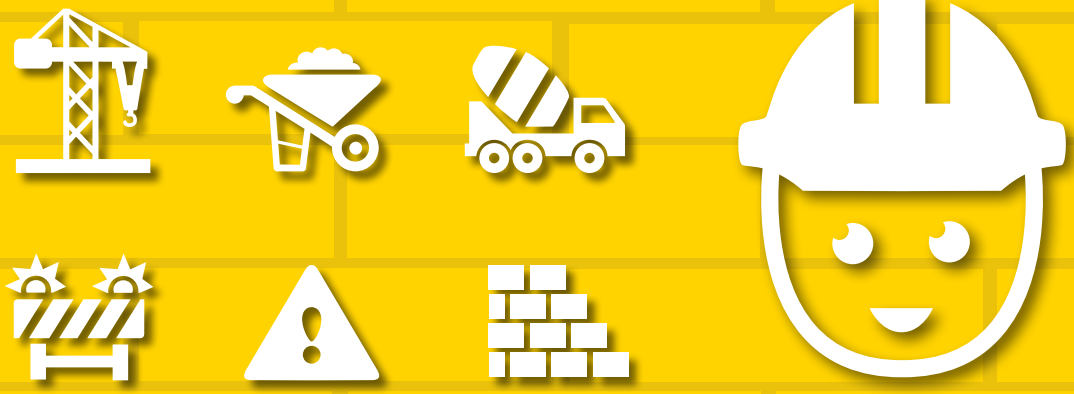
POCKET GUIDE

RISK FROM MANUAL HANDLING OF LOADS



HOW TO AVOID ILLNESSES IN CONSTRUCTION SITES

POCKET GUIDE ON THE RISK FROM MANUAL HANDLING OF LOADS

RISK FROM MANUAL HANDLING OF LOADS

Manual handling of loads

It includes activities performed by one or more workers within the assigned tasks, such as

- **Carrying and holding**
- **Lifting and lowering**
- **Pulling and pushing**
- **Moving and displacing**

objects.

In case of recurrent incorrect activities with overloads, the worker can suffer **temporary or permanent damages** causing occupational diseases.

What is the limit value?

A value that - if exceeded – can cause the conditions for hazard.

Under MHL ideal ergonomic conditions, such value - expressed in kilograms - is the following:

AGE	MEN	WOMEN
-18	20 Kg	15 Kg
18-45	25 Kg	20 Kg
+ 45	20 Kg	15 Kg

Health Risks

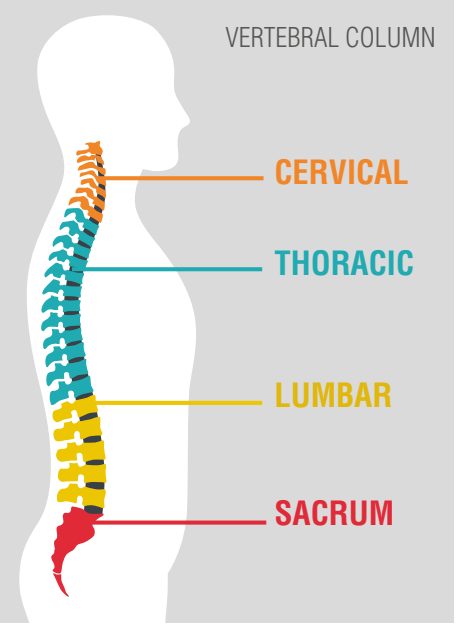
The **muscular strain** required from a manual handling of loads beyond the weight limit affects joints. In particular, the vertebral column can be damaged causing serious back injuries to muscles (back pains and muscular strains), **tendons** and **vertebrae.**

The vertebral column functions

The **vertebral column** is a bone system with the vertebrae aligned vertically and articulated with each other along the body axis.

