# 10. MODULE HSE (MAC / RAPP)

- Introduction
- Data
- Report

# INTRODUCTION

**Scope of application**. The HSE (MAC / RAPP) module makes it possible to estimate the risk of tasks in which the worker carries out operations that involve lifting, lowering, carrying, pushing and/or pulling loads.

The estimate will be made using different tools depending on the type or types of task being carried out:

- Static tasks of lifting and lowering loads.

- Tasks involving carrying of loads.

- Tasks involving lifting and lowering of loads between several persons.

- Moving loads without wheels, which might involve actions such as dragging/ sliding, churning (pivoting and rolling) and rolling.

- Moving loads on wheeled equipment, such as hand trolleys, pump trucks, carts or wheelbarrows.

The application of the module is foreseen as a **simple estimation of the level of risk** (Rapid assessment: initial assessment of the conditions under which manual handling of loads is carried out, in order to identify, in a qualitative way, the level of risk to which the workers are exposed). When the result of this quick assessment does not allow to determine the level of risk or acceptable conditions and/or when despite the implementation of corrective measures, a hazard still exists, a **specific assessment** using quantitative methods (e.g. Simple/Multiple/Variable MMH modules) is necessary.

**Contents**. The process for implementing this module basically consists of the following steps:

- Enter the descriptive data of the task.

- Add all subtasks where manual handling of loads is performed, identifying the type of task involved (lifting, carrying, team lifting, pushing/pulling without auxiliary equipment or pushing/pulling with auxiliary equipment).

- Enter the required data in each of the subtasks.

- For each subtask, the elements of the activity that require most attention (risk factors) are obtained.

**Source**. The module is an application of the methods: "Manual handling assessment charts (the MAC tool)" and "Risk assessment of pushing and pulling (RAPP tool)" produced by the UK's national regulator for health and safety at work, the Health and Safety Executive (HSE).

## DATA

The analysis starts by selecting the **HSE (MAC / RAPP)** module in the New Task window (Figure 1).

This opens the main module window (Figure 2) which contains the following:
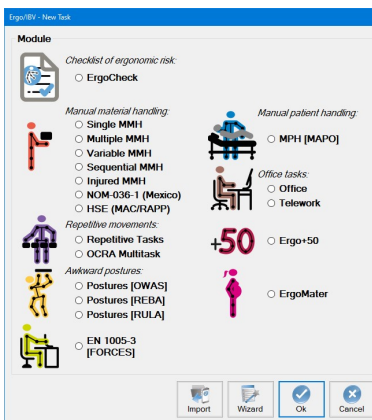


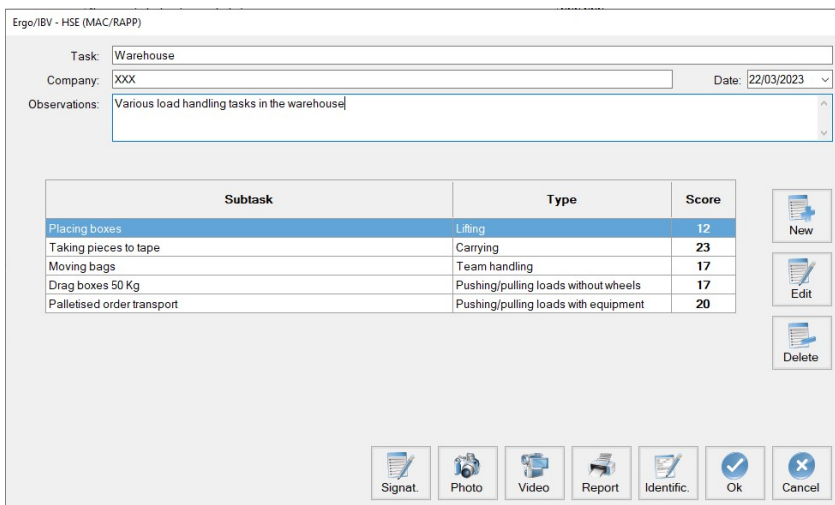Figure 1: Access to module HSE (MAC / RAPP)



Figure 2: HSE (MAC / RAPP) - Main window

- **Identification**. The following identification data of the case are entered in the heading:

  o **Task**. Assign a name to the task that is being analyzed.

  o **Company**. Enter the name of the company or work center where the task is performed.

  o **Date**. Specify the date when the analysis is carried out.

  o **Observations**. Note any clarifications on the case (details of the task, company department, video recorded, etc.).

