Fig.13

Dorsal D-ring

E/A

FA

"A" = 52"
D-ring
height
above the
leading
edge

Limiter
Knot

LE or Fall Hazard

E/A No.6180-ZZ
Service Length = 21"

Fall Arrester Deceleration
"B" = 39"

Fig.14

"C" = 20"
Line Slack or
E/A Length

72"
Free
Fall
+
39"
Fall Arrester
Deceleration
=
111"

"A" = 52"
D-ring
Height

Fig.15

LOF Factors

"B" = 39"
Fall Arrester
Deceleration

"D" = 66"
E/A
Maximum
Deployment

"D" = 66"
E/A Deployment

"E" = 14"
Harness
Stretch

"E" = 14"
Harness
Stretch

"A+C" = 72"
Free Fall

Net LOF

Ground

Clearance

not Included.

191"/15'-11"
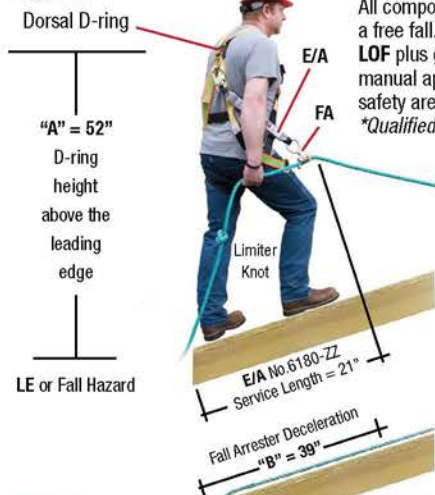
72"
Free
Fall

Ground/Obstacle Clearance
Minimum 24"

Length of Fall (LOF) 6ft Free Fall Example

All components of a fall protection system are subject to stretch, elongation and deceleration when subjected to a free fall. To prevent striking a lower level, the ground below, or exceeding **PPE** performance specifications, the **LOF** plus ground or obstacle clearance must be calculated as accurately as possible. The examples shown in this manual apply to equipment mfg. by **SAS** and are intended as examples only. Personnel* responsible for project safety are required to draft their own Length of Fall Plan **LOFP**.
*Qualified or competent person or a safety consultant as defined by CSA, ANSI or OSHA standards.

Length of Fall Example

Standing at the **LE** with no slack or angle in the Lifeline, the **FA** No.6180-ZZ should be placed on the lifeline no closer than its service length of 21" from the **LE** to reduce free fall to a minimum. **E/A** in tension (See Fig.13).
To prevent free falls greater than 6ft, the **E/A** should not be allowed to hang vertically when positioned at the **LE** (See Fig.16).

Note: The example plan shown here uses the maximum **FA** deceleration and **E/A** deployment lengths as specified by CSA standards and displayed on **SAS** PID labels. *Green color lifeline used for contrast.*

Free Fall Event

Fall arrest occurs in 2 different phases.
The worker steps over the **LE** (See Fig.14) and immediately free falls. The free fall length is equal to the D-ring height of 52" + any line slack or **E/A** length that is allowed to hang vertically. In this example, 20" of line slack + 52" = 72" total free fall before any force is applied to the **FA**.

Phase 1: After free falling 6ft, the **E/A** and lifeline are in tension and the force of the fall is applied to the **FA**. This initiates the **FA's** locking function. As it decelerates a max. length of 39" down the lifeline, the force of the fall causes the **FA** to lock fully onto the lifeline.
This action will initiate **Phase 2**.
Note: A limiter knot positioned below the **FA** on the lifeline at the **LE** can be used to reduce the **FA's** deceleration distance to less than 39" (See Fig.17).

Leading Edge Swing Fall Hazard

Horizontal travel along the leading edge exposes the worker to a swing fall hazard. The free fall length will not increase provided the **E/A** and lifeline remain in tension. **LOF** will be increased by the angle of the lifeline off-center from the anchor point above.
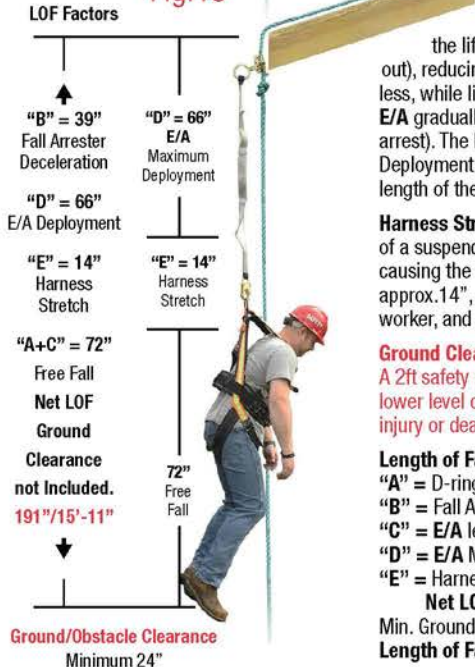
Fall Arrest

Phase 2 E/A Deployment: When the **FA** locks onto the lifeline, the **E/A's** tear webbing begins to deploy (tear out), reducing the free fall velocity and avg. arrest force to 1,350lb or less, while limiting the **G forces** to humanly sustainable levels. As the **E/A** gradually deploys, it brings the free fall to a complete stop (fall arrest). The **E/A's** tear webbing has a max. deployment length of 66". Deployment lengths will vary based on the workers weight and the length of the free fall. It is typically less than 66".

Harness Stretch: The force of the free fall combined with the weight of a suspended worker takes up any slack in the harness webbing causing the D-ring's D-Plate to slide upward. Harness stretch is approx.14", provided the harness has been properly adjusted to fit the worker, and reducing webbing slack to a minimum.

Ground Clearance Warning!

A 2ft safety margin should be added to the net **LOF** to avoid striking a lower level or the ground below. A failure to do so can result in serious injury or death.

Length of Fall Calculation

"A" = D-ring height above **LE**	52"	
"B" = Fall Arrester deceleration	39"	
"C" = **E/A** length over the **LE**	20"	
"D" = **E/A** Max. Deployment	66"	
"E" = Harness stretch	14"	
Net LOF Total	**191"**	**[15'-11"]**
Min. Ground Clearance	24"	
Length of Fall Plan (LOFP)	**215"**	**[17'-11"]**

Key Code:

E/A = Energy Absorber
FA = Fall Arrester (rope grab)
LE = Leading edge
LOF = Length of fall

Calculating Free Fall Lengths

Two factors are required to limit free falls to 6ft:
1) D-ring height above the leading edge, fall hazard or work surface (See Fig.13).
2) The amount of slack/angle in the lifeline and/or the service length of the **E/A** that is allowed to hang vertically (See Fig.16).

Fig.16

E/A Service Length

When the **E/A** is allowed to hang vertically at the **LE**, the total service length must be added to the free fall length.

Total Service Length 30"

E/A Service Length 25"

FA=5"

Leading Edge

Example Free Fall Calculation

D-ring Height = 52"
E/A + **FA** Service Length = 30"
Total Free Fall Length = 82"

Fig.17

Limiter Knot/Failsafe

An **SAS** original rigging design specified for use with our lifeline systems. A figure 8 or termination knot can be used to gauge the worker's position on the lifeline and reduce the **FA's** deceleration distance.

Figure 8
Knot

Termination Knot