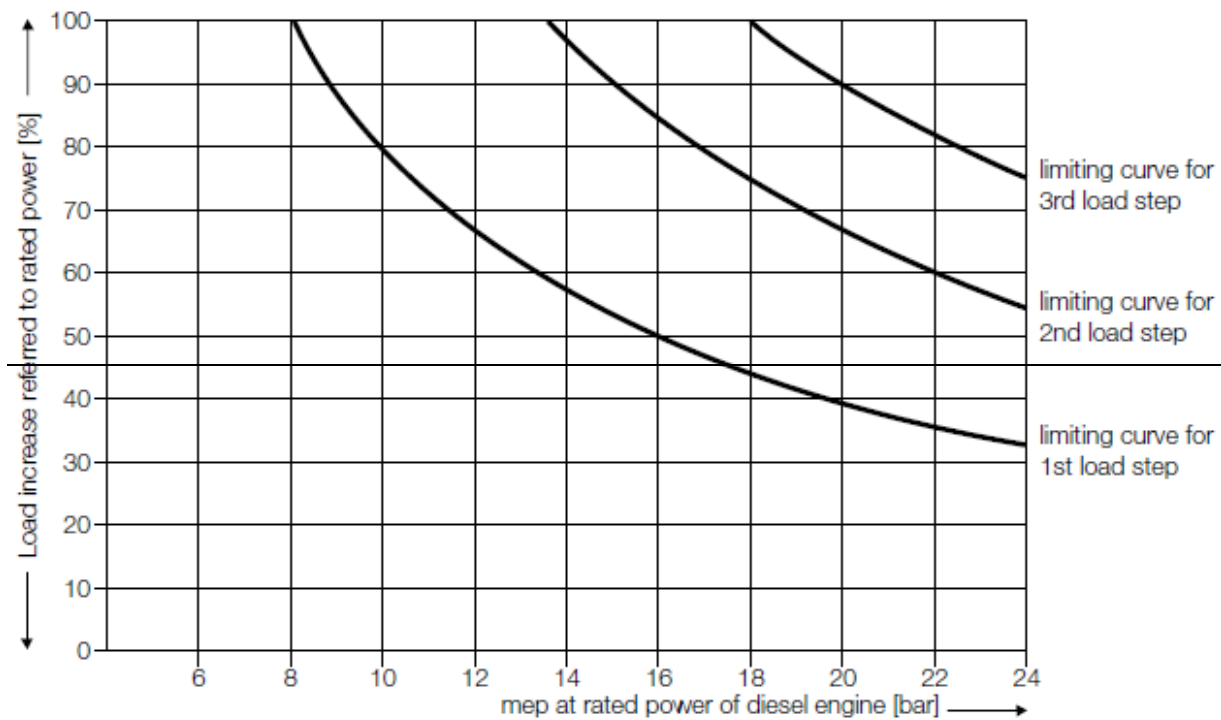
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Fig. 1: Limiting curves for loading 4-stroke diesel engines step by step from no-load to rated power as function of the brake mean effective pressure

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