- **Subtasks**. Each of the subtasks under analysis are displayed.

  o By clicking on the **New** button, it is possible to create a subtask.

  o The **Delete** button allows you to delete the subtask selected in the list (asking for confirmation beforehand).

  o To modify the name of a subtask, write directly on the corresponding field.

  o By clicking on the **Edit** button, you can access the data screen corresponding to each subtask.

**Additional features**.

In the bottom bar of the main window there are a number of options common to all Ergo/IBV modules and additional specific features:

**Identification**: A window opens where, if desired, information can be added to further characterise the job, task or activity under analysis. The fields included in the tab are the following:

- Name of the activity.
- Description of the activity.
- Workers involved.
- Frequency of the activity.
- Duration of activities.
- Observations on the analysis

Below is a description of how to create new subtasks and how to enter the information associated with each subtask.

## Create new subtask

By clicking on the **New** button, it is possible to create a subtask. This button opens a window where the type of subtask is selected (Figure 3), giving access to the main window of the subtask in question, where the corresponding variables can be introduced according to the type of subtask selected.

The available options (types of subtasks) are the following:

- Lifting operations.
- Carrying operations.
- Team handling operations.
- Pushing or pulling loads without equipment.
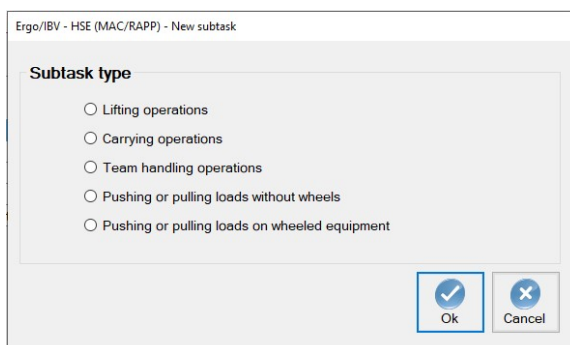- Pushing or pulling loads on wheeled equipment.



Figure 3: HSE (MAC / RAPP) – New Subtask selection window

## Subtask data

The data window, which is accessed after the subtask has been created or via the Edit button, is automatically headed with the type of the selected subtask. In addition, in the header of this window, you can enter any clarifications you consider important about the subtask (Figure 4):

The data required for the analysis of the subtask are collected in the **Data** tab. The data to be recorded will depend on the type of subtask selected:

## Data - Lifting operations.



Figure 4: HSE (MAC / RAPP) - Subtask data - Lifting / lowering of loads

- **Load weight (Kg)**. Note the weight handled in kg. If there are several weights, always consider the "worst case scenario".
- **Frequency of lifts (lifts per hour)**. Indicate the number of manipulations per hour.
- **Hand distance from the lower back**. Select one of the buttons to specify the horizontal distance between the worker's hands and the worker's lower back:
    - o   Close.
    - o   Moderate: Moderate: Hands at moderate distance from the low back. Upper arms angled away from torso.
    - o   Moderate: Hands at moderate distance from the low back. Torso bent forward.
    - o   Far. Hands far from the low back. Upper arms angled away from torso AND torso bent forward
- **Vertical lift zones.** Select one of the buttons to specify the position of the worker's hands at the start of the lift and as the operation progresses:

- o   Hands between knee and elbow height
- o   Hands between knee and floor level OR hands between elbow height and head height
- o   Hands at floor level or below
- o   Hands at head height or above

- **Torso twisting and sideways bending**. Select one of the buttons to specify the torso of the worker as he/she lifts the load:
  - o   Little or no torso twisting or sideways bending
  - o   Torso twisted OR Torso bent sideways. The person twists the torso in relation to the hips OR leans to one side as the load is lifted.
  - o   Torso both twisted AND bent sideways. The torso both twists AND bends to the side as the load is lifted.

- **Postural constraints.** Select the corresponding option from the drop-down menu:
  - o   No postural constraints.
  - o   Restricted posture.
  - o   Severely restricted posture.

- **Grip on the load.** Select the corresponding option from the drop-down menu:
  - o   Good grip.
  - o   Reasonable grip.
  - o   Poor grip.

- **Floor surface.** Select the corresponding option from the drop-down menu:
  - o   Non-slip, dry, clean, firm, level and undamaged
  - o   Mostly dry and clean (damp or some debris), OR reasonably firm OR minor damage
  - o   Slippery (greasy, oily, wet, icy) OR much debris OR soft OR unstable OR severe damage OR inadequate footwear.