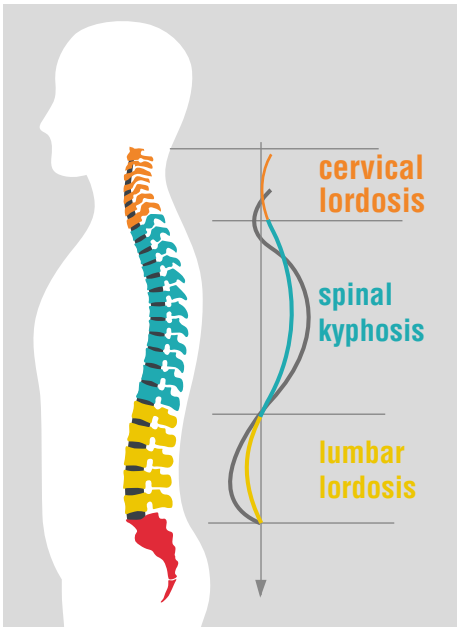
The vertebral column is made up of 33 or 34 vertebrae and is **the primary constructive element of the human skeleton.**

Intervertebral discs are protective shock absorbing pads between the vertebrae.



Most recurrent column alterations

Common **back pain** is a symptom of alteration of vertebrae, intervertebral disks or cervical nerves.



The most frequent diseases are:

- **Arthrosis:** a degenerative disease of joints, which causes the irregular development of bones (bone spurs)
- **Slipped disk:** produced when the intervertebral disk displaces from its seat
- **Sciatica:** caused by the pressure on nerves of a bone spur or an intervertebral disk

The **RISK** for back in adults is **NEGLIGIBLE** only when the weight of load is less than **3** Kg.

IT IS ALL RIGHT

- If you suffer from backaches
- If you have a medical prescription
- If your fitness for work is partial

PAY ATTENTION

EMPLOYER'S RESPONSIBILITIES (LAW DECREE 81/08)

As foreseen in the Safety Consolidated Text,

In order to limit MHL risks, the **employer** adopt the necessary technical measures and operating procedures. In particular, the employer make use of mechanical aids to avoid the manual handling of loads.

When the need for manual handling of loads cannot be avoided, the employer, taking into account the Annex XXXII of the Law Decree 81/80:

- Organizes workstations in such a way as to make such handling as **safe and healthy** as possible
- Assesses, already at the designing stage if possible, the safety and health conditions related to the activity to perform
- Avoids or reduces hazards, particularly those related to back illnesses, adopting the necessary measures and taking into account individual risk factors, conditions of the workplace and related needs
- Provides medical surveillance according to article 41, based on the risk assessment and individual risk factors.

The employer must ensure that workers receive proper training on how to handle loads correctly.

In relation to training and information, the employer:

- Provides workers with proper information concerning weight and other important details on the handled load

- Makes sure employees receive safety training in relation to potential hazards and the correct operating procedures.

The work organization can reduce the risk.

It is necessary **to reduce the manual handling of loads** by adopting organizational procedures and appropriate tools.
From an organizational point of view, the employer examines solutions in order to:

- **Splitting** the loads
- Reducing the **frequency** of lifting and carrying
- Improving the **ergonomic features** of a workplace.

Moreover, the employer provides adequate mechanical aids to avoid manual handling, such as: hand pallet trucks, scissor lifts, wheelbarrows, hydraulic lifts, equipment for curb installation, etc.

WHEN THE MANUAL HANDLING OF LOADS IS HAZARDOUS

Factors to take into consideration in the handling of loads

Dimension, shape and weight of a load are all aspects to take into consideration during handling, especially in relation to the lift height, the distance to cover, the possibility to split loads, the characteristics of the workplace (room available, way accessibility), type of the task (occasional, continuous, repetitive with breaks).

To sum up, in addition to the load weight, it is always advisable to examine the following factors:

- **Type of grip**
- **Size**
- **Shape** and **characteristics**
- **Lift height**
- **Distance** to cover
- Possibility to **split** loads
- Workplace **conditions**
- Type of **task**

The characteristics of a load are important

Remember that the manual handling of loads can represent a **hazard** for the vertebral column, especially under the following conditions:

The load is

TOO HEAVY

25 Kg for adult men
20 Kg for adult women

BULKY
It obstructs the walking view

DIFFICULT TO GRASP

- Difficult to hold the load
- difficult to handle
- with sharp edges
- too cold or too hot
- containing hazardous materials or substances
- unsteady or the content can move
- the load is in such a position that it needs to be manipulated at a distance from the trunk or the handling requires twisting or bending the trunk
- the load can provoke injuries in the event of a collision because of its odd shape and dimension or rough surface

The manual handling of loads can represent a **risk** also when the physical effort to perform it

