# RAMP II © (Preliminary version 2, 2024)

## In depth analysis for assessment of physical risks for manual work

*RAMP - Risk Assessment and Management tool for manual work Proactively*

**Introduction**

This assessment tool (RAMP II) is intended for an in depth analysis and assessment of physical ergonomics risk factors when working with manual work which may increase the risk of developing musculoskeletal disorders (MSDs). Manual work involves for example manual lifting, pushing or pulling of loads and working with hand-held tools. At high or sustained exposure to the risk factors the risk of developing of worsening MSDs increases.

Use this tool to assess a work, work task, or a work station during an average 8 hour work day. In some cases also rarely occurring extreme cases may warrant assessment. Assess the work of an employee who is representative for the group of employees who carry out this kind of work, or, alternatively two people so that the variation among employees is somewhat taken into account. This employee/these employees should be experienced in how the work should be carried out in an appropriate way. Those performing the assessment should be familiar with how the work is carried out. Otherwise, the assessment should be carried out in co-operation with someone with such knowledge. The person who carries out the assessment should have participated in a basic physical ergonomics course, an introduction in the RAMP-method and should have read the RAMP manual.

During the assessment, choose the alternative which best matches the situation. Fill in the score in the white answering box corresponding to each question.

The result of the RAMP II assessment is presented at three risk and priority levels:

**High risk**. The loading situation has such a magnitude and characteristics that many employees are at an increased risk of developing musculoskeletal disorders. Improvement measures should be given high priority.

**Risk**. The loading situation has such a magnitude and characteristics that certain employees are at an increased risk of developing musculoskeletal disorders. Improvement measures should be taken.

**Low risk**. The loading situation has such a magnitude and characteristics that most employees are at a low risk of developing musculoskeletal disorders. However, individuals with reduced physical capacity may be at risk. Individually tailored improvement measures may be needed.

The result is also presented with a sum of scores, mainly intended for comparison between different jobs risks within a risk level (for example the red level). The result is intended to form a part of the decision making basis when prioritizing and choosing actions in order to reduce the risk for MSDs.

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Date:_____ Assessment of: ☐ Work/ work task ☐ Employee load

Work/work task: _____

Assessment ordered by: _____ Position_____

Assessment completed by: _____ Position_____

Company representative: _____ Position_____

Safety/work environment officer/employee:_____ Position_____

Other:_____ Position_____

_____

Department:_____

Other information:_____

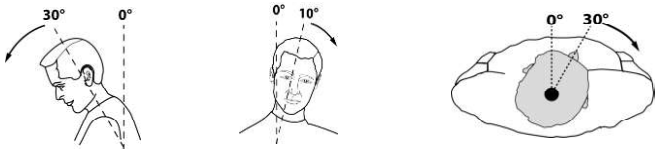
_____

## 1. Postures

**Fill in the corresponding score in the white box** | **Score:** | **Comment:**

### 1.1 Posture of the head - forwards and to the side

Does a clear bending of the head forwards or to the side, or twisting to the side occur, as shown in the figures, or more?




| | |
|---|---|
| 4 hours or more | 7 |
| 3 to < 4 hours | 5 |
| 2 to < 3 hours | 3 |
| 1 to < 2 hours | 2 |
| 30 minutes to < 1 hour | 1 |
| 5 to < 30 minutes | 0.5 |
| < 5 minutes | 0 |

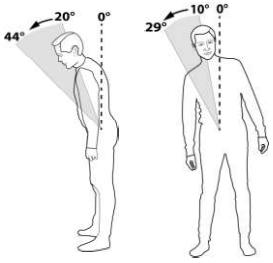
### 1.2 Posture of the head - backwards

Does bending of the head backwards occur, as shown in the figure, or more?


| | |
|---|---|
| 2 hours or more | 10 |
| 1 to < 2 hours | 6 |
| 30 minutes to < 1 hour | 3 |
| 5 to < 30 minutes | 1.5 |
| < 5 minutes | 0 |

### 1.3 Back posture - moderate bending

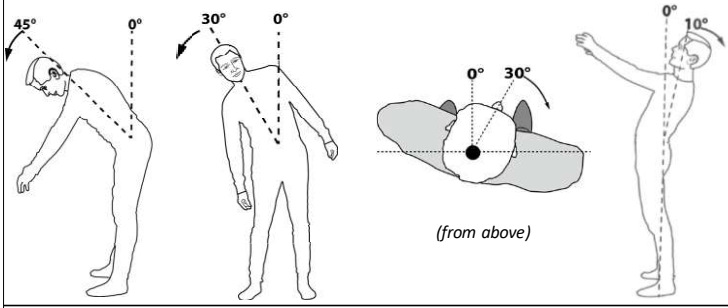
Does moderate bending of the upper body forwards or to the side occur, as shown in the figures, or more?




