

Ergonomic Assessment Worksheet v1.3.6 ESO

| | | |
|------------------|---|---|
| Plant | Gender of operator m <input type="checkbox"/> f <input type="checkbox"/> | Body height |
| Line | MTM Analysis | Analyst |
| Task / Workplace | Task duration [s] | Observation <input type="checkbox"/> Planning <input type="checkbox"/> |
| Date | | |

Result of overall evaluation:

Calculate the total score of whole body and compare it to the UL score. The overall result is determined by the higher value and the appropriate traffic light is checked. Anyway, interpretation should take into account both values.

| | | | | | | | | | | |
|---|-------------------|---|-----------------|---|---------------|---|--------------|---|--------------|--------------------|
| <input type="checkbox"/> Green <input type="checkbox"/> Yellow <input type="checkbox"/> Red | Whole Body | = | Postures | + | Forces | + | Loads | + | Extra | Upper Limbs |
| | | = | | + | | + | | + | | |

| | | | |
|------------------------|---------------|--------|---|
| EAWS evaluation | 0-25 Points | Green | Low risk: recommended; no action is needed |
| | >25-50 Points | Yellow | Possible risk: not recommended; redesign if possible, otherwise take other measures to control the risk |
| | >50 Points | Red | High risk: to be avoided; action to lower the risk is necessary |

| Extra points "Whole body" (per minute / shift) | | | | | | Extra points | | |
|--|--|------------|-------------|--------------|-------------|-----------------------------------|--------------|-----------|
| 0a | Adverse effects by working on moving objects | 0 | 3 | 8 | 15 | Intensity | | |
| | | none | middle | strong | very strong | | | |
| 0b | Accessibility (e.g. entering motor or passenger compartment) | 0 | 2 | 5 | 10 | Status | | |
| | | good | complicated | poor | very poor | | | |
| 0c | Countershocks, impulses, vibrations | 0 | 1 | 2 | 5 | Intensity x frequency | | |
| | | light | visible | heavy | very heavy | | | |
| | | 0 [n] | 1 1 - 2 | 2,5 4 - 5 | 4 8 - 10 | | 6 18 - 20 | 8 > 20 |
| 0d | Joint position (especially wrist) | 0 | 1 | 3 | 5 | Intensity x duration or frequency | | |
| | | neutral | ~ 1/3 max | ~ 2/3 max | maximal | | | |
| | | 0 [s] | 2 3 | 2,5 10 | 4 20 | | 6 40 | 8 60 |
| | | [n] [%] | 1 5 | 8 17 | 11 33 | | 16 67 | 20 100 |
| 0e | Other physical work load (please describe in detail) | 0 | 5 | 10 | 15 | Intensity | | |
| | | none | middle | strong | very strong | | | |




| | | | | |
|--|---|---|---|--|
| Extra = \sum lines 0a – 0e | note: Max. score = 40 (line 0c, 0d); Max. score = 15 (line 0a, 0e); Max. score = 10 (line 0b) | note: correct evaluation, if duration of evaluation \neq 60 s | = | |
|--|---|---|---|--|

Lines 0a-b mainly relate to the Automotive Industry, for other sectors additional elements may be necessary. For details see the EAWS manual.







| Shift Duration and Tasks: | | |
|---|--------------|--------|
| Description | Formula | Result |
| Real shift duration [min] | | |
| Lunch break [min] | - | |
| Other official pauses [min] | - | |
| Non repetitive tasks (i.e. cleaning, supplies, etc) [min] | - | |
| Net duration of repetitive task/s (a) [min] | = | |
| No. of real units (or cycles) (b) | | |
| Net cycle time [s] | (a/b x 60) = | |
| Idle Time [s] | | |

| Comments / proposals for improvements |
|---------------------------------------|
| |