- **Environmental factors.** Select the corresponding option from the drop-down menu:
  - o   No factors
  - o   One factor
  - o   Two or more factors

## Data - Carrying.



Figure 5: HSE (MAC / RAPP) – Subtask data - Loads Carrying

- **Load weight (Kg)**. Note the weight carried in kg. If there are several weights, always consider the "worst case scenario".
- **Frequency of carries (carries per hour)**. Indicate the number of manipulations per hour.
- **Hand distance from the lower back**. Select one of the buttons to specify the horizontal distance between the worker's hands and the worker's lower back:
    - Close.
    - Moderate: Moderate: Hands at moderate distance from the low back. Upper arms angled away from torso.
    - Moderate: Hands at moderate distance from the low back. Torso bent forward.
    - Far. Hands far from the low back. Upper arms angled away from torso AND torso bent forward.

- **Asymmetrical load on the torso.** Select one of the buttons to specify how the load is carried with respect to the torso:
    - Load AND hands symmetrical in front of the torso
    - Torso symmetrical but load is carried to one side
    - Load not symmetrical
    - Two-handed carrying to the side
- **Postural constraints.** Select the corresponding option from the drop-down menu:
    - No postural constraints.
    - Restricted posture.
    - Severely restricted posture.
- **Grip on the load.** Select the corresponding option from the drop-down menu:
    - Good grip.
    - Reasonable grip.
    - Poor grip.
- **Floor surface.** Select the corresponding option from the drop-down menu:
    - Good.
    - Reasonable.
    - Poor.
- **Environmental factors.** Select the corresponding option from the drop-down menu:
    - No factors
    - One factor
    - Two or more factors
- **Carry distance.** Select the corresponding option from the drop-down menu:
    - Between 2 m and 4 m
    - Between 4 m and 10 m
    - Over 10 m
- **Obstacles on route.** Select the corresponding option from the drop-down menu:
    - No obstacles AND carry route flat or slopes gently
    - One type of obstacle OR steep slope.
    - Ladders OR at least two types of obstacle.

## Data – Team handling.



Figur6 6: HSE (MAC / RAPP) – Subtask data – Team handling

- **Load weight (Kg)**. Record the weight handled in kg. If there are several weights, always consider the "worst case scenario".
- **Number of workers performing the task**. Select the number of workers performing the task (2, 3 or 4).
- **Hand distance from the lower back**. Select one of the buttons to specify the horizontal distance between each worker's hands and the lower back. Always consider the "worst case scenario":
  - Close.
  - Moderate.
  - Far.
- **Vertical lift zones.** Select one of the buttons to specify the position of each worker's hands at the start of the lift and as the operation progresses:
  - Hands between knee and elbow height

- o  Hands below knee AND/ OR above elbow height
- o  Hands at floor level or below OR head height and above

- **Torso twisting and sideways bending**. Select one of the buttons to specify the torso of each worker as they lift the load:
    - o  Little or no torso twisting or sideways bending
    - o  Torsos either twisted OR bent sideways.
    - o  Torsos both twisted AND bent sideways.

- **Postural constraints.** Select the corresponding option from the drop-down menu:
    - o  No postural constraints.
    - o  Restricted posture.
    - o  Severely restricted posture.

- **Grip on the load.** Select the corresponding option from the drop-down menu:
    - o  Good grip.
    - o  Reasonable grip.
    - o  Poor grip.

- **Floor surface.** Select the corresponding option from the drop-down menu:
    - o  Good
    - o  Reasonable
    - o  Poor

- **Environmental factors.** Select the corresponding option from the drop-down menu:
    - o  No factors
    - o  One factor
    - o  Two or more factors

- **Communication, co-ordination and control.** Select the corresponding option from the drop-down menu:
    - o  Good
    - o  Reasonable
    - o  Poor

- **Carry distance.** Select the corresponding option from the drop-down menu:
    - o  Between 2 m and 4 m
    - o  Between 4 m and 10 m
    - o  Over 10 m

- **Obstacles on route.** Select the corresponding option from the drop-down menu:
  - o No obstacles AND carry route flat or slopes gently
  - o One type of obstacle OR steep slope.
  - o Ladders OR at least two types of obstacle.

## Data - Pushing or pulling loads without equipment.



Figure 7: HSE (MAC / RAPP) – Subtask data – Pushing or pulling loads without equipment.

- **Load weight (Kg)**. Note the mass of the load moved. If loads of different masses are moved, evaluate the activity with the load of greater mass.