| | |
|---|---|
| 4 hours or more | 7 |
| 3 to < 4 hours | 5 |
| 2 to < 3 hours | 3 |
| 1 to < 2 hours | 2 |
| 30 minutes to < 1 hour | 1 |
| 5 to < 30 minutes | 0 |
| < 5 minutes | 0 |

### 1.4 Back posture - considerable bending and twisting

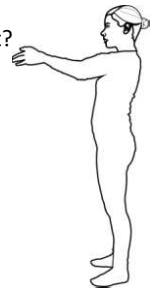
Does considerable bending of the upper body forwards or to the side, twisting or bending backwards occur, as shown in the figures, or more?




| | |
|---|---|
| 4 hours or more | 10 |
| 3 to < 4 hours | 7 |
| 2 to < 3 hours | 5 |
| 1 to < 2 hours | 3 |
| 30 minutes to < 1 hour | 2 |
| 5 to < 30 minutes | 1 |
| < 5 minutes | 0 |

### 1.5 Upper arm posture - hand in or above shoulder height

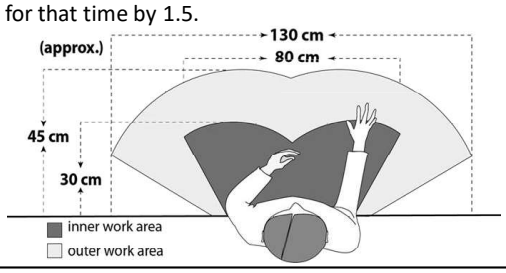
Is work perfomed with the hand at or above shoulder height? (about 130 - 150 cm)



| | Left | Right |
|---|---|---|
| 4 hours or more | 10 | 10 |
| 3 to < 4 hours | 7 | 7 |
| 2 to < 3 hours | 5 | 5 |
| 1 to < 2 hours | 3 | 3 |
| 30 minutes to < 1 hour | 2 | 2 |
| 5 to < 30 minutes | 1 | 1 |
| < 5 minutes | 0 | 0 |

### 1.6 Upper arm posture - hand in or outside the outer work area

Is work perfomed with the hand in the outer work area?
If the hand is outside the outer work area (white area), multiply the time-points for that time by 1.5.

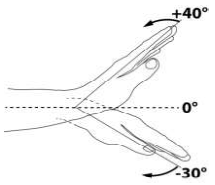


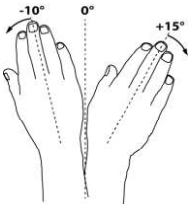

| | Left | Right |
|---|---|---|
| 4 hours or more | 10 | 10 |
| 3 to < 4 hours | 7 | 7 |
| 2 to < 3 hours | 5 | 5 |
| 1 to < 2 hours | 3 | 3 |
| 30 minutes to < 1 hour | 2 | 2 |
| 5 to < 30 minutes | 1 | 1 |
| < 5 minutes | 0 | 0 |

**Fill in the corresponding score in the white box** **Score:** **Comment:**

**1.7 Wrist posture**

Is work performed with clearly bent wrist, as shown in the figures, or more?

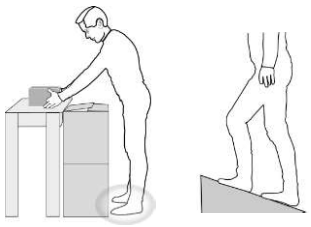



| | Left | Right |
|---|---|---|
| 4 hours or more | 7 | 7 |
| 3 to < 4 hours | 5 | 5 |
| 2 to < 3 hours | 3 | 3 |
| 1 to < 2 hours | 2 | 2 |
| 30 minutes to < 1 hour | 1 | 1 |
| 5 to < 30 minutes | 0 | 0 |
| < 5 minutes | 0 | 0 |

**1.8 Leg and foot space and surface**

Is there a lack of space for the legs or for the feet, or is the surface unstable or sloping?



| | |
|---|---|
| 4 hours or more | 3 |
| 3 to < 4 hours | 2 |
| 2 to < 3 hours | 1,5 |
| 1 to < 2 hours | 1 |
| 30 minutes to < 1 hour | 0,5 |
| 5 to < 30 minutes | 0 |
| < 5 minutes | 0 |

## 2. Work movements and repetitive work

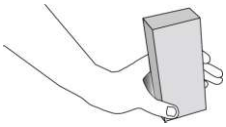
**2.1 Movements of the arm (upper and lower arm)**

