

# Drive group (FEM group) selection

## An important subject

Apart from the type of hoist required, the load capacity, the hook path and the lifting speed, the drive or FEM group is one of the main criteria to consider when selecting a hoist. The drive group must be selected to ensure that the hoist is fit for use for its intended purpose. Standard hoists are normally designed for a mean theoretical service life of 10 years, subject to operation in accordance with FEM 9.511. If the drive group selected is not appropriate in view of actual service conditions, the actual service life may be considerably shorter than 10 years. The results are excessive expenditure for maintenance, repairs and overhauls. In Germany, accident prevention regulations VBG D8 and D6 require hoist operators to determine the used-up portion of the theoretical service life during each regular inspection of the hoist. When the theoretical service life has elapsed, the hoist must be decommissioned. Continued operation is only permitted if an inspector finds that there are no objections to continued operation and lays down conditions for operation. Normally, the inspector requires the hoist to be overhauled. The objective of these requirements is to ensure that each hoist is only operated within its safe working period (S.W.P.).

In addition to the mean working time per day,  $t_m$  (total average hours of operation of the hoist per day), the correct assessment of the load population is essential for selecting the appropriate drive group. The value  $t_m$  is given by the following equation:

$$t_m = \frac{2 \times \text{mean lifting height (m)} \times \text{load cycles (1/h)} \times \text{working time (h/day)}}{60 \text{ (min/h)} \times \text{lifting speed (m/min)}}$$

### Mean lifting height:

the average hook travel under actual operating conditions

### Load cycles:

the average number of lifting operations per hour. A load cycle consists of one lifting and one lowering operation, i.e. two hook movements (lifting operations with an empty hook as a result of process conditions must also be taken into account in determining load cycles, but also make the load population determined less severe.

### Working time:

average working time per day within which the average load cycles per hour are performed

### Lifting speed:

average lifting speed (normally the maximum lifting speed) at which the load cycles are performed.





The following table indicates the theoretical service life D in hours for FEM groups 1 Bm, 1 Am, 2 m, 3 m and 4 m.

	Drive group	1Bm/M3	1Am/M4	2m/M5	3m/M6	4m/M7
Line	Load population	Theoretical service life D (h)				
1	light	3200	6300	12500	25000	50000
2	medium	1600	3200	6300	12500	25000
3	heavy duty	800	1600	3200	6300	12500
4	very heavy duty	400	800	1600	3200	6300

The selection of the next highest FEM group results in a doubling of the theoretical service life if the operating conditions assumed remain unchanged.

Further information on this rather complex subject is given by FEM 9.755 and the fourth supplement to accident prevention regulation VBG 8 for winches, hoists and traction systems. We will also be pleased to send you our planning service form for selecting the correct FEM group as well as an article concerning the determination of remaining service life.

If the mean working time  $t_m$  and the load population are known, the correct drive group in accordance with DIN 15020 or FEM 9.755 can be selected using the following table.

Load population	Definition of load population	Mean working time $t_m$ per working day in h				
1 (light)	( $k \leq 0.50$ ) Only operated at maximum load in exceptional cases, mainly operated at very low load, small dead load		$\leq 2$	2 – 4	4 – 8	8 – 16
2 (medium)	( $0.50 < k \leq 0.63$ ) operated quite frequently at maximum load, operated continuously at low load, medium dead load		$\leq 1$	1 – 2	2 – 4	4 – 8
3 (heavy duty)	( $0.63 < k \leq 0.80$ ) operated frequently at maximum load, operated continuously at medium load, heavy dead load		$\leq 0.5$	0.5 – 1	1 – 2	2 – 4
4 (very heavy duty)	( $0.80 < k \leq 1$ ) operated regularly at maximum load, very heavy dead load		$\leq 0.25$	0.25 – 0.5	0.5 – 1	1 – 2
Drive/FEM group in accordance with DIN 15020 or FEM 9.511			1Bm	1Am	2m	3m