Ergonomic Assessment Worksheet v1.3.6 ESO

| Basic Postures / Postures and movements of trunk and arms | | | | | | | | | | | | Postures | | | | | | | | | | | | | | | | | | |
|---|----|-----|----|----|----|-----|-----|-----|-----|------|----------------------|--|----------------------|-----|----------------------|-----|----|----|----|----|----|------|-----|--------------|---|-----|---|-----|---|--|
| (incl. loads of <3 kg, forces onto fingers of <30 N and whole body forces of <40 N) Static postures: ≥ 4 s High frequency movements: Trunk bendings (> 60°) ≥ 2/min Kneeling/crouching ≥ 2/min Arm liftings (> 60°) ≥ 10/min | | | | | | | | | | | | Symmetric | | | | | | | | | | | | Asymmetric | | | | | | |
| | | | | | | | | | | | | Evaluation of static postures and/or high frequency movements of trunk/arms/legs | | | | | | | | | | | | Sum of lines | Trunk Rotation 1) | | Lateral Bending 1) | | Far Reach 2) | |
| | | | | | | | | | | | | Duration [s/min] = $\frac{\text{duration of posture [s]} \times 60}{\text{Task duration [s]}}$ | | | | | | | | | | | | |  | |  | |  | |
| | | | | | | | | | | | | [%] | 5 | 7,5 | 10 | 15 | 20 | 27 | 33 | 50 | 67 | ≥ 83 | int | | dur | int | dur | int | dur | |
| [s/min] | 3 | 4,5 | 6 | 9 | 12 | 16 | 20 | 30 | 40 | ≥ 50 | 0-5 | 0-3 | 0-5 | 0-3 | 0-5 | 0-2 | | | | | | | | | | | | | | |
| [min/8h] | 24 | 36 | 48 | 72 | 96 | 130 | 160 | 240 | 320 | ≥400 | Intensity x Duration | | Intensity x Duration | | Intensity x Duration | | | | | | | | | | | | | | | |




Standing (and walking)

| | | | | | | | | | | | | | | | | | | |
|---|--|--|-----|-----|------|------|------|------|------|------|------|------|--|--|--|--|--|--|
| 1 |  | Standing & walking in alternation, standing with support | 0 | 0 | 0 | 0 | 0,5 | 1 | 1 | 1 | 1,5 | 2 | | | | | | |
| 2 |  | Standing, Confined space | 0,7 | 1 | 1,5 | 2 | 3 | 4 | 6 | 8 | 11 | 13 | | | | | | |
| 3 |  | a Bent forward (20-60°) | 2 | 3 | 5 | 7 | 9,5 | 12 | 18 | 23 | 32 | 40 | | | | | | |
| | | b with suitable support | 1,3 | 2 | 3,5 | 5 | 6,5 | 8 | 12 | 15 | 20 | 25 | | | | | | |
| 4 |  | a Strongly bent forward (>60°) | 3,3 | 5 | 8,5 | 12 | 17 | 21 | 30 | 38 | 51 | 63 | | | | | | |
| | | b with suitable support | 2 | 3 | 5 | 7 | 9,5 | 12 | 18 | 23 | 31 | 38 | | | | | | |
| 5 |  | a Elbow at/above shoulder level | 3,3 | 5 | 8,5 | 12 | 17 | 21 | 30 | 38 | 51 | 63 | | | | | | |
| | | b With S01 exoskeleton | 2,5 | 3,8 | 6,4 | 9,0 | 13,1 | 16,2 | 23,1 | 29,0 | 39,0 | 48,0 | | | | | | |
| 6 |  | a Hands above head level | 5,3 | 8 | 14 | 19 | 26 | 33 | 47 | 60 | 80 | 100 | | | | | | |
| | | b With S01 exoskeleton | 4,1 | 6,2 | 11,0 | 14,8 | 20,0 | 25,3 | 36,5 | 46,5 | 62,0 | 77,5 | | | | | | |