How are the movements of the arm generally?

| | Left | Right |
|---|---|---|
| Constant movements mainly without pause | 5 | 5 |
| Frequent movements with some pauses | 2 | 2 |
| Varied movements, movement now and then (up to 2/min) | 0 | 0 |

**2.2 Movements of the wrist**

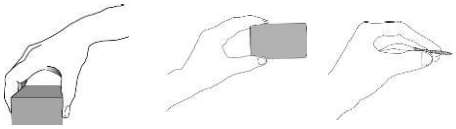
Do similar movements of the wrist occur?



| | Left | Right |
|---|---|---|
| More than 20 times per minute | 5 | 5 |
| 11 - 20 times per minute | 3 | 3 |
| 6 - 10 times per minute | 1 | 1 |
| Up to 5 times per minute | 0 | 0 |

**2.3 Type of grip - frequency**

Is overhand grip (palm facing downward), wide finger grip or pinch grip used while lifting or holding objects weighing 0.5 kg or more?



| | Left | Right |
|---|---|---|
| More than 200 times per day | 4 | 4 |
| 101 - 200 times per day | 2 | 2 |
| 50 - 100 times per day | 1 | 1 |
| Less than 50 times per day | 0 | 0 |

**2.4 Shorter recovery/variation during work (mainly regarding the neck, the arms and the back)**

Assessment of whether or not the work enables sufficient variation or breaks so that muscle groups under strain are given time to recover. The variation or break has to be at least 5 seconds at a time to be eligible.

Approximately, how much of the working time consists of such variation or breaks generally?

| | |
|---|---|
| 30 seconds or less per 10 minutes work | 10 |
| Between 30 and 90 seconds per 10 minutes work | 4 |
| 90 seconds or more per 10 minutes work | 0 |

**2.5 Longer recovery/variation during work (not breaks, e.g. task rotation that gives sufficient recovery)**

Assessment of whether or not the work enables sufficient variation or breaks so that muscle groups under strain are given time to recover. The variation or break has to be at least 5 minutes when totalled together to be eligible.

Approximately, how often does such variation or breaks occur during the work generally?

| | |
|---|---|
| Every 4 hours or less frequently | 10 |
| Every 3 hours | 6 |
| Every second hour | 3 |
| Every hour | 0 |

## 2.6 Work with repeated force exertion by the hand or fingers

Beta-version for ACE2023. Do not disseminate.

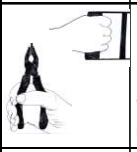
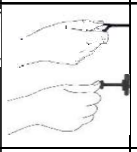
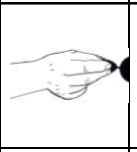
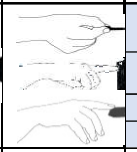
**Fill in the corresponding score in the white box** **Score**

If no work occurs with the hand or fingers in repeated force exertions: Write "0" in the box on the right and go to 3. **No work with the hand in repeated force exertions** **0**

Make the assessment for the hand with the highest exposure. If you are unsure which of the hands has the highest exposure, assess both hands. The Risk score for the hand with the highest exposure is displayed in the results. Make an assessment of an average case. Frequent handling of low forces (< 5 % of maximum) and computer work are not considered here.

1. Choose the suitable type of grip/contact area in Table 7. Measure the exerted force for that grip/contact area. (If you cannot measure this, mark the chosen grip/contact area type in Table A and measure five employees maximum exerted power grip force [N] three times. Insert the highest of these values in Table A for each employee. Thereafter, let them assess % of max force exerted in the case to be analysed and insert it in the Table A for each emplc An average based on the inserted values is calculated automatically and the cell to use is highlighted in Table 7.)
2. Assess how often the force is exerted.
3. Choose the grip/contact area in Table 7 which best matches the current case and follow that row down to the force interval cell which includes the current force.
4. Move towards the right in Table 7 to the cell including the frequency for the force exertion, to determine the Grip-force-and-frequency factor.
5. Based on the duration of each force exertion generally, determine the Duration-per-exertion factor in Table 8.
6. Assess the general wrist posture during the force exertions. Based on the posture (extension/flexion) in Table 9 showing the highest value, determine the Wrist-posture factor.
7. The Risk score is calculated in Table 10 by multiplying the four factors which you have determined above. This is done automatically in the digital model. The Risk score can also be calculated "by hand" if you do not have access to the digital version. The Risk score for the average case is displayed as "Risk score 1" in the bottom right corner.
8. If single force exertions are performed which are perceived as particularly strenuous, these should be assessed separately. If so, do the same for that case, i.e. perform step 1-8.
9. If a worst case is analysed, the Risk score for this case is displayed as "Risk score 2" in the bottom right corner below. If no worst case is analysed, the Risk score for the average case (i.e. "Risk score 1") is also displayed in the "Risk score 2" box. (In a later version, the result will also display if the Risk scores correspond to green, yellow, or red Risk-and-Priority levels.)

