FEDERATION EUROPEENNE DE LA MANUTENTION
Section IX
SERIAL HOIST UNITS

FEM 9.755

Measures for achieving safe working periods for motorized serial hoist units (S.W.P.)

06.1993 (E)

1 Introduction, definitions and other relevant guidelines, standards and rules

For technical reasons, it is of advantage for a user to adapt serial hoist units as far as possible to the actual loads. For this purpose, serial hoist units are classified into 8 groups of mechanisms in accordance with table 1 resulting from the application of the following regulations (ISO 4301/1, FEM 9.511, FEM 9.661, FEM 9.671).

Many elements involved in the distribution of forces in a serial hoist unit are not visible during the prescribed inspection intervals and cannot be checked. The onset of damage, therefore, cannot be or hardly be recognized. On reaching the theoretical utilization D, at the latest, hazards may occur with increasing probability.

The theoretical utilization D given in table 1 determines, in conjunction with the actual operating conditions, safe working periods (Safe Working Periods; see definitions), for all elements of serial hoist units.

It is therefore the objective of this rule to determine measures for achieving safe working periods over the entire duration of service, although – according to the state of the art – premature failure cannot be ruled out.

Furthermore, the fulfillment of the basic safety and health requirements of the guideline of the Council 89/392/EWG and supplement guideline 91/368/EWG for avoiding special hazards resulting from lifting processes, e.g. due to fatigue and aging, makes it necessary to adhere to the measures contained in this rule.

1.1 Definitions

- **Theoretical duration of service D**
  Is the calculated total operating time of a serial hoist unit for a duration of service of approx. 10 years classified according to groups of mechanisms based on FEM 9.511.
- **Safe working period (S.W.P.)**
  The safe working period results from:

$$\frac{\text{actual duration of service S}}{\text{theoretical duration of service D}} \leq 1.$$

- **Actual duration of service S (h)**
  The actual duration of service of the serial hoist unit is defined as the effective operation, based on operating hours, load spectra and any factors f.
- km_i : documented actual load spectrum factor per inspection interval
- T_i : effective number of operating hours per inspection interval (h).
- f : factor depending on the type of recording in accordance with 3.1, 3.2, 3.3, 6.2.1 and 6.2.2
- km_1 to km_4 : factors of the load spectrum (see table 1)
- **Total duration of service (h)**
  The total duration of service of a serial hoist unit is defined as the period from commissioning to final taking out of operation.

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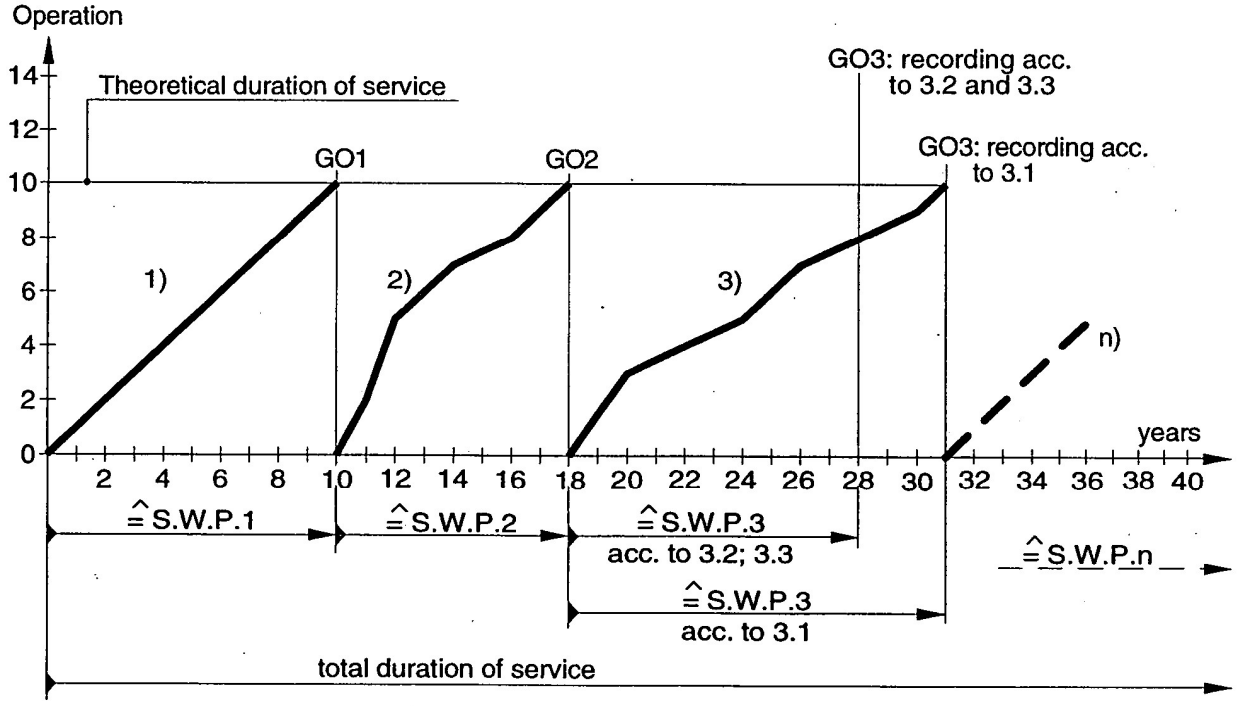
Sources of supply see back page

Table 1: Theoretical duration of service D (h)

	Groups of mechanisms	1Dm M1*)	1Cm M2	1Bm M3	1Am M4	2 m M5	3 m M6	4 m M7	5 m M8
Line	Load spectra, load spectrum factor	Theoretical utilization D (h)							
1	light 1 / L1 K = 0.5 (Km_1 = 0.125 ≙ 0.5^3)	800	1600	3200	6300	12500	25000	50000	100000
2	medium 2 / L2 0.5 < K < 0.63 (Km_2 = 0.25 ≙ 0.63^3)	400	800	1600	3200	6300	12500	25000	50000
3	heavy 3 / L3 0.63 < K < 0.8 (Km_3 = 0.5 ≙ 0.8^3)	200	400	800	1600	3200	6300	12500	25000
4	very heavy 4 / L4 0.8 < K < 1 (Km_4 = 1 ≙ 1.0^3)	100	200	400	800	1600	3200	6300	12500

*) M1 to M8 according to ISO 4301/1 (currently being revised)

For safe operation during the entire duration of service, the following assumptions are made:
- load-related selection of serial hoist units to FEM 9.511
- adherence to prescribed inspection intervals
- adherence to operating, inspection and maintenance instructions of the manufacturer
- carrying out general overhaul (GO)



GO : general overhaul / general overhauls

1) : operation as classified

2) : variable operation per year, operation higher than classified

3) : operation lower than classified: theoretical duration of service is not reached after 10 years

n) : the new theoretical duration of service determined after each GO can be identical with, lower or higher than the previous one and must be specified by the manufacturer

1.2 Other relevant guidelines, standards and rules

89/392/EWG, 91/368/EWG,
ISO 4301/1, ISO/DIS 9927/1,
FEM 9.511, FEM 9.661, FEM 9.671