American Conference of Governmental Industrial Hygienists (ACGIH)
Threshold Limit Values (TLVs®) for Lifting

These TLVs® recommend workplace lifting conditions under which it is believed nearly all workers may be repeatedly exposed, day after day, without developing work-related low back and shoulder disorders associated with repetitive lifting tasks.

The TLVs® consist of three tables which present lifting tasks defined by their durations, either less than or greater than 2 hours per day, and by their frequency, expressed in number of lifts per hour. The TLVs® represent weight limits for a two-handed, single-lift performed in front of the body in an upright (neutral) position. Other manual material handling tasks such as carrying, pushing and pulling are not accounted for in the TLV®

When other factors or working conditions, such as those listed below are present, professional judgment should be used to reduce weight limits below those recommended in the TLVs®:

- High frequency lifting: > 360 lifts per hour
- Extended work shifts: lifting performed for more than 8 hours per day
- High asymmetry: lifting with torso bent
- Rapid or twisting lift motions, i.e. side to side
- One handed lifting
- Constrained lower body posture, such as lifting while seated or kneeling
- High heat and humidity
- Lifting unstable or non-rigid objects
- Poor hand holds: lack of handles, cut-outs, or ther grasping points
- Unstable footing (e.g. not able to support the body with both feet while standing)
- During or immediately after exposure to whole-body vibration at or above the TLV for Whole-Body Vibration

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Instructions for Users of the TLV® Tables

1. **Ensure that there is an understanding of the TLV tables and their limits.** If there are questions, please review the Documentation for the Lifting TLVs®. Copies of this documentation can be obtained at www.acgih.org/store.

2. **Classify task duration** as less than or equal to a cumulative 2 hours per day or greater than a cumulative 2 hours per day. Task duration is the total length of time that a worker performs the task in 1 day.

3. **Determine the lifting frequency** as the number of lifts a worker performs per hour.

4. **Use the TLV® table that corresponds to the duration and lifting frequency of the task.**

5. **Determine the vertical height** (Figure 1) based on the location of the hands at the start of the lift.

6. **Determine the horizontal distance of the lift** (Figure 1) by measuring the horizontal distance from the midpoint between the inner ankle bones to the midpoint between the hands at the start of the lift.

7. **Determine the TLV®** for the lifting task, as displayed in the table cell that corresponds to the vertical and horizontal heights in the appropriate table, based upon frequency and duration.

8. **Consider load control at destination.** If the load is placed at the destination in a controlled fashion (i.e. slowly or deliberately placed), repeat Steps 5 through 7 using the destination point instead of the start. The TLV® is represented by the lower of the two limits.