- **Activity**. Select one of the buttons to specify the push/pull activity being performed [1]:
  - o Rolling (e.g. pushing a cylinder).
  - o Churning. Loads are moved by pivoting/rolling along the base edges (e.g. moving a drum by rotating it on its base).
  - o Dragging/hauling or sliding (e.g. moving a box or a block).
- **Posture.** Select the corresponding option from the drop-down menu:
  - o Good.
  - o Reasonable.
  - o Poor / Inadequate.
- **Hand grip.** Select the corresponding option from the drop-down menu:
  - o Good.
  - o Reasonable.
  - o Poor / Inadequate.
- **Work Pattern.** Select the corresponding option from the drop-down menu:
  - o Good.
  - o Reasonable.
  - o Poor / Inadequate.
- **Travel Distance.** Select the corresponding option from the drop-down menu:
  - o Short. Between 2 m and 4 m
  - o Medium. Between 4 m and 10 m
  - o Long. Over 10 m
- **Floor surface.** Select the corresponding option from the drop-down menu:
  - o Good.
  - o Reasonable.
  - o Poor / Inadequate.
- **Obstacles along the route.** Select the corresponding option from the drop-down menu:
  - o Good.
  - o Reasonable.

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[1] If two or more activities are performed (e.g. rolling and turning on its base), an assessment should be made for each type of activity.

> > > o   Poor / Inadequate.
> - **Other factors.** Select the corresponding option from the drop-down menu:
> > > o   Good.
> > > o   Reasonable.
> > > o   Poor / Inadequate.

## Data - Pushing or pulling loads on wheeled equipment.



Figure 8: HSE (MAC / RAPP) – Subtask data - Pushing or pulling loads on wheeled equipment.

- **Load weight (Kg)**. Note the mass of the load moved. If loads of different masses are moved, evaluate the activity with the load of greater mass.
- **Load exceeds equipment's rated capacity (manufacturer's recommended maximum weight)** Mark in case the mass moved

exceeds the capacity indicated by the manufacturer for the equipment used[2].

- **Type of equipment**. Identify the type of equipment used [3]:
    - o Small with one or two wheels.
    - o Medium, with three or more fixed wheels and/or castors.
    - o Large, steerable or running on rails.
- **Posture.** Select the corresponding option from the drop-down menu:
    - o Good.
    - o Reasonable.
    - o Poor / Inadequate.
- **Hand grip.** Select the corresponding option from the drop-down menu:
    - o Good.
    - o Reasonable.
    - o Poor / Inadequate.
- **Work Pattern.** Select the corresponding option from the drop-down menu:
    - o Good.
    - o Reasonable.
    - o Poor / Inadequate.
- **Travel Distance.** Select the corresponding option from the drop-down menu:
    - o Short. 10 m or less
    - o Medium. Between 10 m and 30 m
    - o Long. Over 30 m
- **Condition of equipment.** Select the corresponding option from the drop-down menu:
    - o Good.
    - o Reasonable.

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[2] If this option is ticked, the activity is considered to be **Unacceptable**. In this case, the weight should be reduced or appropriate equipment should be provided. The activity should not be performed and the assessment should not continue until this condition has been modified.

[3] If two or more types of equipment are used, an assessment should be carried out for each type of equipment.

- o   Poor / Inadequate.
- **Floor surface.** Select the corresponding option from the drop-down menu:
  - o   Good.
  - o   Reasonable.
  - o   Poor / Inadequate.
- **Obstacles along the route.** Select the corresponding option from the drop-down menu:
  - o   Good.
  - o   Reasonable.
  - o   Poor / Inadequate.
- **Other factors.** Select the corresponding option from the drop-down menu:
  - o   Good.
  - o   Reasonable.
  - o   Poor / Inadequate.

**Results** (Figure 9). Once the data entry has been completed, the results of the assessment can be displayed in the Results tab.
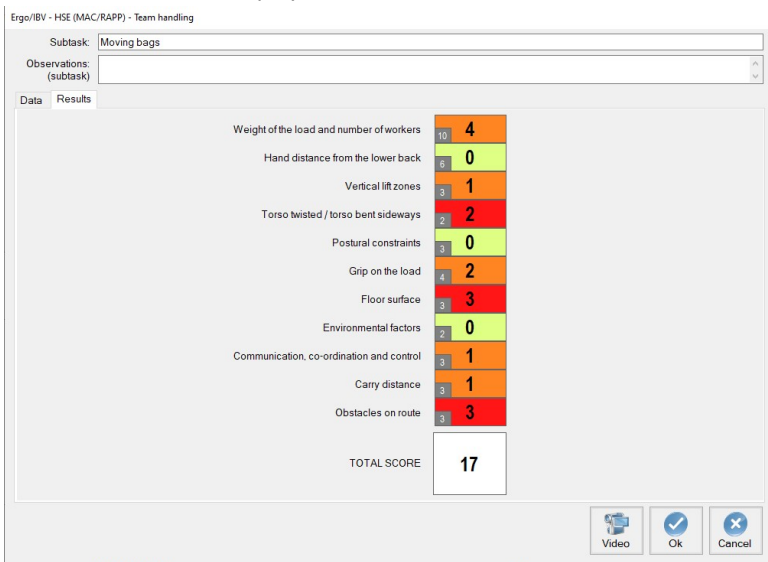


