FEDERATION EUROPEENNE DE LA MANUTENTION
Section IX
SERIES LIFTING EQUIPMENT

FEM
9.852

Power driven series hoist mechanisms Standardised test procedure for verification of the classification

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Fédération Européenne de la Manutention (Section IX)

Available in German (D), English (E), French (F)
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1 Introduction:

The calculated classification of series hoist mechanisms is effected according to **FEM 9.511** "Rules for the design of series lifting equipment - Classification of mechanisms". The theoretical duration of service table 1 in **FEM 9.755** "Series lifting equipment - Measures for achieving safe working periods for power driven series hoist mechanisms (S.W.P.)" is also based on **FEM 9.511**. The verification of the dimensioning and classification of series hoist mechanisms according to the specified rules is effected by the manufacturers using mathematical methods and tests.

Since, however, **FEM 9.511** contains no further information on other factors resulting in the cause of damage beyond the load spectrum and time, this Rule defines a "standardised test procedure" (referred to in the following as "test") which specifies the minimum requirements.

The successful implementation of the test in conjunction with the mathematical verifications gives the manufacturer the authority to apply the designation "Classification in Group of Mechanisms according to the Standardised Test Procedure".

2 Scope of application

This Rule applies to power driven series hoist mechanisms in the scope of application of **FEM 9.511**. This Rule does not deal with the load bearing means employed (ropes, chains, belts).

The test is effected in the lowest Group of Mechanisms in which the series hoist mechanism is offered. Verification of the classification in higher Groups of Mechanisms can be effected mathematically according to **FEM 9.511** on the basis of the test results of the lowest Group.

3 Implementation of the test

3.1 Framework conditions:

The test may be performed in enclosed, non-climatised rooms. The ambient temperature should be in the 20° C ± 10° C range.

This test does not include environmental factors (e.g. moisture / rain / snow / temperature). If such factors are expected to affect the serviceability of safety-related parts (e.g. brakes), separate verification shall be obtained either for the complete series hoist mechanism or these parts.

The hoist mechanism must be supported in a mechanically rigid arrangement with the permitted tolerance for the supporting surface. If additional loads are created in certain configurations (e.g. in the frame or drum bearings) owing to the design of the hoist mechanism, the test must be based on the most unfavourable bearing arrangement.

The suspended load may be guided in a slide arrangement.

3.2 Configurations:

The test must be carried with the hoist mechanism fully assembled. Preference must be given to selecting the reeving arrangement for the load bearing means which effects the highest lifting speed offered. If the test is performed with a higher reeving arrangement, the load must be increased in order to take into account the larger rigid body kinetic stress resultants in the chain of drive elements during the acceleration times. Instead of exact calculation (see annex), the factor 1.1 (see annex) may be selected as the increase in load for each 50 % reduction in the lifting speed. In this case, 10 % of the operating period must be verified with increased load.

Alternatively, the operating period with increased load may be converted into an extended total operating period (see annex) for verification purposes. If the test is performed with a higher lifting speed than the maximum offered, the load may be reduced for the same reasons. In this case, however, the exact calculation method specified in the annex must be selected.

Two hoist mechanisms may be tested simultaneously (particularly in order to test hoist mechanisms with multiple-layer windings) by means of opposed winding and unwinding (see fig. 1).

For rope hoists: In the case of drums with a rope guide arrangement and single layer winding, the rope lead-off must move symmetrically towards the drum centre (see fig. 2).

If the series hoist mechanism is offered with various drive units and controls (e.g. squirrel-cage rotor motors, frequency inverters, direct current, hydraulics, pneumatics), the series drive unit which causes the most unfavourable moment impact must be selected for the test.

Additional components which are possible as an option or which are possible depending on the reeving arrangement or selected drive may be tested separately from the fully assembled series hoist mechanism (e.g. control switching elements, bottom blocks, second brake, overload protection ...).

3.3 Test program:

3.3.1 Load

The entire test must be performed at full load (load spectrum coefficient 1). Depending on the reeving arrangement, or in the case of opposed winding, the load must be increased or the test period correspondingly extended (see 3.2).

3.3.2 Time sequence:

The test must be performed with the permitted values specified by the manufacturer for operating time (CDF) and number of starts of the drive. The operating time may be collated into a block of time within a 2 minute cycle. Additional stopping points must be provided along the lifting path in order to achieve the number of starts of the drive, if required.