Sitting

| | | | | | | | | | | | | | | | | | | |
|----|---|--|-----|-----|-----|-----|------|------|------|------|------|------|--|--|--|--|--|--|
| 7 |  | Upright with back support slightly bent forward or backward | 0 | 0 | 0 | 0 | 0 | 0,5 | 1 | 1,5 | 2 | | | | | | | |
| 8 |  | Upright no back support (for other restriction see Extra Points) | 0 | 0 | 0,5 | 1 | 1,5 | 2 | 3 | 4 | 5,5 | 7 | | | | | | |
| 9 |  | Bent forward | 0,7 | 1 | 1,5 | 2 | 3 | 4 | 6 | 8 | 11 | 13 | | | | | | |
| 10 |  | a Elbow at / above shoulder level | 2,7 | 4 | 7 | 10 | 13 | 16 | 23 | 30 | 40 | 50 | | | | | | |
| | | b With S01 exoskeleton | 1,9 | 2,8 | 4,9 | 7,0 | 9,1 | 11,2 | 16,1 | 21,0 | 28,0 | 35,0 | | | | | | |
| 11 |  | a Hands above head level | 4 | 6 | 10 | 14 | 20 | 25 | 35 | 45 | 60 | 75 | | | | | | |
| | | b With S01 exoskeleton | 2,8 | 4,2 | 7,0 | 9,8 | 14,0 | 17,5 | 24,5 | 31,5 | 42,0 | 52,5 | | | | | | |

Kneeling or crouching

| | | | | | | | | | | | | | | | | | | |
|----|---|-----------------------------------|-----|-----|------|------|------|------|------|------|------|-------|--|--|--|--|--|--|
| 12 |  | Upright | 3,3 | 5 | 7 | 9 | 12 | 15 | 21 | 27 | 36 | 45 | | | | | | |
| 13 |  | Bent forward | 4 | 6 | 10 | 14 | 20 | 25 | 35 | 45 | 60 | 75 | | | | | | |
| 14 |  | a Elbow at / above shoulder level | 6 | 9 | 16 | 23 | 33 | 43 | 62 | 80 | 108 | 135 | | | | | | |
| | | b With S01 exoskeleton | 5,2 | 7,8 | 13,9 | 20,0 | 29,1 | 38,2 | 55,1 | 71,0 | 96,0 | 120,0 | | | | | | |

Lying or climbing


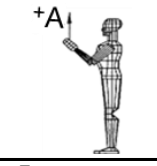
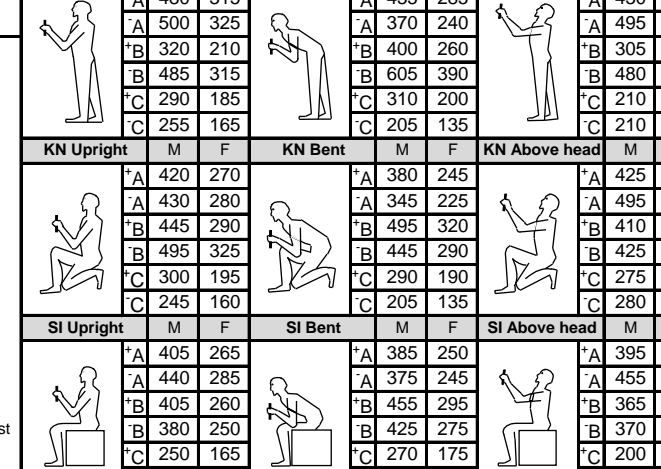
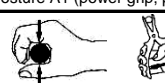

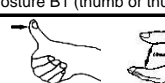
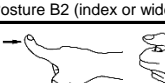
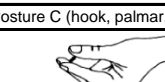
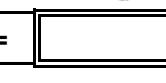

| | | | | | | | | | | | | | | | | | | | |
|----|---|--|-----|----|----|----|----|----|----|----|----|-----|--|--|--|--|--|--|--|
| 15 |  | Lying (on back, breast or side) w/ arms above head | 6 | 9 | 15 | 21 | 29 | 37 | 53 | 68 | 91 | 113 | | | | | | | |
| 16 |  | Climbing | 6,7 | 10 | 22 | 33 | 50 | 66 | | | | | | | | | | | |