- is **too strenuous**
- is achieved by a **twisting movement** of the trunk
- is required likely to result in a **sudden movement** of the body
- is made with the body in an **unstable** posture

Risk factors increase in inadequate workplaces

For example when:

- the available room (particularly vertical) is not enough to carry out the activity
- the floor is uneven, presenting the risk of slipping or stumbling
- the environment doesn't allow the worker to handle the load at a safety height and with good posture
- there are variations in the level of the floor or worktop causing variations of the handling levels
- the floor or footrest is unstable
- the temperature, humidity or air circulation are inadequate
- worktops and surrounding path are obstructed
- there are variations in the level of the floor such as holes, protruding parts, or there are slipping dangers.

Moreover, individual risk factors must be considered, such as:

- Physical unsuitability to carry out the handling
- Difference of gender and age
- Inadequate clothes, shoes or other personal effects worn by the workers
- Insufficient or inadequate knowledge and training.

Factors relevant to the activity are also to be assessed. In particular, the risks increase if:

- There is over-frequent **physical effort** involving the spine
- The **break** is not sufficient
- There is **excessive** lifting or **lowering distance**
- The worker cannot manage the working **rhythm** required for the handling

WHAT THE WORKER CAN DO

How to minimize the risk

In order to handle loads correctly, the worker is required to put into practice the indications received from the employer through training and information activity.

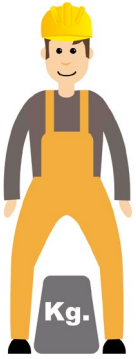
The worker:

- stands **upright** during movements
- must always avoid **incorrect twists**
- avoids **sudden movements**, such as pulling up suddenly
- during transport, must keep load **as close as possible to the body**
- when lifting and lowering the load, **must keep back straight, trunk upright, body crouched and stable position**, even if the load is light
- must hold the load firmly using the **hand palms**
- must handle the load possibly at an height **between knees and head** (if possible, it's even better when the load can be grasped at an initial height of 60 cm. from the ground)
- **avoids maximum extension of arms** over the head and **back arching**
- avoids the load is kept on **one side only**
- avoids **to bounce** with knees bent when holding the load

IF YOU DO A MANUAL JOB, MOVE IN THE PROPER WAY

When load is heavy

Get your body **close** to the load facing the movement direction, your feet **around the load and stable** on the ground. This position **reduces risks of instability, provides better**



control of the physical effort and the center of gravity of the body is closer to the one of the load to lift.
Bend hips and knees but **not** the spine.

Pressure on disks and vertebral components caused by the trunk inclination and the extra load will be restrained and tolerable.

Tighten back muscles and grasp the load firmly.

Tightening back muscles provides support to the column during the strain so that you can better manage any unpredictable situation.
A firm grasp is extremely important because slipping of the hands increase the possibility of sudden or uncontrolled movements, which are the most frequent causes of injuries or physical problems.

Pull the object as close as possible to your body and lift using the muscles of your legs.

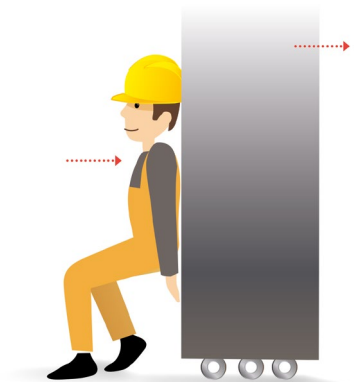
Minimizing the distance between the centres of gravity, each movement is simpler and equilibrated obtaining a better control of each strain.

Carry out the movement gradually and without jerks.

A gradual movement avoids excessive muscle strains that could cause tears or excessive pressure on vertebral disks.

