SKILLSIGNAL™
Construction Safety & Compliance

TOOLBOX TALK

Total Fall Clearance: The Math That Decides Whether You Hit the Ground Anyway

TOPIC NO.	DURATION	AUDIENCE
FP-10	**10 to 15 min**	**All Crew**

OSHA REFERENCE 29 CFR 1926.502(d)(16) · 29 CFR 1926.502(d)(20) · OSHA SHIB 03-24-2004 (Suspension Trauma)

PROJECT / JOBSITE	DATE	PRESENTED BY

01 THE HOOK

START HERE

Here is the one that gets experienced people. Harness on right. Lanyard inspected. Clipped to a rated anchor. Then you fall, the lanyard catches, the shock pack rips open exactly like it is supposed to, and you hit the slab anyway, because the floor was 14 feet below you and the system needed 17 and a half. Everything worked. There just was not enough room for it to work in. Fall clearance is the number nobody figures out, and it is simple addition.

02 WHAT YOU ARE ADDING UP

Your **free fall** is how far you drop before the lanyard goes tight: it depends on the lanyard length and how high the anchor is relative to your D-ring. OSHA caps it at **6 feet** (**1926.502(d)(16)(iii)**). But free fall is only where the arithmetic starts. Four more numbers stack on top of it before you are hanging still.

FEET	FACTOR	WHERE IT COMES FROM
6.0	Free fall	A 6-foot lanyard anchored at D-ring height. **The OSHA maximum.** Anchor higher and this shrinks. Anchor at your feet and it doubles, which is illegal and usually fatal.
3.5	Deceleration	The shock absorber stretching out to slow you down. OSHA allows **up to 3.5 feet** (**1926.502(d)(16)(iv)**). Use the maximum unless the label on your pack says otherwise.
1.0	Harness stretch / D-ring shift	The harness stretches and the D-ring slides up your back when the load hits. **Assume 1 foot.** Check the manufacturer; some say more.
5.0	D-ring height	From the dorsal D-ring to the bottom of your boots. **About 5 feet on a 6-foot worker.** Taller than 6 feet, add the difference. Your feet are the lowest point, not your D-ring.
2.0	Safety factor	Room for the things you did not count: a loose anchor strap, a sagging horizontal lifeline, a heavy tool belt. **Add 2 feet** minimum.

TOTAL CLEARANCE NEEDED

17.5

FEET

FROM ANCHOR TO NEAREST OBSTRUCTION

6 + 3.5 + 1 + 5 + 2

With a 6-foot shock-absorbing lanyard anchored at D-ring level, you need **17.5 feet of clear air** below the anchor before you touch the ground, a beam, a lower deck, or a piece of equipment. Industry guidance runs from **17.5 to 18.5 feet** depending on the assumptions. On a one-story structure with the anchor at 14 feet, the system cannot save you. **Measure before you tie off, not after.**

03 HOW TO RUN THE CHECK

STEP

1

MEASURE FROM THE ANCHOR DOWN

Find the distance from the **anchor point** to the nearest thing you could hit below: ground, slab, lower deck, duct, scaffold, parked equipment. Not from your feet. From the anchor. If you cannot measure it, estimate low.

STEP 2

ADD UP YOUR SYSTEM

Free fall (from lanyard length and anchor height) + deceleration (3.5 ft or the label) + harness stretch (1 ft) + your D-ring height (5 ft, more if you are tall) + 2 ft safety. For a standard 6-foot lanyard at D-ring height, that is **17.5 feet**.

STEP 3

COMPARE THE TWO NUMBERS

If the clearance you measured is **greater** than the clearance your system needs, you are good. If it is **equal or less**, the system as rigged will not stop you in time. Do not tie off and hope.

STEP 4

IF IT DOESN'T FIT, CHANGE THE SYSTEM

First options: **raise the anchor** or **shorten the lanyard**. Both cut free fall. If that still does not get you there, get the competent person: a **self-retracting lifeline** anchored overhead can cut free fall to 2 feet or less and total clearance to a fraction of 17.5. A **fall restraint** setup that keeps you from reaching the edge needs no clearance at all.

04 SWING FALLS AND WHAT HAPPENS AFTER

THE OTHER MATH

SWING FALL

Clearance is measured straight down. Falls do not always go straight down.

✗ **DON'T WORK OFF TO THE SIDE OF YOUR ANCHOR**

If your anchor is 10 feet to your left when you go over the edge, you do not drop. You swing, and the bottom of the arc is lower than a straight fall. You also hit whatever is between you and the point directly under the anchor: a column, the edge itself, a wall. Swing falls add distance you did not calculate and impacts you did not plan for.

✓ **KEEP THE ANCHOR OVERHEAD AND MOVE IT WITH THE WORK**

Work as close to directly under the anchor as you can. When the work moves sideways, move the anchor or re-tie to the next one. If you must work off to the side, the competent person needs to account for swing in the clearance and look at what you would hit.

⚠ **HANGING IN THE HARNESS CAN KILL YOU TOO**

OSHA's suspension trauma bulletin is blunt: hanging motionless in a harness after a fall can cause **unconsciousness, followed by death, in less than 30 minutes**, as blood pools in the legs. **1926.502(d)(20)** requires the employer to provide for **prompt rescue** or make sure you can rescue yourself. Before anyone ties off, the crew knows the rescue plan. If you are hanging, pump your legs and get your feet into anything that takes weight. If you are the rescuer, every minute counts.

05 WHY IT MATTERS

[JOBSITE]

FOR THE CREW

Fall clearance is the question that exposes a fall protection plan that was never really planned. Crews that run the math pick the right lanyard, the right anchor, and the right system before the first climb. The number also goes straight into the JHA and the rescue plan.

[INDIVIDUAL]

FOR YOU

A harness, a lanyard, and a rated anchor are three things that can all be right and still leave you dead if there was not enough room. Do the addition. It takes a minute and you only have to do it once per setup.

[HOME]

FOR LIFE OFF-SITE

Roof work at home with a harness from the hardware store is the same problem. A 6-foot lanyard on a single-story house with 14 feet to the driveway does not have enough clearance. Fall restraint or a shorter system does.

06 TODAY'S DRILL

TODAY'S DRILL **RUN THE NUMBERS ON YOUR SETUP**

For wherever you are tying off today, measure or estimate the distance from your anchor to the nearest obstruction below. Then add your system: free fall + 3.5 + 1 + your D-ring height + 2. Write both numbers down and show the foreman. If the clearance is not bigger than the system number, do not tie off until the setup changes. While you are at it, say out loud who rescues you if you fall and how.

07 CREW DISCUSSION

Take 2 minutes. Pick one.

1. Has anyone on this crew ever actually measured fall clearance before tying off? What stopped you?
2. Where on this site is somebody working on a 6-foot lanyard with less than 18 feet below the anchor?
3. If you fell right now and were hanging, who would get you down, with what, and how long would it take?

08 ATTENDANCE & SIGN-OFF

All attendees confirm they participated in this Toolbox Talk and understand the content covered.

NAME (PRINT)	SIGNATURE

SUPERVISOR SIGNATURE

_____ Date: _____

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