**Table 7: Grip-, force-and-frequency factor.**

| Force [N] | Grip /contact area type: Power grip | Thumb pinch / Thumb press | Three-finger grip[1] | Index pinch[2] / Index press | Exertions per: | Frequency: day | hour | minute |
|---|---|---|---|---|---|---|---|---|
| |  |  |  |  | | ≤ 96 | ≤ 12 | ≤ 0.2 |
| | > 220 | > 54 | > 60 | > 43 | | 8.5 | 13 | 20 |
| | 196 - 220 | 49 - 54 | 55 - 60 | 40 - 43 | | 6.7 | 10 | 16 |
| | 176 - 195 | 44 - 48 | 49 - 54 | 36 - 39 | | 5.1 | 7.9 | 12 |
| | 151 - 175 | 39 - 43 | 43 - 48 | 31 - 35 | | 3.9 | 6.0 | 9.2 |
| | 131 - 150 | 33 - 38 | 37 - 42 | 27 - 30 | | 3.0 | 4.6 | 7.0 |
| | 111 - 130 | 28 - 32 | 31 - 36 | 23 - 26 | | 2.3 | 3.5 | 5.3 |
| | 89 - 110 | 23 - 27 | 25 - 30 | 18 - 22 | | 1.7 | 2.7 | 4.1 |
| | 66 - 88 | 17 - 22 | 19 - 24 | 14 - 17 | | 1.3 | 2.0 | 3.1 |
| | 46 - 65 | 12 - 16 | 13 - 18 | 9 - 13 | | 1.0 | 1.5 | 2.3 |
| | 23 - 45 | 6 - 11 | 7 - 12 | 5 - 8 | | 0.7 | 1.0 | 1.6 |
| | 12 - 22 | 4 - 5 | 4 - 6 | 3 - 4 | | 0.4 | 0.6 | 1.0 |
| | 5 - 11 | 1 - 3 | 1 - 3 | 1 - 2 | | 0.3 | 0.4 | 0.6 |

| 97 - 479 | 480 - 959 | 960 - 1439 | 1440 - 1919 | 1920 - 2399 | 2400 - 2880 | 2881 - 3840 | 3841 - 4800 | 4801 - 9600 | 9601 - 14400 |
|---|---|---|---|---|---|---|---|---|---|
| 13 – 59 | 60-119 | 120-179 | 180--239 | 240 - 299 | 300 - 360 | 361 - 480 | 481 - 600 | 601 - 1200 | 1201 - 1800 |
| 0.3 – 0.9 | 1 | 2 | 3 | 4 | 5-6 | 7 - 8 | 9 - 10 | 11 – 20 | 21 – 30 |
| 13 | 20 | 34 | 48 | 65 | 99 | 131 | 162 | 308 | 440 |
| 10 | 16 | 27 | 38 | 51 | 77 | 102 | 126 | 239 | 341 |
| 7.9 | 12 | 21 | 29 | 39 | 59 | 78 | 97 | 184 | 263 |
| 6.0 | 9.2 | 16 | 22 | 30 | 45 | 60 | 74 | 141 | 201 |
| 4.6 | 7.0 | 12 | 17 | 23 | 34 | 46 | 57 | 107 | 153 |
| 3.5 | 5.3 | 9.2 | 13 | 17 | 26 | 35 | 43 | 82 | 117 |
| 2.7 | 4.1 | 7.0 | 9.9 | 13 | 20 | 27 | 33 | 62 | 89 |
| 2.0 | 3.1 | 5.2 | 7.4 | 10 | 15 | 20 | 25 | 47 | 67 |
| 1.5 | 2.3 | 3.9 | 5.5 | 7,4 | 11 | 15 | 18 | 35 | 49 |
| 1.0 | 1.6 | 2.7 | 3.9 | 5.2 | 8 | 10 | 13 | 24 | 35 |
| 0.6 | 1.0 | 1.6 | 2.3 | 3.1 | 4.7 | 6 | 8 | 15 | 21 |
| 0.4 | 0.6 | 1.1 | 1.5 | 2.0 | 3.0 | 4.0 | 5 | 9.4 | 13 |

[1] = Palmar pinch, Tripod pinch grip, Chuck grip.