| | | | | | | | | | | | | | |
|----|-----|----------|--------|----------|----|---------|----------|----------|----------|---|-------------|---------------|---------------|
| 1) | 0 | 1 | 3 | 5 | 2) | 0 | 1 (0,75) | 3 (2,25) | 5 (3,75) | Σ | Σ (max.=15) | Σ (max.=15) | Σ (max.=10) |
| | int | slightly | medium | strongly | | extreme | int | close | 60% | | 80% | arm stretched | Σ (max. = 40) |
| | dur | never | 4 s | 10 s | | ≥ 13 s | dur | never | 4 s | | 10 s | ≥ 13 s | |
| | 0% | 6% | 15% | ≥ 20% | | dur | 0% | 6% | 15% | | ≥ 20% | (a) | |

note: Max. duration of evaluation = duration of task or 100%! note: correct evaluation, if task duration ≠ 60 s

| | | | | | |
|----------------------------------|-----|---|-----|---|--|
| Postures = Σ lines 1 - 16 | (a) | + | (b) | = | |
|----------------------------------|-----|---|-----|---|--|

Ergonomic Assessment Worksheet v1.3.6 ESO

| Action forces (per minute) | | | | | | | Forces | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|------------------|------------------------|------------------------|------------------------|------------------------|------------------|---|--|------------------|---------|---------|---------|-----|---------------|-----|---------------|---|--|------------------|---------------------------------|-----------|---|---|---------------|--|---|---|--|--|
| 17 |  | Forces onto fingers (e.g. clips, plugs) | Int | 0 | 7 | 15 | 25 | 50 | Intensity x Duration | | | | | | | | | | | | | | | | | | | | | | |
| | | | F _{max} | 16,7% F _{max} | 33,3% F _{max} | 50,0% F _{max} | 66,7% F _{max} | F _{max} | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Duration stat | 0 | 1 | 1 | 1,5 | 2 | | | 3,5 | 7 | | | | | | | | | | | | | | | | | | | |
| | | | Duration dyn | [s] | 3 | 6 | 9 | 12 | | | 20 | ≥ 30 | | | | | | | | | | | | | | | | | | | |
| | | | [%] | 5 | 10 | 15 | 20 | 33 | ≥ 50 | | | | | | | | | | | | | | | | | | | | | | |
| | | | [n] | 0 | 1,5 | 2 | 2,5 | 3 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | [n] | 0 | 4 | 10 | 15 | ≥ 20 | | | | | | | | | | | | | | | | | | | | | | | |
| 18 |  | Forces onto arms / whole body forces | Int | 0 | 6 | 15 | 25 | 50 | Intensity x Duration | | | | | | | | | | | | | | | | | | | | | | |
| | | | F _{max} | 16,7% F _{max} | 33,3% F _{max} | 50,0% F _{max} | 66,7% F _{max} | F _{max} | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Duration stat | 0 | 1 | 1 | 1,5 | 2 | | | 4 | 8,5 | | | | | | | | | | | | | | | | | | | |
| | | | Duration dyn | [s] | 3 | 6 | 9 | 12 | | | 20 | ≥ 30 | | | | | | | | | | | | | | | | | | | |
| | | | [%] | 5 | 10 | 15 | 20 | 33 | ≥ 50 | | | | | | | | | | | | | | | | | | | | | | |
| | | | [n] | 0 | 1 | 2 | 3 | 4,5 | 6,5 | 10 | | | | | | | | | | | | | | | | | | | | | |
| | | | [n] | 1 | 3 | 6 | 8 | 10 | ≥ 12 | | | | | | | | | | | | | | | | | | | | | | |
