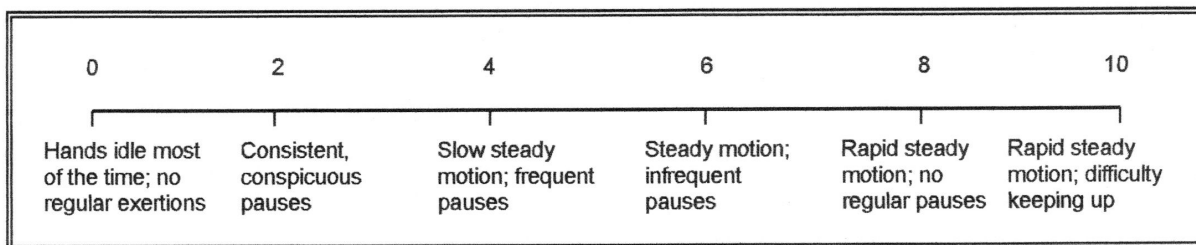


Appendix I-C-4 Risk Factor Definitions

Risk Factor Definitions

Upper limb movements:

Repetitiveness is performing the same motions repeatedly. The severity of risk depends on the frequency of repetition, speed of the movement or action, the number of muscle groups involved, and the required force. Repetitiveness is influenced by machine or line pacing incentive programs, piece-work and unrealistic deadlines. This risk factor, upper limb movements, is a measure of the amount of time a person spends with their upper limbs moving, as well as the speed of the movements. You should think of this as a 10-point scale of movement where *moderate* falls around the 5-7 mark and *intensive* falls around the 8-10 mark. If you think of the fastest pace you could work, where if you took a break you would fall behind immediately, then that would be intensive movement. The key here is that you are looking at the amount of movement over the entire work cycle. You cannot have intensive movement for 10 seconds, and then take a break. This scale takes breaks into consideration. If you feel the movements are moderate over the entire work cycle then the person is exposed to this risk factor. Therefore, the only two answers you can have are no exposure or exposure for the entire work cycle.



Hand Force:

A power grip is gripping an object with your hand in the shape of a fist. You are able to use your fingers, thumb and palm to generate the force. A pinch grip involves gripping onto an object using your thumb and any of your fingers. A power grip becomes forceful when either the object being held weighs more than 10 lbs, or (through visual analysis) you note excessive muscular activity in the forearm while gripping the object (i.e. high force movement ... heavy push/pull, etc.). The pinch grip becomes a risk factor when you grip something weighing more than 2 pounds. Poorly fitted gloves reduce dexterity and feeling, resulting in a need to use stronger muscle force; if the worker is wearing gloves, you will add 1 point to the risk factor score.

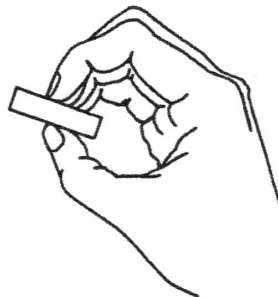


Figure 1:
Pinch Grip

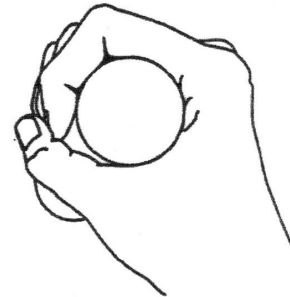


Figure 2:
Power Grip

Awkward Postures:

An awkward posture refers to a deviation from the ideal working posture, which is standing straight with arms at the side of the torso, elbows bent, with the wrists straight. Awkward postures typically include reaching behind, twisting, working overhead, kneeling, forward or backward bending, and squatting. These are postures that cause the body to produce excessive and unnecessary force to perform a movement. The principal here is that when the muscles and joints are not in an optimal position for force development, then they must increase their level of effort to perform the activity.

You are looking for the following:

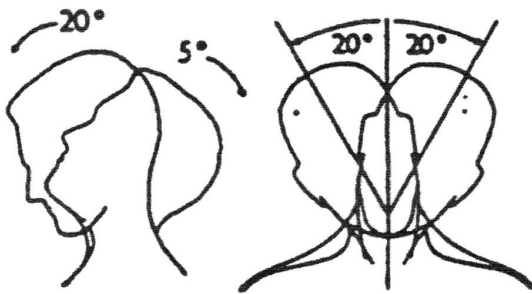


Figure 3: Neck bending/twisting > 20°

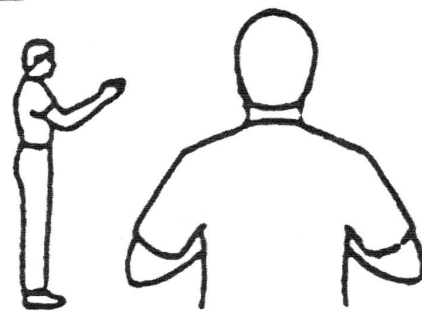


Figure 4: Shoulder being flexed such that the elbow is working above mid-torso height