If the load is heavy and mechanical handling equipment or the aid of other people are unavailable, it is important to:

- Try to slip the load putting it on carpets, rollers, etc…, without arching your back forward or backward, and pushing instead of pulling the load



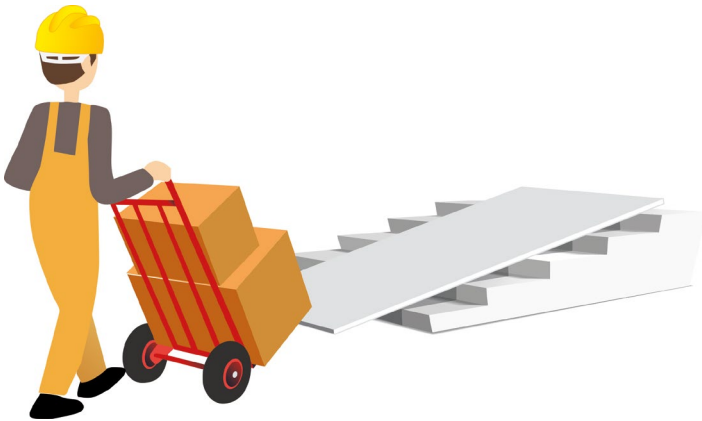
- Better if you put the load on a trolley

It is possible to move heavy loads using two and four-wheel trolleys

2 WHEELS

4 WHEELS

Moreover, four-wheel trolleys, if they do not dispose of rudder or drawbars, must be pushed instead of pulled and must be loaded in a way that worker's view is not obstructed.



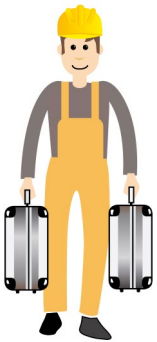
Use caution when you transport loads on an uneven floor, or where the floor has holes, slopes, steps or other obstacles unremoved.

Even if the load is light (5-10 Kg), do not forget the follow basic rules:

- cover the distance more times with a lighter load instead of moving a heavier load in a shorter distance

- if the object has a handle, it can be carried close to the body changing side frequently

- if there are many objects with a handle to carry, it is necessary to keep one on each side sharing the weight evenly



- when moving loads, avoid twisting your trunk only but the whole body

- if you need to put an object in a high position, avoid to arch the back and use a stair or a safety platform.

FOR A WEALTHY LIFESTYLE

Prevention and health protection

Prevention and frequent **physical exercises** are recommended to achieve a good quality of life. You will find hereinafter the typical exercises to relax, stretch and strengthen, which are useful to adopt a healthy lifestyle, to protect integrity and preserve the precious functions of the spine. For an effectual prevention, the proposed exercises must be executed following the suggested order, at least twice a week, requiring no more than half an hour.

Relaxation of neck muscles

Resting position with head in your hands. Repeat twice a day for a few minutes, taking a deep breath.

Relaxation of back

On the floor, knees bent, breathe deeply inhaling through the nose and exhaling slow through the mouth. Both chest and abdomen must raise and lower during breathing. Make sure your back is always flat with the floor. Repeat 10 times.

Rear back muscles stretch

Repeat a few times.

Leg muscles stretch

Repeat on each side for 10 times.

Lateral neck muscles stretch

Keep head tilted on one side; get your ear close to the shoulder until you feel the stretch on the other side of the neck. Keep this position for 30 seconds.

Repeat on each side for a few times.

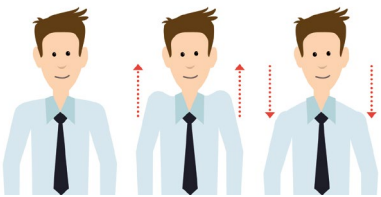
Rear muscles stretch

Repeat for a few times.

Shoulder muscles stretch

Sit on a stool, move a hand between scapulae with elbow pointing high up. Gradually increase the head stretch. Keep this position for 30 seconds. Repeat a few times.

Shoulders' mobilisation



Repeat a few times

Back relaxation

Always complete your exercises repeating the first exercise for back.

This exercise program is also recommended to people carrying out a sedentary job, with only occasional manual handling of loads.

LIMIT VALUES

What is the maximum acceptable load?

Annex XXXIII of Law Decree 81/08 does not fix the weight limit that is safe for a worker. It is generally defined as “recommended limit weight”.
However, it must be considered that previous national legislation and ISO and UNI EN regulations fixed specific restrictions, which are therefore prevailing, for men, women, children and teenagers.
The reference policy framework can be summarized as follows:

-ISO 11228
-UNI EN1005
-Law 653/1934
-Law 977/67

The following table summarizes limit weights, based on age and sex of population.

AGE	MEN	WOMEN
-18	20 Kg	15 Kg
18-45	25 Kg	20 Kg
+ 45	20 Kg	15 Kg

As you have read so far, manual handling of loads depends on many different variables.