[2] = Tip pinch, Tip-to-tip, Pulp pinch.

**Table A: Assessment of force** (if you cannot measure it for the chosen grip /contact area type).

| Choose Grip / Contact area type from the drop-down list: | Choose grip: | | | | |
|---|---|---|---|---|---|
| | Person 1 | Person 2 | Person 3 | Person 4 | Person 5 |
| Insert five employees highest measured power grip force in [N]: | | | | | |
| Insert 5 empl. assessed % of max force exerted in the case in [%]: | | | | | |

**Table 8: Duration-per-exertion factor. Please state this for the general duration per exertion.**

| Duration of the force exertion [s] | ≤ 0.2 | 0.3 – 0.9 | **1 – 2** | 2.1 - 3.4 | 3.5 – 5 | 6 – 10 | 11 – 20 | 21 – 30 | 31 – 60 | 61 – 90 | 91 – 120 | 121 – 240 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.5 | 0.7 | **1.0** | 1.3 | 1.9 | 3.3 | 6.2 | 9 | 18 | 25 | 30 | 43 |

**Table 9: Wrist-posture factor. Please state this for the general wrist posture during the force exertions.**

| Extension (wrist angle upwards) | **0 – 45°** | > 45° | |
|---|---|---|---|
| **Flexion (wrist angle downwards)** | **0 – 15°** | 16 – 45° | > 45° |
| Factor | **1.0** | 1.4 | 1.6 |

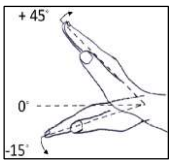



**Table 10: Calculation of Risk score.**

| | Left Average case Factor | Right Average case Factor | Left Possible worst case Factor | Right Possible worst case Factor |
|---|---|---|---|---|
| Grip-, force-and-frequency factor from Table 7. | | | | |
| Duration-per-exertion factor from Table 8. | | | | |
| Wrist-posture factor from Table 9. | | | | |
| **Risk score** (multiply the factors in each column): | **0,0** | **0,0** | **0,0** | **0,0** |

**Comment: (Start on the next row)**

| Score | Colour |
|---|---|
| ≥ 5 | |
| 3 - 4.9 | |
| < 3 | |

**Risk score Average case:**

**Risk score Worst case:**

## 3. Lifting work

**Fill in the corresponding score in the white box** **Score:**

If no lifts occur: Write 0 in the box on the right and go to 4. **No lifting work** **0**

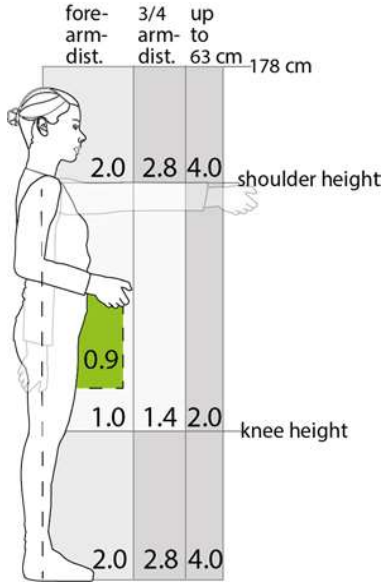
Make an assessment for an average case. Frequent handling of light loads (< 1 kg) is covered in other parts of RAMP II.

1. Estimate the weight of the load and how often it is lifted to determine the Frequency-and-weight factor (Table 1).
2. Estimate in what work area the lifting is carried out (Table 2) using the posture of the hands (height and distance) at the start and at the end of the lift. Use the largest of these values.
3. Calculate the Risk score in Table 3 by:
   a. inserting the values from Table 1 and Table 2 into Table 3.
   b. assessing the other factors on the list in Table 3 and use these when calculating the Risk score in Table 3.
   c. multiplying the factors in the column on the right in Table 3 with each other.
4. Insert this Risk score as "Risk score 1" in the box on the right at the bottom.
5. If single lifts which are perceived as particularly strenuous occur, these should be assessed separately. If so, do the same for that case, i.e. perform step 1-3.
6. If a worst case is analysed, insert its Risk score in the box "Risk score 2" on the right at the bottom. If no worst case is analysed, insert the Risk score for the average case (i.e. "Risk score 1") also in the "Risk score 2" box. Beside it information about if the Risk score corresponds to green, yellow or red risk level is displayed.