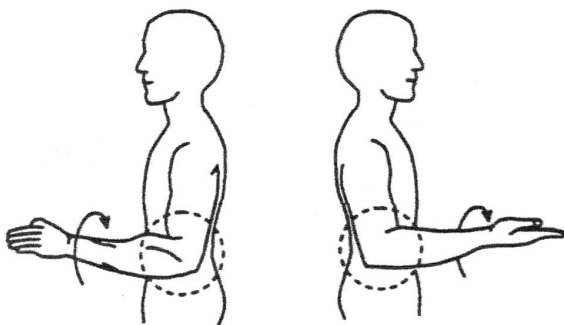


Figure 5: Rapid rotation of the forearm (screwdriving action)

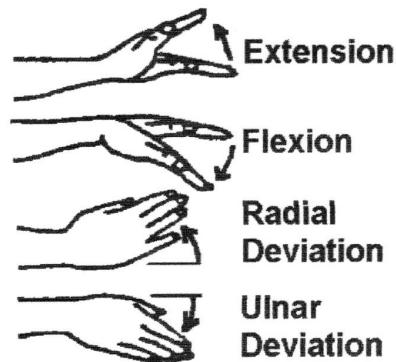


Figure 6: Flexion/extension of the wrist >20° or ulnar/ radial deviation of the wrist



Figure 7: Mild forward bending (20-45°)



Figure 8: Severe bending of the torso (>45°);



Figure 9: Bending to the side



Figure 10: Twisting of the torso > 20° (you are looking for the angle between the shoulders and the hips)



Figure 10: Prolonged sitting without back support

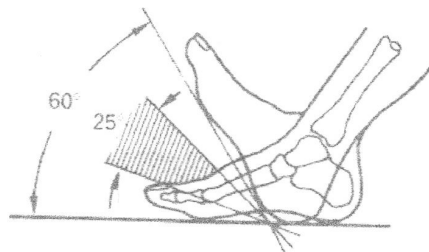
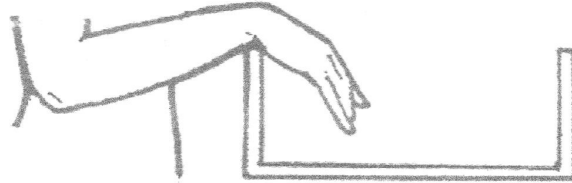


Figure 11: Repetitive ankle extension/flexion

Mechanical Compression:

Mechanical compression refers to contact of the body with a hard surface or edge that results in the pinching or crushing of tissue. Contact stress can also result when using a part of the body as a hammer or striking instrument. You are looking for objects/materials that would press into the skin and in some way deter blood flow or place undue pressure on a nerve, tendon or muscle (i.e. inhibit motion in any way). Using the hand as a striking tool is also a contact stress risk factor.



Vibration:

Hand-arm vibration refers to vibration (generally from equipment or a hand tool) that goes through the hand and arm, then travels through the rest of the body. Vibration can also affect the lower back, especially when driving a vehicle. Vibration reduces blood flow and sensory response. You are looking for either the transfer of vibration into a distinct body area, usually through the hand, or into the entire body by standing or sitting on a vibrating surface. Many tools vibrate during use, and this can transfer into the arm to produce localized vibration.



Environment:

Low temperatures reduce sensory feedback, dexterity, blood flow, muscle strength, and balance. High temperatures increase the rate at which the body fatigues. Lighting levels affect the person's ability to perform the task (e.g. bending forward in order to see product).

Control Over Work Pace:

Control over work pace is a risk factor because it affects the ability of the worker to regulate their speed of work. If a worker starts to feel pain or discomfort, the best method of alleviating this is to stretch and take a break. If the pace of the work is externally controlled, then the worker cannot take a break when needed. Things such as a production line, a conveyer belt, working for piece rate (e.g. tree planting), electronic monitoring, etc., are all examples of control factors. If the person is exposed to one factor, they get a score of 1. If they are exposed to 2 or more factors, they get a score of 2.

Push/Pull:

If you have a device that can measure a push/pull force, then a Moderate push/pull is when the initial force is between 90 and 225 N (9 kg – 23 kg) ; a Heavy push/pull is when the initial force required is >225 N. If you cannot measure the force, then you can estimate the force by watching the person work. A Moderate push/pull can be produced with one hand or two, requires little effort from the legs and looks smooth and steady once the object is moving. A Heavy push/pull will require two hands, steady and possibly significant effort from the legs, and the movement will seem very strenuous over the entire course of the push/pull.

Keyboard use:

Any type of keypad use, computer keyboard, or machine control keys. 'Intermittent' use refers to 50-75% of the day spent on a keyboard. 'Intensive' keyboard use refers to 75-100% of the day spent on a keyboard.

