

SAFE WORKING PERIOD (SWP) CALCULATION

The end of the Safe Working Period (SWP) must be calculated in accordance with the ISO 12482-1 standard during each recurring inspection and service. If the component does not have a condition-monitoring unit, use the following method to calculate the remaining SWP%.



Note: If a condition-monitoring unit is fitted, it performs the SWP calculation and displays the remaining SWP% automatically.



Note: For some products, the condition-monitoring unit can be retrofitted as a modernization to enhance safety (not available for chain hoists). Contact your supplier for more details.



Note: The values used in each SWP calculation, as well as the result and date, must be carefully recorded in the logbook. Each SWP calculation requires the use of figures recorded during previous calculations.

Step 1: Calculate the motor operating hours (running hours) per inspection interval, T_i Check the following values for this inspection interval:

J = the number of working days during the inspection interval [days]

H = the average hoisting height [m]_[SEP]

N = the average number of work cycles per hour [cycles/h]_[SEP]

T = the average daily working time [h]

V = the maximum hoisting speed [m/min] (as shown on the data plate)

Use the following formula to calculate T_i , the motor operating hours (total lifting time) per inspection interval:

$$T_i = \frac{2 * H * N * T * J}{V * 60}$$

For Example, if you use:

J = 180 [days], H = 5 [m], N = 20 [cycles/h], T = 12 [h], V = 5 [m/min]

$$T_i = \frac{2 * 5 * 20 * 12 * 180}{5 * 60} = 1440$$

Step 2: Calculate the actual load spectrum factor per inspection interval, K_{mi}

1. Divide the total lifting time in proportion to the actual load spectrum during the inspection interval. For example, if the product has lifted full loads (100%) for half of the time and no load (0%) for half of the time then record 50 for each of these in the "Lifting time %" column of the table below.

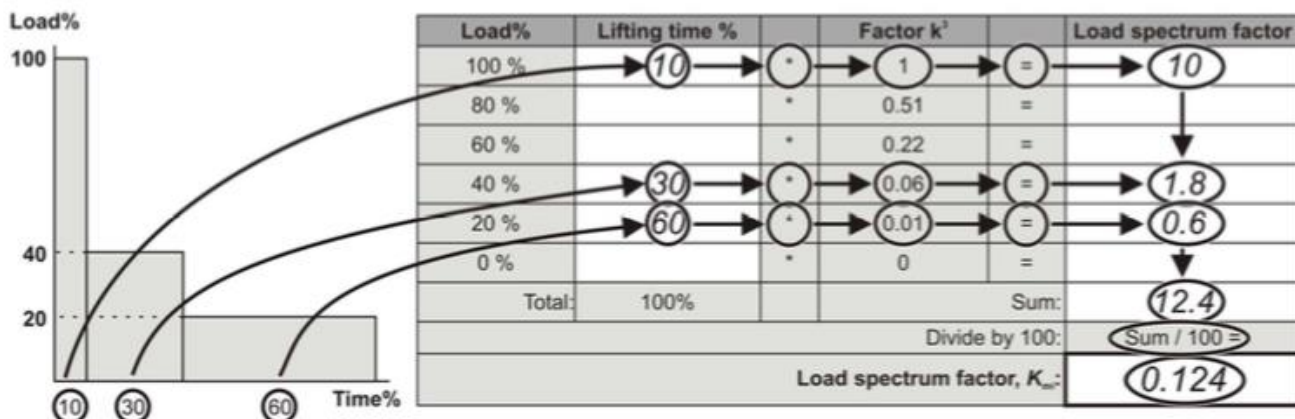
| Load % | Lifting time % | * | Factor k^3 | = | Load spectrum factor |
|---|----------------|---|--------------|------|----------------------|
| 100 % | | * | 1 | = | |
| 80 % | | * | 0.51 | = | |
| 60 % | | * | 0.22 | = | |
| 40 % | | * | 0.06 | = | |
| 20 % | | * | 0.01 | = | |
| 0 % | | * | 0 | = | |
| Total: | 100% | | | Sum: | |
| Divide by 100: | | | | | Sum / 100 = |
| Load spectrum factor, K_{mi}: | | | | | |

2. The sum of the figures in the "Lifting time %" column must always be 100.

3. Multiply each entry in the "Lifting time %" column by the multiplier in the "Factor k^3 " column. Write the results in the "Load spectrum factor" column.