**Table 1: Frequency-and-weight factor.**

| | Number of lifts per day | ≤ 12 | 13 - 24 | 25 - 60 | 61 - 96 | 97 - 240 | 241 - 480 | 481 - 960 | 961-1920 | 1921-2880 | 2881-3840 | 3841-4800 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Equals number of lifts per hour | ≤ 1.5 | 1.6 - 3 | 3.1 - 7.5 | 7.6 - 12 | 13 - 30 | 31 - 60 | 61 - 120 | 121 - 240 | 241 - 360 | 361 - 480 | 481 - 600 |
| Weight | over 25 kg - 30 kg | **6.5** | **6.5** | **7.0** | **7.6** | **8.0** | **8.6** | **9.9** | **14.3** | **23.9** | **35.9** | **49.7** |
| | over 20 kg - 25 kg | **5.4** | **5.4** | **5.8** | **6.3** | **6.6** | **7.1** | **8.3** | **12.0** | **19.9** | **29.9** | **41.4** |
| | over 15 kg - 20 kg | **4.3** | **4.4** | **4.7** | **5.1** | **5.3** | **5.7** | **6.6** | **9.6** | **15.9** | **23.9** | **33.1** |
| | over 10 kg - 15 kg | **3.2** | **3.3** | **3.5** | **3.8** | **4.0** | **4.3** | **5.0** | **7.2** | **12.0** | **17.9** | **24.8** |
| | over 7 kg - 10 kg | **2.2** | **2.2** | **2.3** | **2.5** | **2.7** | **2.9** | **3.3** | **4.8** | **8.0** | **12.0** | **16.6** |
| | over 5 kg - 7 kg | **1.5** | **1.5** | **1.6** | **1.8** | **1.9** | **2.0** | **2.3** | **3.3** | **5.6** | **8.4** | **11.6** |
| | over 3 kg - 5 kg | **1.1** | **1.1** | **1.2** | **1.3** | **1.3** | **1.4** | **1.7** | **2.4** | **4.0** | **6.0** | **8.3** |
| | 1 kg - 3 kg | **0.6** | **0.6** | **0.7** | **0.8** | **0.8** | **0.9** | **1.0** | **1.4** | **2.4** | **3.6** | **5.0** |

**Table 2: Lifting area factor. If the lift is performed outside the shaded area in the figure, add 1 point to the value of the closest cell.**



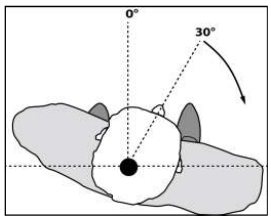




**Figure: Torso twisted 30°.**

**Table 3: Calculation of Risk score.**

| | Factor | Possible worst case Factor |
|---|---|---|
| Frequency-and-weight factor from Table 1. | | |
| Lifting area factor from Table 2. | | |
| **Do the following factors occur in the majority of lifts?** If no, insert the value 1.0 to the right, else the stated value: | | |
| ☐ Lift with one hand. If yes, insert the factor 1.7. | | |
| ☐ Torso twisted more than 30° (see the figure to the right above). If yes, insert the factor 1.3. | | |
| ☐ Poor grip. If yes, insert the factor 1.1. | | |
| ☐ Hot environment 27-32°. If yes, insert the factor 1.1. | | |
| ☐ Two people lift the load. If yes, insert the factor 0.6. | | |
| **Risk score** (multiply the factors in each column) | | |

**Comment:**

| Score | Colour |
|---|---|
| ≥ 5 | |
| 3- 4,9 | |
| < 3 | |

**Risk score 1:**

**Risk score 2:**

## 4. Pushing and pulling work

**Fill in the corresponding score in the white box** **Score:**

If no pushing and pulling work occurs: Write 0 in the box on the right and go to 5. **No pushing and pulling work** **0**

Make an assessment for an average case. Frequent handling of light loads (exerted forces < 50 N) is covered in other parts of RAMP II.

If the load is pushed or pulled for less than 5 seconds, only assess the initial force (the force to set an object in motion, sometimes called starting force) using Table 4. If it is pushed or pulled for 5 seconds or longer, assess both the initial and the continuous force (i.e. also Table 5).

1. Measure the exerted force.
2. Enter Table 4/Table 5 at the relevant frequency and force level to find the corresponding Frequency-and-force factor.
3. Calculate the Risk score in Table 6 by:
   a. inserting the values from Table 4 and when applicable from Table 5 into Table 6.
   b. assessing the other factors on the list in Table 6 and use these when calculating the Risk score in Table 6.
   c. multiplying the factors in the column for initial force with each other. Do the same for continuoius force if also such an analysis is carried out.
4. Insert the Risk score for the initial force, or if also continuous force is assessed, the highest Risk score of these two as "Risk score 1".
5. If single pushing and pulling tasks which are perceived as particularly strenuous occur, these should be assessed separately. If so, do the same for that case of those cases, i.e. perform step 1-3.
6. If one or two worst cases (initial and continuous force) are analysed insert the highest of these two Risk scores in the box "Risk score 2". Else, insert the Risk score from "Risk score 1" also in the box for "Risk score 2". Beside it information about if the Risk score corresponds to green, yellow or red risk level is displayed.