| Forces F _{max} onto arms / whole body forces | | | | | | | | | | Finger forces F _{max} (F=Female M=Male) | | | | | | | | | | | | | | | | | | | | | |
| M for males & F for females | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  <p style="text-align: center;">median plane</p> <p style="text-align: center;">Data based on the "Assembly specific force atlas" (Wakula, Berg, Schaub, Glitsch, Ellegast 2009)</p> | | | | | | | | | | ST Upright | | M | F | ST Bent | | M | F | ST Above head | | M | F | Posture A1 (power grip, pliers) | | F _{max} | | | | | | | |
| | | | | | | | | | | *A | 480 | 315 | *A | 435 | 285 | *A | 430 | 280 | *A | 495 | 320 | M | F |  | | 315 205 | | | | | |
| | | | | | | | | | | *B | 500 | 325 | *A | 370 | 240 | *A | 495 | 320 | *A | 495 | 320 | | | | | | | | | | |
| | | | | | | | | | | *B | 320 | 210 | *B | 400 | 260 | *B | 305 | 200 | *B | 480 | 310 | | | | | | | | | | |
| | | | | | | | | | | *B | 485 | 315 | *B | 605 | 390 | *B | 480 | 310 | *C | 210 | 140 | | | | | | | | | | |
| | | | | | | | | | | *C | 290 | 185 | *C | 310 | 200 | *C | 210 | 140 |  | | F _{max} | | 235 155 | | | | | | | | |
| | | | | | | | | | | *C | 255 | 165 | *C | 205 | 135 | *C | 210 | 140 | | | | | | | | | | | | | |
| | | | | | | | | | | KN Upright | | | | | | | | | | M | F | KN Bent | | M | F | KN Above head | | M | F | Posture B1 (thumb or thumb to 4 fingers) | |
| | | | | | | | | | | *A | 420 | 270 | *A | 380 | 245 | *A | 425 | 275 |  | | F _{max} | | 110 70 | | | | | | | | |
| | | | | | | | | | | *A | 430 | 280 | *A | 345 | 225 | *A | 495 | 320 | | | | | | | | | | | | | |
| | | | | | | | | | | *B | 445 | 290 | *B | 495 | 320 | *B | 410 | 270 |  | | F _{max} | | 75 50 | | | | | | | | |
| | | | | | | | | | | *B | 495 | 325 | *B | 445 | 290 | *B | 425 | 275 | | | | | | | | | | | | | |
| *C | 300 | 195 | *C | 290 | 190 | *C | 275 | 180 |  | | F _{max} | | 85 55 | | | | | | | | | | | | | | | | | | |
| *C | 245 | 160 | *C | 205 | 135 | *C | 280 | 180 | | | | | | | | | | | | | | | | | | | | | | | |
| SI Upright | | | | | | | | | | M | F | SI Bent | | M | F | SI Above head | | M | F | Posture C (hook, palmar, strong pinch) | | | | | | | | | | | |
| *A | 405 | 265 | *A | 385 | 250 | *A | 395 | 255 |  | | F _{max} | | 75 50 | | | | | | | | | | | | | | | | | | |
| *A | 440 | 285 | *A | 375 | 245 | *A | 455 | 295 | | | | | | | | | | | | | | | | | | | | | | | |
| *B | 405 | 260 | *B | 455 | 295 | *B | 365 | 240 |  | | F _{max} | | 85 55 | | | | | | | | | | | | | | | | | | |
| *B | 380 | 250 | *B | 425 | 275 | *B | 370 | 240 | | | | | | | | | | | | | | | | | | | | | | | |
| *C | 250 | 165 | *C | 270 | 175 | *C | 200 | 130 | | | | | | | | | | | | | | | | | | | | | | | |
| *C | 235 | 155 | *C | 205 | 135 | *C | 210 | 135 | | | | | | | | | | | | | | | | | | | | | | | |
| Action forces = ∑ lines 17 - 18 | | | | | | | | | | note: correct evaluation, if task duration ≠ 60s | | | | = | | | | | | | | | | | | | | | | | |