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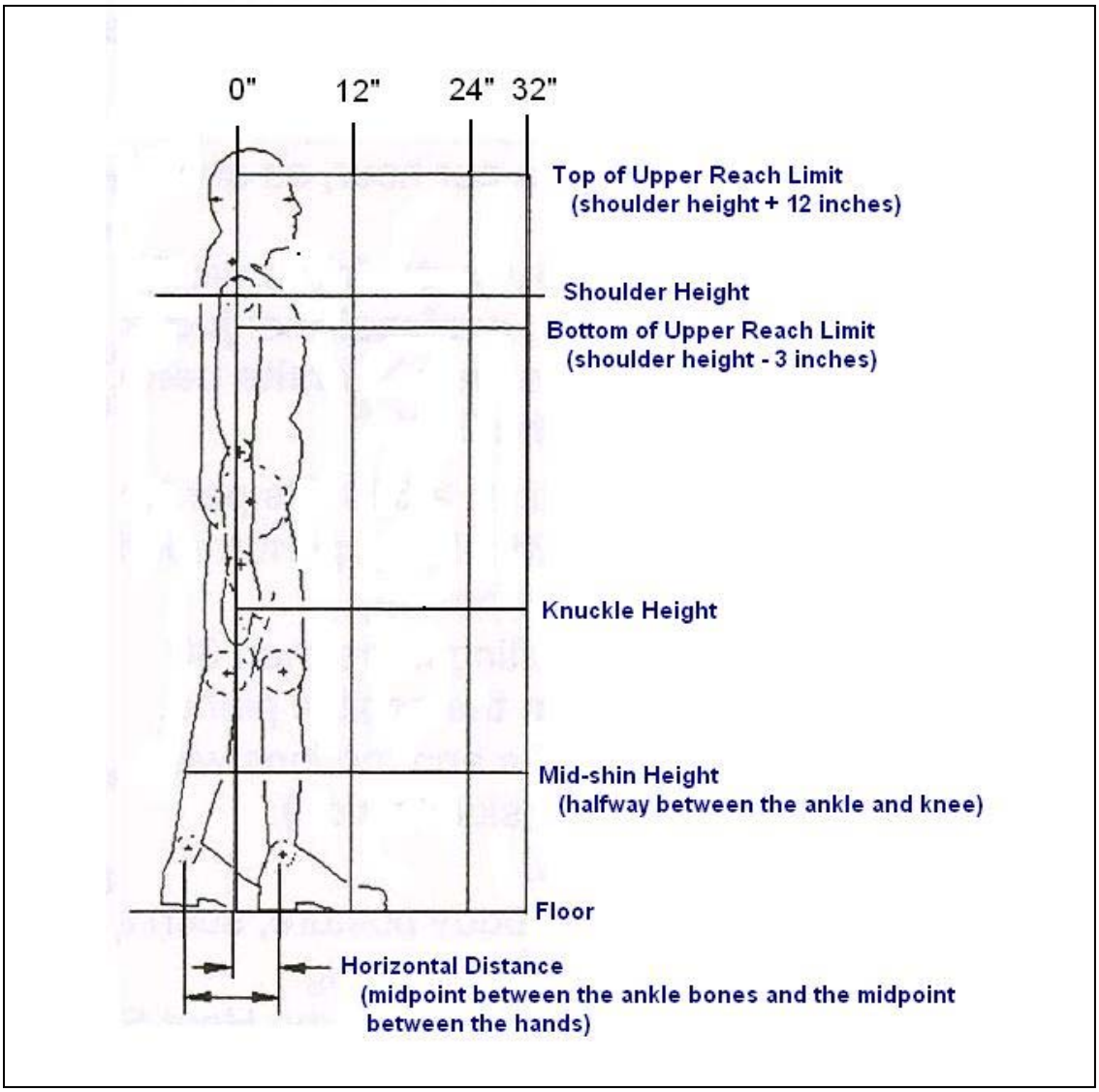

FIGURE 1. Graphic representation of hand locations

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TABLE 1. TLVs® for Infrequent Lifting:
≤ 2 Hours per Day with ≤ 60 Lifts per Hour
OR
≥ 2 Hours per Day with ≤ 12 Lifts per Hour

Vertical Height of Hands	Horizontal Distance of Hands from Body[A]		
	Close: < 12 inches (30 cm)	**Intermediate: 12-24 inches (30-60 cm)**	**Extended:[B] 25-32 inches (60-80 cm)**
Reach Limit:[C]	35 lbs (16 kg)	15 lbs (7 kg)	No known safe limit for repetitive lifting[D]
Shoulder Area: 12" above to 3" below shoulder	35 lbs (16 kg)	15 lbs (7 kg)	No known safe limit for repetitive lifting[D]
Torso Area: Below shoulder to knuckle height[E]	70 lbs (32 kg)	35 lbs (16 kg)	20 lbs (9 kg)
Knee Area: Knuckle to middle of shin height[E]	40 lbs (18 kg)	30 lbs (14 kg)	15 lbs (7 kg)
Ankle Area: Middle of shin height to floor	30 lbs (14 kg)	No known safe limit for repetitive lifting[D]	No known safe limit for repetitive lifting[D]

Footnotes for Table 1:

A. Distance from midpoint between inner ankle bones and the load
B. Lifting tasks should not start or end at the horizontal reach distance more then 32 inches from the midpoint between the inner ankle bones (See Figure 1)
C. Routine lifting tasks should not start or end at heights that are greater than 12 inches above the shoulder or more than 71 inches above floor level (see Figure 1)
D. Routine lifting tasks should not be performed for shaded table entries marked "No known safe limit for repetitive lifting." While the available evidence does not permit identification of safe weight limits in the shaded regions, professional judgment may be used to determine if infrequently lifts of light weight may be safe.
E. Anatomical landmark for knuckle height assumes the worker is standing erect with arms hanging at the sides.