**Table 4: Frequency and force factor for initial force (starting force).**

| | Times per day | ≤ 1 | 2 - 16 | 17 - 96 | 97 - 240 | 241-480 | 481-1920 |
|---|---|---|---|---|---|---|---|
| | Times per hour | | ≤ 2 | 2.1 - 12 | 13 - 30 | 31 - 60 | 61 - 240 |
| Force value | 501 - 600 N | **8.5** | **10** | **10.5** | **14** | **14.5** | **24** |
| | 451 - 500 N | **7.5** | **9** | **9.5** | **12.5** | **13** | **22** |
| | 401 - 450 N | **6.5** | **8** | **8.5** | **11** | **11.5** | **20** |
| | 351 - 400 N | **6** | **7** | **7.5** | **9.5** | **10** | **18** |
| | 301 - 350 N | **5** | **6** | **6,5** | **8** | **8,5** | **16** |
| | 251 - 300 N | **4** | **5** | **5** | **5** | **7** | **14** |
| | 201 - 250 N | **3** | **4** | **4** | **4** | **5** | **12** |
| | 151 - 200 N | **2.5** | **2.5** | **3** | **3** | **4** | **5** |
| | 101 - 150 N | **2** | **2** | **2.5** | **2.5** | **3** | **4** |
| | 51 - 100 N | **1.5** | **1.5** | **2** | **2** | **2.5** | **2.5** |

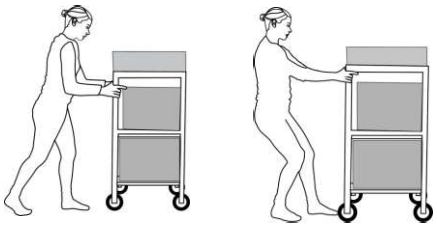


**Figure: Pushing and pulling work.**

**Table 5: Frequency and force factor for continuous force.**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Up to 8 meters: Use the force values in the table. | | | | | | | |
| 9 -30 meters: Add 50 N to the measured force to calculate the force value. | | | | | | | |
| 31-60 meters: Add 100 N to the measured force to calculate the force value. | | | | | | | |
| | Times per day | ≤ 1 | 2 - 16 | 17 - 96 | 97 - 240 | 241-480 | 481-1920 |
| | Times per hour | hour | ≤ 2 | 2.1 - 12 | 13 - 30 | 31 - 60 | 61 - 240 |
| Force value | 501 - 600 N | **10.5** | **12** | **12.5** | **17** | **19** | **30** |
| | 451 - 500 N | **9.5** | **11** | **11.5** | **15.5** | **17.5** | **28** |
| | 401 - 450 N | **8.5** | **10** | **10.5** | **14** | **16** | **26** |
| | 351 - 400 N | **7.5** | **9** | **9.5** | **12.5** | **14.5** | **24** |
| | 301 - 350 N | **6.5** | **8** | **8.5** | **11** | **13** | **22** |
| | 251 - 300 N | **6** | **7** | **7.5** | **9.5** | **11.5** | **20** |
| | 201 - 250 N | **5** | **6** | **6.5** | **8** | **10** | **18** |
| | 151 - 200 N | **4** | **5** | **5** | **5** | **8.5** | **16** |
| | 101 - 150 N | **3** | **4** | **4** | **4** | **5** | **14** |
| | 51 - 100 N | **2.5** | **2.5** | **2.5** | **3** | **4** | **12** |