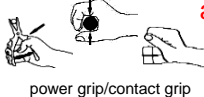
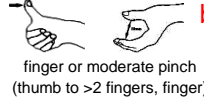

| Manual Material Handling (per shift) | | | | | | | | | | Loads | | | | | | | | | | | |
|--|--|----------------------|---|--|--|------------|---|------|--|--|--------------------|--|-------|-------------------------|---------|--------|---|---------------------------|---------|---|---|
| Weights of loads [kg] for repositioning (lifting / lowering), carrying and holding as well as pushing and pulling | | | | | | | | | | | | | | | | | | | | | |
| + | Reposition, carrying & holding | Male (kg) | | 3 | 10 | 15 | 20 | 25 | 30 | 35 | ≥40 | | | | | | | | | | |
| | | Load points | | 1 | 1,5 | 2 | 3 | 4 | 10 | 17 | 25 | ≥25 | | | | | | | | | |
| | | Female (kg) | | 2 | 5 | 7 | 10 | 12 | 15 | 20 | ≥25 | ≥25 | | | | | | | | | |
| | | Load points | | 1 | 1,5 | 2 | 3 | 4 | 5,5 | 7 | 25 | 25 | | | | | | | | | |
| + | Pushing and pulling | M1 |  | Wheelbarrows and Dollies | | Male (kg) | | 50 | 75 | 100 | 150 | 200 | ≥ 250 | | | | | | | | |
| | | | | Female (kg) | | 40 | 60 | 80 | 115 | 155 | ≥ 195 | | | | | | | | | | |
| | | M2 |  | Carriage, trolleys. No fixed rollers | | Male (kg) | | 50 | 75 | 100 | 150 | 250 | 350 | ≥ 550 | | | | | | | |
| | | | | Female (kg) | | 40 | 60 | 80 | 115 | 195 | 270 | ≥ 425 | | | | | | | | | |
| | | M3 |  | Carts, roller conveyors, pallet truck | | Male (kg) | | 50 | 75 | 150 | 250 | 350 | 500 | 600 | 800 | ≥ 1250 | | | | | |
| | | | | Female (kg) | | 40 | 60 | 115 | 195 | 270 | 385 | 460 | 615 | ≥ 960 | | | | | | | |
| Load points | | Means of transport | | 0,5 | 1 | 1,5 | 2 | 3 | 4 | 5 | 6 | 8 | | | | | | | | | |
| Posture, position of load (select characteristic posture) | | | | | | | | | | | | | | | | | | | | | |
| + |  | | | | | | | | | | | | | | | | | | | | |
| | trunk upright and / or not twisted | | | little trunk bending or twisting; load at or close to the body | | | bending trunk deep or far forward; little trunk bending forward and trunk twisting simultaneously; load far from body or above shoulder level | | | Asymmetric postures (bending trunk far forward and twisting; load far from the body; limited postural stability while standing or crouching) or kneeling | | | | | | | | | | | |
| | Posture points | | | 1 | 2 | 4 | 8 | | | | | | | | | | | | | | |
| Working Conditions (pushing and pulling only) | | | | | | | | | | very high | | | | | | | | | | | |
| (+) | very low rolling resistance | | trolley pushing / pulling on (very) slick floor | | rough floor and above small gaps / edges | | on structured sheet metal into / out of a track | | trolleys have to be teared off when starting, strongly damaged floor | | rolling resistance | | | | | | | | | | |
| | Conditions points | | 0 | 1 | 3 | 5 | 6 | 8 | | | | | | | | | | | | | |
| Frequency of load manipulations [frequency/shift], holding time [min/shift] or travel distance [meter/shift] | | | | | | | | | | | | | | | | | | | | | |
| × | Frequency (#) of repositionings / pushing & pulling short | | | | | 5 | 25 | 120 | 350 | 750 | 1000 | 1500 | 2000 | 2500 | ≥ 3000 | | | | | | |
| | Duration (holding time) [min] | | | | | 2,5 | 10 | 37 | 90 | 180 | ≥ 240 | | | | | | | | | | |
| | Distance (carrying, pushing & pulling long) [m] | | | | | 300 | 650 | 2500 | 6000 | 12000 | ≥16000 | | | | | | | | | | |
| | Duration points | | | | | 1 | 2 | 4 | 6 | 8 | 10 | 11 | 13 | 14 | 15 | | | | | | |
| Manual Material Handling (result) | | | | | | | | | | | | | | | | | | | | | |
| 19 | (Load + posture + (condition points)) × duration points | Repositioning 1) | (+) | x | = | Holding 1) | (+) | x | = | Carrying 1) | (+) | x | = | Pushing & Pulling short | (+ +) | x | = | Pushing & Pulling long 1) | (+ +) | x | = |
| | | Handling = ∑ line 19 | | | | | | | | | | 1) Maximal cumulative duration points for all tasks of repositioning, holding, carrying as well as pushing & pulling all together = 15 | | = | | | | | | | |