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TABLE 2. TLVs® for Moderately Frequent Lifting:
> 2 Hours per Day with > 12 and ≤ 30 Lifts per Hour
OR
≤ 2 Hours per Day with > 60 and ≤ 360 Lifts per Hour

Vertical Height of Hands	Horizontal Distance of Hands from Body[A]		
	Close: < 12 inches (30 cm)	**Intermediate: 12-24 inches (30-60 cm)**	**Extended:[B] 25-32 inches (60-80 cm)**
Reach Limit:[C]	30 lbs (14 kg)	10 lbs (5 kg)	No known safe limit for repetitive lifting[D]
Shoulder Area: 12" above to 3" below shoulder	30 lbs (14 kg)	10 lbs (5 kg)	No know safe limit for repetitive lifting[D]
Torso Area: Below shoulder to knuckle height[E]	60 lbs (27 kg)	30 lbs (14 kg)	15 lbs (7 kg)
Knee Area: Knuckle to middle of shin height[E]	35 lbs (16 kg)	25 lbs (11 kg)	10 lbs (5 kg)
Ankle Area: Middle of shin height to floor	20 lbs (9 kg)	No known safe limit for repetitive lifting[D]	No known safe limit for repetitive lifting[D]

Footnotes for Table 2:

A. Distance from midpoint between inner ankle bones and the load
B. Lifting tasks should not start or end at the horizontal reach distance more then 32 inches from the midpoint between the inner ankle bones (See Figure 1)
C. Routine lifting tasks should not start or end at heights that are greater than 12 inches above the shoulder or more than 71 inches above floor level (see Figure 1)
D. Routine lifting tasks should not be performed for shaded table entries marked "No known safe limit for repetitive lifting." While the available evidence does not permit identification of safe weight limits in the shaded regions, professional judgment may be used to determine if infrequently lifts of light weight may be safe.
E. Anatomical landmark for knuckle height assumes the worker is standing erect with arms hanging at the sides.

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TABLE 3. TLVs® for Frequent, Long Duration Lifting:
> 2 Hours per Day with > 30and ≤ 360 Lifts per Hour

Vertical Height of Hands	Horizontal Distance of Hands from Body[A]		
	Close: < 12 inches (30 cm)	**Intermediate: 12-24 inches (30-60 cm)**	**Extended:[B] 25-32 inches (60-80 cm)**
Reach Limit:[C]	25 lbs (11 kg)	No known safe limit for repetitive lifting[D]	No known safe limit for repetitive lifting[D]
Shoulder Area: 12" above to 3" below shoulder	25 lbs (11 kg)	No known safe limit for repetitive lifting[D]	No known safe limit for repetitive lifting[D]
Torso Area: Below shoulder to knuckle height[E]	30 lbs (14 kg)	20 lbs (9 kg)	10 lbs (5 kg)
Knee Area: Knuckle to middle of shin height[E]	20 lbs (9 kg)	15 lbs (7 kg)	5 lbs (2 kg)
Ankle Area: Middle of shin height to floor	No known safe limit for repetitive lifting[D]	No known safe limit for repetitive lifting[D]	No known safe limit for repetitive lifting[D]

Footnotes for Table 3:

A. Distance from midpoint between inner ankle bones and the load
B. Lifting tasks should not start or end at the horizontal reach distance more then 32 inches from the midpoint between the inner ankle bones (See Figure 1)
C. Routine lifting tasks should not start or end at heights that are greater than 12 inches above the shoulder or more than 71 inches above floor level (see Figure 1)
D. Routine lifting tasks should not be performed for shaded table entries marked "No known safe limit for repetitive lifting." While the available evidence does not permit identification of safe weight limits in the shaded regions, professional judgment may be used to determine if infrequently lifts of light weight may be safe.
E. Anatomical landmark for knuckle height assumes the worker is standing erect with arms hanging at the sides.

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