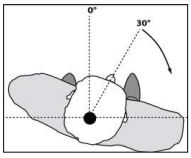



**Figure: Torso twisted 30°.**

**Table 6: Calculation of Risk score.**

| | Factor Initial force | Factor Continuous force | If any, worst case Factor Initial force | If any, worst case Factor Continuous force |
|---|---|---|---|---|
| Frequency and force factor from Table 4, and, if applicable, from Table 5. | | | | |
| **Do the following factors occur in the majority of the pushes and pulls?** If no, insert the value 1 to the right, else the stated value: | | | | |
| ☐ Pushing/pulling with one had. If yes, insert the factor 1.7. | | | | |
| ☐ Pushing/pulling sideways. If yes, insert the factor 1.7. | | | | |
| ☐ Gripping height: If the gripping height is below knee height or above shoulder height, insert the factor 2; if the gripping height deviates considerably from elbow height, insert the factor 1.2. | | | | |
| ☐ Torso twisted more than 30° (see the figure to the right above). If yes, insert the factor 1.3. | | | | |
| ☐ Poor grip. If yes, insert the factor 1.1. | | | | |
| ☐ Hot environment 27-32°. If yes, insert the factor 1.1. | | | | |
| ☐ Pushing/pulling work on slippery surface. If yes, insert the factor 1.7. | | | | |
| ☐ Two people perform the pushing/pulling. If yes, insert the factor 0.6. | | | | |
| **Risk score** (multiply the factors in each column) | | | | |

**Comment:**

| Score | Colour |
|---|---|
| ≥ 5 | |
| 3- 4,9 | |
| < 3 | |

**Risk score 1:**

**Risk score 2:**

## 5. Influencing factors

**Fill in the corresponding score in the white box** **Score:** **Comment:**

| **5.1 Influencing physical factors hand/arm** - do the following occur? The times refer to "per work day". | Yes | No | |
|---|---|---|---|
| a. The employee is exposed to hand-arm vibrations more than 20 minutes (10 for strongly vib). | 2 | 0 | |
| b. The employee is exposed to hand-arm vibrations more than 90 minutes (60 for strongly vib).† | 4 | x | |
| c. Warm or cold objects are handled manually. | 2 | 0 | |
| d. The hand is exposed to impact, reaction load or shock (e.g. as an impact tool) often or a long time* | 2 | 0 | |
| e. Holding hand tools weighing more than 2.3 kg for more than 30 minutes . | 2 | 0 | |
| f. Holding precision tools weighing more than 0.4 kg for more than 30 minutes. | 2 | 0 | |

| **5.2 Other physical factors** - do the following occur? The times refer to "per work day" | | | |
|---|---|---|---|
| a. The employee is exposed to whole-body vibrations more than 1 hour. | 2 | 0 | |
| b. The employee is exposed to whole-body vibrations more than 6 hours.† | 4 | x | |
| c. The visual conditions are insufficient for the task. | 2 | 0 | |
| d. The work is carried out in hot or cold temperatures or in draughty environments. | 2 | 0 | |
| e. Standing or walking on a hard surface more than half of the work day. | 2 | 0 | |
| f. Prolonged sedentary work without possibility to change to do the work standing up. | 2 | 0 | |
| g. Prolonged standing work without possibility to change to do the work sitting down. | 2 | 0 | |
| h. Kneeling/squatting more than 30 times or more than 30 minutes. | 2 | 0 | |

| **5.3 Work organisational and psychosocial factors** - do the following occur? | | | |
|---|---|---|---|
| a. There is no possibility to influence at what pace the work is performed. | 2 | 0 | |
| b. There is no possibility to influence the work setting or how the work shall be carried out. | 2 | 0 | |
| c. It is often difficult to keep up with the work tasks | 2 | 0 | |
| d. The employees often work rapidly in order to be able to take a longer break. | 2 | 0 | |

**† If you want to answer "No" on 5.1b or 5.2b, enter an "x" in the white answering box to the right.**
*** Here "often" means about 100 times per working day or more and "a long time" about 30 minutes per work day or more.**

## 6. Reports on physically strenuous work

**6.1 Documented reporting on physically strenuous work**

Do documented reports exist of physically strenuous tasks (e.g. incident reports) when cayrrying out the work task?

| | Yes | No | |
|---|---|---|---|
| Documented reporting | 2 | 0 | |

**6.2 Type of work that has led to reporting**

If "Yes" on 6.1, mark (with an x) in the table below what type of work that has led to this. Else, go to 7.

| | |
|---|---|
| lifting | |
| holding/carrying | |
| pushing/pulling | |
| pushing with hand or fingers | |
| other (please note)_____ | |

## 7. Perceived physical discomfort

**Preferably ask five people who perform this work task.**

**7.1 Perceived physical discomfort**

Are there parts of the work which lead to physical discomfort (e.g. in muscles or joints) during the work day?
Answer "Yes" if any employee experiences such discomfort.

| | Yes | No | |
|---|---|---|---|
| Discomfort in muscles or joints | 2 | 0 | |

**7.2 If "Yes" on 7.1, which is the worst task?**

Preferably state answers from five employees in the table below.

| |
|---|
| Person 1:_____ |
| Person 2:_____ |
| Person 3:_____ |
| Person 4:_____ |
| Person 5:_____ |

| **Assessment comments (if any, please write below):** |
|---|
| |