Ergonomic Assessment Worksheet v1.3.6 ESO

Upper limb load in repetitive tasks

Upper Limbs

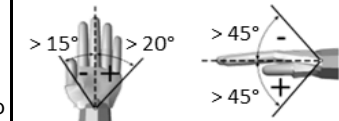
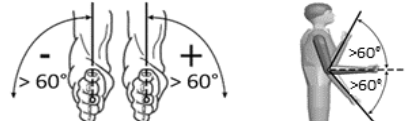
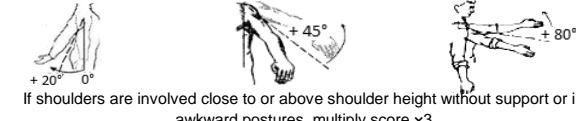
Force & Frequency & Grip (FFG) Basis: number of real actions per minute or percent static actions (analyze only the most loaded limb)

| | | | | |
|---------------|----------|---|--|---|
| Legend | a |  power grip/contact grip | %SA = Percentage of Static Actions | %DA = 100% - %SA |
| | b |  finger or moderate pinch (thumb to >2 fingers, finger) | FDS = Force-Duration Static | FFD = Force-Frequency Dynamic |
| | c |  strong pinch (thumb to 1 or 2 fingers) | GS' = Modified Grip Points Static (Grip x %SA) | GD = Grip Points Dynamic |
| | | | %FLS = Percentage of Static Actions at force level | %FLD = Percentage of Dynamic Actions at force level |
| | | | SC = Static Contribution | DC = Dynamic Contribution |
| | | FDGS = Sum of Static Contributions | FFGD = Sum of Dynamic Contributions | |

| Force [N] | Calc Stat | | | | Static actions (s/min) | | | | | Grip | | | Dynamic actions (real actions/min) | | | | | | | Calc Dyn | | | | | |
|-------------|-----------|-----|------|----|------------------------|----|----|----|---|------|-----|----|------------------------------------|---|----|----|----|----|----|----------|-----|-----|----|------|----|
| | FDS | GS' | %FLS | SC | ≥45 | 30 | 20 | 10 | 5 | 3 | 0 | 2 | 4 | 2 | 10 | 15 | 20 | 25 | 30 | 35 | ≥40 | FFD | GD | %FLD | DC |
| 0 – 5 | | | | | 1 | 1 | 0 | 0 | 0 | 0 | abc | | | 0 | 0 | 0 | 1 | 2 | 3 | 4 | 7 | | | | |
| > 5 – 20 | | | | | 4 | 2 | 1 | 1 | 0 | 0 | ab | bc | | 0 | 0 | 1 | 2 | 3 | 4 | 6 | 9 | | | | |
| > 20 – 35 | | | | | 7 | 5 | 3 | 2 | 1 | 1 | ab | b | c | 0 | 1 | 2 | 3 | 4 | 6 | 8 | 12 | | | | |
| > 35 – 90 | | | | | 11 | 8 | 5 | 3 | 2 | 1 | a | b | b | 1 | 2 | 3 | 5 | 7 | 9 | 12 | 18 | | | | |
| > 90 – 135 | | | | | 16 | 11 | 7 | 4 | 3 | 2 | a | ab | b | 2 | 3 | 5 | 7 | 9 | 12 | 15 | 24 | | | | |
| > 135 – 225 | | | | | 21 | 14 | 10 | 6 | 4 | 3 | a | a | b | 4 | 5 | 6 | 8 | 11 | 14 | 20 | 32 | | | | |
| > 225 – 300 | | | | | 28 | 18 | 12 | 8 | 5 | 4 | a | a | b | 5 | 6 | 7 | 9 | 12 | 16 | 26 | 40 | | | | |

