

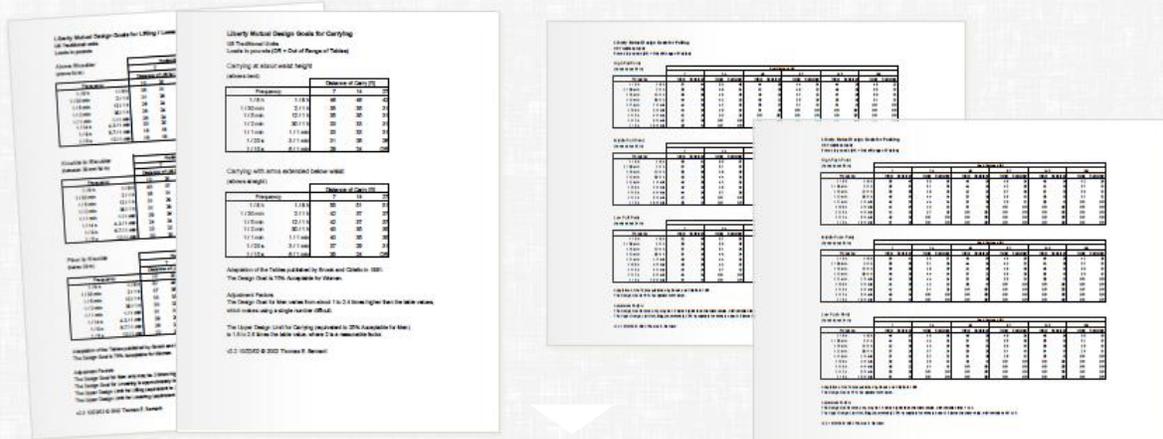
THINK PREVENTION

A Step-by-Step Guide

SNOOK Tables



The Liberty Mutual MMH Tables (commonly known as “Snook Tables”) outline design goals for various lifting, lowering, pushing, pulling, and carrying tasks based on research by Dr. Stover Snook and Dr. Vincent Ciriello at the Liberty Mutual Research Institute for Safety. The tables provide weight/force values, for specific types of job tasks that are deemed to be acceptable to a defined percentage of the population. This is done by comparing data for each of the specific manual handling tasks against the appropriate table.



When the task specific data does not match the values in the table, select the next highest table value that is closest to the actual task requirements. By selecting the next highest value in the table for any of the specific criteria, a more conservative or protective assessment will result.

Many jobs require a wide variety of manual handling tasks (lifting, lowering, pushing, pulling, and/or carrying) which can be assessed as a whole using the Snook Tables. This can be done by comparing data for each of the specific manual handling tasks against the appropriate table, and then using the ‘total frequency for all the tasks’ as the frequency value to determine the percentage of the population that would find the task to be acceptable.

For example, if a job requires lifting at a rate of one lift every two minutes, a push every five minutes and a carry every five minutes, the worker would do four and a half 'tasks' over five minutes, or approximately one task per minute. The evaluator can then compare the data for the lift, carry and push, against the appropriate table but use the same frequency (one per minute) for each to determine a result.

When a mixture of males and females are doing the task, the task should be designed so that it is acceptable to at least 75 per cent of the female population, which would make it acceptable to more than 90 per cent of the male population. Any task that cannot be performed by at least 75 percent of the total population should be considered for MSD prevention controls and redesign.

Getting Ready

The evaluator should prepare for the assessment by interviewing and observing workers to gain a complete understanding of the job tasks and demands. Selection of the job tasks to be evaluated should be based on the most difficult manual material handling work tasks, based on worker interview and job observation. Equipment needed: A tape measure is required to take distance measures, and a weigh scale or force measurement gauge is required to determine the weight of the object(s) being lifted/lowered or carried, and the forces required for pushing and pulling.

Data Collection

For each job task analyzed, the evaluator will need to collect relevant data. Measurements and data required for this method include:

- **Weight:** the weight of the object being lifted, lowered, or carried.
- **Lift/lower distance:** the distance of travel of the hands while lift or lower taking place.
- **Hand distance:** the distance from the front of the body to the hands. This will normally be half the width of the object being handled unless the object is purposely held away from the body.
- **Hand height:** the height of the hands on the object being pushed or pulled, or the height of the hands when carrying a load.
- **Push/pull/carry distance:** the distance the item is pushed or pulled, or carried.
- **Frequency:** the number of lifts, lowers, pushes, pulls or carries expressed in terms of number of activities done in 'x' seconds, minutes, or hours (see tables).
- **Force requirement:** For each pushing and pulling task evaluated, you will need to measure the amount of force required to get the item moving (initial force) and then measure the amount of force it takes to keep the item moving (sustained force).
- **Lift/lower zone:** the area of the body in which the lift/lower finishes. Take note of the position of the hands when the worker has completed the lift/lower (floor to knuckle, knuckle to shoulders, or shoulder to overhead reach)

Using the Snook Tables - Examples

Example 1: Above Shoulder Lift

Variables determined by the assessment:

- Vertical Location - above shoulder lift (54"+)
- Frequency - average of 1 lift every 5 minutes
- Horizontal Distance - 10" (front of body to mid-line of hands)
- Distance of Lift - 30" (lifts from cart at 25" to rack height of 55")



Above Shoulder
(above 54 in)