Criteria to assess the maximum acceptable weight are as follows:

- Strain capacity of the worker, depending on sex, age, build and height.
- Characteristics of the load, as shape, dimensions, center of gravity, ease to grasp and stability
- Environment: distance, type of path, height and frequency of lift, use of mechanical aids, temperature, clothes, etc…

THE NIOSH METHOD

Handling of loads. To be on the safe side, respect NIOSH standard.

To carry out a safe manual handling of loads, refer to the values elaborated by the National Institute for Occupational Safety (NIOSH).

NIOSH is the standard renowned by the international scientific community and NIOSH values are those to respect for a correct manual handling of loads.

For safe lifting activities, refer to the **Risk Synthetic Index.**

- 0,85
Risk Synthetic Index is less than 0,85

0,85 - 1
Risk Synthetic Index ranges between 0,85 and 1

+ 1
The Synthetic risk index is higher than 1

THE RISK SYNTHETIC INDEX

The Risk Index is the value NIOSH calculated based on precise criteria, in order to assess the maximum acceptable weight:

GREEN LIGHT
Situation is acceptable and no specific intervention is required

YELLOW LIGHT
Improve structural factors, review organizational measures and train workers. Assess if medical surveillance is effective.

RED LIGHT
Re-design as fast as possible tasks and workplaces. Train workers and implement medical surveillance.

Based on precise calculation, NIOSH develops and sets up the Risk Synthetic Index, which is the instrument used to determine the threshold of seriousness of the risk associated with manual handling of loads and identify the risk levels. According to those levels, adequate activities need to be implemented for the benefit of the involved workers: surveillance, training, information on risks and all organizational and technical procedures.

CALCULATION OF NIOSH INDEXES

Load Constant in kilograms (LC)

In order to provide a correct risk assessment, the following NIOSH Recommended Weight Limit table is useful to calculate the lifting index.

AGE	MEN	WOMEN
>18 YEARS	25 Kg	20 Kg

Height from the ground of the hands at lifting starting point (A)

H cm	0	25	50	75	100	125	150	>175
A	0,77	0,85	0,93	1,00	0,93	0,85	0,78	0,00

Distance the object is moved vertically between start and end of lifting (B)

H cm	25	30	40	50	70	100	170	>175
B	1,00	0,97	0,93	0,91	0,88	0,87	0,86	0,00

Horizontal distance between hands and worker's ankles mid-point (C)

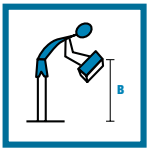
H cm	25	30	40	50	55	60	>63
C	1,00	0,83	0,63	0,50	0,45	0,42	0,00

Angular displacement of load in degrees (D)

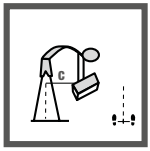
angle	0	30	60	90	120	135	>135
D	1,00	0,90	0,81	0,71	0,52	0,57	0,00

A

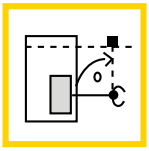
B



C



D



Classification of the load grasp (E)

CLASSIFICATION	GOOD	POOR
E	1,00	0,90

Frequency of lifts (number per minute) during a sampling period (F)

Number	0,20	1	4	6	9	12	>15
E - 1h	1,00	0,94	0,84	0,75	0,52	0,37	0,00
E 1-2 h	0,95	0,88	0,72	0,50	0,30	0,21	0,00
E 2-8 h	0,85	0,75	0,45	0,27	0,52	0,00	0,00

NIOSH EQUATION

RECOMMENDED WEIGHT LIMIT
=
LC x A x B x C x D x E x F

Calculation example:
25 • 0,85 • 0,91• 0,83 • 0,90 • 1 • 0,72
=
10,40

Risk Synthetic Index
=

$$\frac{\text{WEIGHT LIFTED}}{\text{RECOMMENDED WEIGHT LIMIT}}$$

Calculation example:

$$\frac{20\ \text{kg}}{10{,}40} = \mathbf{1{,}92}$$

1,92 is the value of the **Risk Synthetic Index**, also known as Lifting Index.
According to the NIOSH standards, this value means **“Red light”**, that is to say, the situation can involve risks for workers’ health and therefore a structural intervention is required.

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