4. Add up the numbers in the "Load spectrum factor" column and record the result of this sum. 5. Divide the sum of the "Load spectrum factor" column by 100 to get the K_{mi}

For example, if we use: 100% load for 10% of the time, 40% load for 30% of the time and 20% load for 60% of the time:



Step 3: Calculate the partial duration of service, S_i . Use T_i and K_{mi} in the following formula to calculate S_i [hours] Select the value of X, from the table below.

$$S_i = X * K_{mi} * T_i$$

| Product | Value of X |
|----------------------------------|------------|
| With counter and log book | 1.2 |
| With log book | 1.4 |
| Without counter, log book or CMS | 1.5 |

Record the value of S_i in the logbook. This value will be needed for future SWP calculations.

For example, if we use: $X=1.2$, $K_{mi}=0.124$ and $T_i=1440$:

$$S_i = 1.2 * 0.124 * 1440 = 214.272$$

Step 4: Calculate the actual duration of service, S . Add together each of the S_i partial duration of service values gathered from this and previous inspection intervals

since the start of the safe working period. The earlier S values ($S_1...S_i$) can be read from the log book.

$$S = S_1 + S_2 + ... + S_i$$

For example, if we use $S_1 = 215.468$, $S_2 = 210.26$, $S_3 (S_i) = 214.272$:

$$S = 215.468 + 210.26 + 214.272 = 640$$

Step 5: Calculate the SWP% and remaining service life

Check the hoist-operating group, which can be found on the hoist's rating plate.

In the appropriate column of the following table, find the number closest to S. The two final columns on the same row will tell you the remaining SWP% and the estimated remaining service life.

| Hoist operating group marked on hoist's rating plate | | | | | | Estimated remaining service life |
|--|-------------|------------|------------|------------|------------|----------------------------------|
| M3 (1Bm) | M4 (1Am) | M5 (2m) | M6 (3m) | M7 (4m) | M8 (5m) | |
| | | | | | | |

Record the value of SWP% in the logbook.

For example, if we use $S = 640$, Hoist duty group = M5 (2m) then SWP%=60%:

| Hoist operating group marked on hoist's rating plate | | | | | | SWP% | Estimated remaining service life [years] |
|--|----------|---------|---------|---------|---------|------|--|
| M3 (1Bm) | M4 (1Am) | M5 (2m) | M6 (3m) | M7 (4m) | M8 (5m) | | |
| Actual duration of service, S [h] | | | | | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | 100% | 10 |
| 40 | 80 | 160 | 320 | 630 | 1250 | 90% | 9 |
| 80 | 160 | 320 | 640 | 1260 | 2500 | 80% | 8 |
| 120 | 240 | 480 | 960 | 1890 | 3750 | 70% | 7 |
| 160 | 320 | 640 | 1280 | 2520 | 5000 | 60% | 6 |
| 200 | 400 | 800 | 1600 | 3150 | 6250 | 50% | 5 |
| 240 | 480 | 960 | 1920 | 3790 | 7500 | 40% | 4 |
| 280 | 560 | 1120 | 2240 | 4410 | 8750 | 30% | 3 |
| 320 | 640 | 1280 | 2560 | 5040 | 10000 | 20% | 2 |
| 360 | 720 | 1440 | 2880 | 5670 | 11250 | 10% | 1 |
| 400 | 800 | 1600 | 3200 | 6300 | 12500 | 0% | 0 |

When SWP% reaches zero, a General Overhaul (GO) must be conducted. Refer to chapter 'General Overhaul (GO)'.