		Horizontal Distance (Front of Body to Hands) [in]								
		7			10			15		
Frequency		Distance of Lift [in]			Distance of Lift [in]			Distance of Lift [in]		
		10	20	30	10	20	30	10	20	30
1 / 8 h	1 / 8 h	35	31	29	29	26	24	26	24	22
1 / 30 min	2 / 1 h	31	26	24	24	22	20	22	20	18
1 / 5 min	12 / 1 h	26	24	22	22	20	18	20	20	18
1 / 2 min	30 / 1 h	26	24	22	22	20	18	20	20	18
1 / 1 min	1 / 1 min	26	24	20	20	20	18	20	18	15
1 / 14 s	4.3 / 1 min	20	20	18	18	18	13	18	18	13
1 / 9 s	6.7 / 1 min	18	18	15	15	15	13	15	15	13
1 / 5 s	12 / 1 min	18	18	13	13	13	11	13	13	11

Design goal = 18 pounds

Example 2: Floor to Knuckle Lift

Variables determined by the assessment:

- Vertical Location - floor to knuckle lift (below 29")
- Frequency - average of 1 lift every 2 minutes
- Horizontal Distance - 10" (front of body to mid-line of hands)
- Distance of Lift - 20" (lowers from height of 32" to 4"= 28", rounded to value of 30)



Floor to Knuckle
(below 29 in)

		Horizontal Distance (Front of Body to Hands) [in]								
		7			10			15		
		Distance of Lift [in]			Distance of Lift [in]			Distance of Lift [in]		
Frequency		10	20	30	10	20	30	10	20	30
1 / 8 h	1 / 8 h	51	48	42	42	40	35	40	37	31
1 / 30 min	2 / 1 h	37	35	31	31	31	26	29	29	24
1 / 5 min	12 / 1 h	33	33	29	29	26	22	26	24	22
1 / 2 min	30 / 1 h	33	33	29	26	26	22	26	24	22
1 / 1 min	1 / 1 min	31	31	26	26	24	22	24	22	20
1 / 14 s	4.3 / 1 min	29	26	24	24	20	20	24	20	20
1 / 9 s	6.7 / 1 min	26	24	22	22	20	18	22	20	18
1 / 5 s	12 / 1 min	22	20	18	18	15	15	18	15	15

Design goal = 22 pounds

Example 3: Carrying

Variables determined by the assessment:

- Vertical Location - Carrying at about waist height with elbows bent
- Frequency - average of 1 carry every 2 minutes
- Distance of Carry - up to 40' (use highest value of 27')



Carrying at about waist height
(elbows bent)

Frequency		Distance of Carry [ft]		
		7	14	27
1 / 8 h	1 / 8 h	46	46	42
1 / 30 min	2 / 1 h	35	35	31
1 / 5 min	12 / 1 h	35	35	31
1 / 2 min	30 / 1 h	33	33	31
1 / 1 min	1 / 1 min	33	33	31
1 / 20 s	3 / 1 min	31	26	26
1 / 10 s	6 / 1 min	29	24	OR

Design goal = **31 pounds**

Example 4: Pulling

Variables determined by the assessment:

- **Vertical Location - Middle pull point**
- **Frequency - 1 pull every 10 minutes (round down to 1 / 5 minutes)**
- **Distance of Pull - up to 75' (use value of 97')**



Middle Pull Point
(hands about 36 in)

Frequency		Pull Distance [ft]											
		7		24		48		97		145		194	
Initial	Sustained	Initial	Sustained	Initial	Sustained	Initial	Sustained	Initial	Sustained	Initial	Sustained	Initial	Sustained
1 / 8 h	1 / 8 h	59	42	55	37	46	31	46	29	46	26	42	20
1 / 30 min	2 / 1 h	57	35	51	31	44	26	42	22	42	20	37	15
1 / 5 min	12 / 1 h	55	33	48	29	42	24	40	20	40	20	35	15
1 / 2 min	30 / 1 h	48	29	44	26	37	22	35	20	35	18	33	13
1 / 1 min	1 / 1 min	46	29	42	24	37	22	33	18	33	15	OR	OR
1 / 30 s	2 / 1 min	46	29	40	24	31	18	OR	OR	OR	OR	OR	OR
1 / 15 s	4 / 1 min	44	26	37	20	OR	OR	OR	OR	OR	OR	OR	OR
1 / 12 s	5 / 1 min	42	26	OR	OR								
1 / 6 s	10 / 1 min	35	18	OR	OR								

Design goal = **Initial 40 pounds, Sustained 20 pounds**

About Ergonomics Plus

Since 1989, Ergonomics Plus consultants have been working with companies to reduce injury risk and improve productivity and efficiency.

Over two decades of experience has taught us that a proactive, prevention-focused process that is comprehensive and works to improve both the work and the worker gets the best results.

In a comprehensive MSD prevention process:

- Ergonomic issues are systematically identified and resolved with cost-effective solutions.
- Employees are educated on proper lifting techniques, ergonomic principles, body mechanics and self-care tools and techniques.
- Costly injuries are averted with a proactive, prevention-focused approach (early intervention) that seeks out and eliminates worker fatigue and discomfort.

Think Prevention!

We call our process described above the E+ System, and it's the methodology we use for our clients.

If you are interested in learning more about our proactive MSD prevention process, get in touch with us today!

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CONTACT US



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Mark has been providing workplace injury prevention and ergonomics consulting services to industry since 1989. He is the founder of Ergonomics Plus, author of Building Wellness from the Inside Out and a member of the National Speakers Association.