20a $FDGS = \sum SC_i$ 100% $FFG = FDGS + FFGD$ FFG $\%DA = \sum FLD_j$ $FFGD = \sum DC_j$ %DA

Hand / arm / shoulder postures (use duration for worst case of wrist / elbow / shoulder)

| | | | | | | | | |
|------------------|---|---|--|-----|-----|-----|-----|----|
| 20b | Wrist (deviaton, flex./extens.) | Elbow (pron, sup, flex./extens.) | Shoulder (flexion, extension, abduction) | | | | | |
| |  |  |  | | | | | |
| | Posture points | 10% | 25% | 33% | 50% | 65% | 85% | PP |
| | Wrist/Elbow | 0 | 0,5 | 1 | 2 | 3 | 4 | |
| Shoulder | 0 | 1,5 | 3 | 6 | 9 | 12 | | |
| Shoulder w/exosk | 0 | 1,1 | 2,3 | 4,5 | 6,8 | 9 | | |

Additional factors

| | | | |
|-----|--|---|--------------------------|
| 20c | Gloves inadequate (which interfere with the handling ability required) are used for over half the time | 2 | <input type="checkbox"/> |
| | Working gestures required imply a countershock. Frequency of 2 time per minute or more (i.e.: hammering over hard surface) | 2 | <input type="checkbox"/> |
| | Working gestures imply a countershock (using the hand as a tool) with freq. of 10 time per hour or more | 2 | <input type="checkbox"/> |
| | Exposure to cold or refrigeration (less than 0 degree) for over half the time | 2 | <input type="checkbox"/> |
| | Vibrating tools are used for 1/3 of the time or more | 2 | <input type="checkbox"/> |
| | Tools with a very high level of vibrations | 4 | <input type="checkbox"/> |
| | Tools employed cause compressions of the skin (rednesses, callosities, blebs, etc.) | 2 | <input type="checkbox"/> |
| | Precision tasks are carried out for over half the time (tasks over areas smaller than 2-3 mm) | 2 | <input type="checkbox"/> |
| | During almost the whole time one or more additional factor/s is/are present | 3 | <input type="checkbox"/> |
| | Additional points (choose the highest value) | = | AF |

Repetitive tasks duration

| | | | | | | | | | | |
|-----|---------------------------------|-------------------------------------|-----|------|---|-----|-----|--------------------------------------|----|---|
| 20d | Net Duration [min/shift] | 60 | 90 | 180 | 300 | 420 | 480 | + | | |
| | Shift Points (1 hour = 1 point) | 1 | 1,5 | 3 | 5 | 7 | 8 | | | |
| | Work Organization | Breaks are possible at every time | | | Breaks are possible at given conditions | | | Breaks lead to a stop of the process | | + |
| | Work Organization Points | (Cycle time longer than 10 minutes) | | | (Cycle time between 1 and 10 minutes) | | | (Cycle time shorter than 1 minute) | | |
| | Breaks (≥ 8 min) [#]/shift | 0 | 1 | 2 | 3 | 4 | 5 | 6 | ≥7 | + |
| | Break points cycle time ≤ 30 s | 3 | 2 | 1 | 0 | -1 | -2 | -3 | -4 | |
| | Break points cycle time > 30 s | 0 | | -0,5 | | -1 | | -1,5 | -2 | |
| | Duration Points | | | | | | | | | = |

Upper limb load in repetitive tasks

20 ((a) Force & Frequency & Grip FFG + (b) Postures PP + (c) Additional factors AF) × (d) Duration DP = Upper Limbs