Figure 9: HSE (MAC / RAPP) – Results

This screen displays:

- The scores corresponding to each of the variables, indicating with a colour code the level of risk they represent. In each score cell, in addition to the current value, the maximum possible value for that cell is shown in a small box. The interpretation of the colour codes is as follows:
    - o Green – Low risk level
    - o Orange – Medium risk level
    - o Red – High risk level
    - o Purpple – Very high risk level
- The total score for the analysed subtask. This score is the sum of the partial scores.
    - o The total score is used to prioritise actions by addressing the subtask with the highest total score first. **Total scores do not refer to specific action levels.**

# REPORT

Clicking the *Report* button in the main window of this module generates a report of the task that contains the following sections:

- **Datos generales**. It includes date, name of the task and the company and evaluator's observations. If a photograph was added to the task, it will also appear in this section.



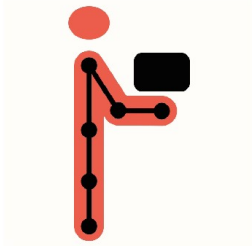| GENERAL DATA | |
|---|---|
| Date | 21/03/2023 |
| Task | Factory NOM036 |
| Company | XXXX |
| Observations | |

Figura 10: HSE (MAC / RAPP) – Informe-Identificación

- **Identification of activities** (Figure 11). This section includes descriptive information on the activity analysed, if completed.



**IDENTIFICATION OF ACTIVITIES**

**Name of the activity**
Materials operation tasks

**Description of the activity**
Movement of miscellaneous materials in warehouses

**Workers involved**
10 workers

**Frequency of the activity**
Aprox 25 operations per hour

**Duration of activities**
All day

Figure 11: HSE (MAC / RAPP) – Report- Identification of activities

- **Subtask risk** (Figure 12). This section summarises the results obtained for all the subtasks analysed. For each subtask analysed, the name of the subtask, the method used for its analysis and the total score are shown.

| SUBTASK RISK | | |
|---|---|---|
| **Subtask** | **Type** | **Score** |
| Placing boxes | Lifting | 12 |
| Taking pieces to tape | Carrying | 23 |
| Moving bags | Team handling | 17 |
| Drag boxes 50 Kg | Pushing/pulling loads without wheels | 17 |
| Palletised order transport | Pushing/pulling loads with equipment | 20 |

Figure 12: HSE (MAC / RAPP) – Report – Subtask Risk

- **Subtask detail** (Figure 13). Each subtask is headed with its name and the observations for the subtask. Then the details of the results obtained in the analysis are shown, including the name, data entered and score for each of the items considered.

  Finally, the total score of the subtask is indicated.

**Ergo/IBV**
Ergonomic risk assessment

## HSE (MAC/RAPP)

### RISK ASSESSMENT REPORT

IBV — INSTITUTO DE BIOMECÁNICA DE VALENCIA

| SUBTASK DETAIL |
| --- |

Subtask: Placing boxes

Type: Lifting

Observations:

**Results**

| Item assessed | Data entered | Score | |
| --- | --- | --- | --- |
| Load weight and frequency | 24,0 Kg<br>10,000 Lifts per hour | 10 | 4 |
| Hand distance from the lower back | Close: Hands close to the low back. Upper arms vertical AND torso upright | 6 | 0 |
| Vertical lift zones | Hands at head height or above | 3 | 3 |
| Torso twisting and sideways bending | Torso twisted OR bent sideways | 2 | 1 |
| Postural constraints | Restricted posture | 3 | 1 |
| Grip on the load | Reasonable grip | 2 | 1 |
| Floor surface | Poor floor surface. Slippery, much debris, soft, unstable, severe damage, inadeq. footwear | 2 | 2 |
| Environmental factors | No factors | 2 | 0 |
| | **TOTAL SCORE** | | **12** |

Figure 13: HSE (MAC / RAPP) – Report – Subtask detail