

RT Introduction to Anchor Rigging



Anchor Stability (*static*)

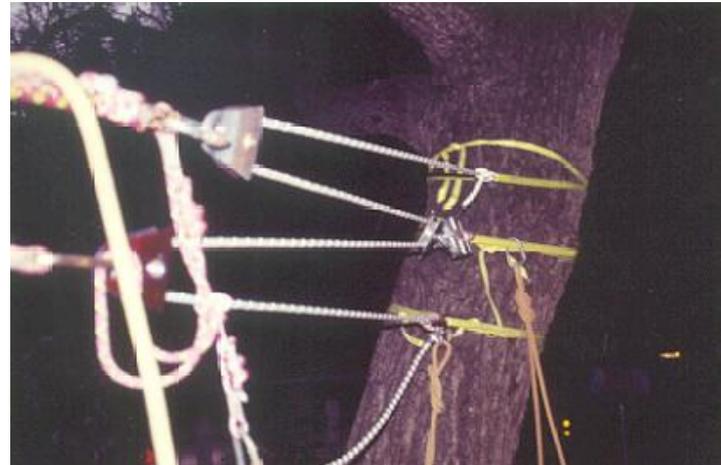
The key to any anchor system is to minimize movement (static) and when movement is needed, do so with a planned purpose in a highly controlled manner (dynamic).

Bombproof Anchor vs. Marginal Anchor Systems

What is a bombproof anchor and is there a number that we can attach to it? From the early history of rescue rigging, it was inferred that a 'bombproof' anchor was so strong that it would withstand a direct hit from a bomb. Also, it had to be agreed upon by the whole team that it is indeed BOMBPROOF...and then we all would be surprised when the *bombproof* tree would snap or the leaf springs of the *bombproof* axle of the fire truck would saw its way through the wrap 3/pull 2. The truth is...any anchor is only as 'bombproof' as we make it. When an anchor fails it is always due to human error.



Bombproof anchors continued...



Bombproof anchor construction might be the more appropriate phrase. The most critical aspect of a bombproof anchor is extremely high-quality rigging that pays attention to the smallest of details, makes no assumptions, and takes nothing for granted. In the final analysis, during a rescue we want our anchor system to be strong enough to support the predicted resultant force that it will see during the time of greatest stress during the operation. If we were to put a rating on our anchor selection it should be one that meets a realistic margin of safety of our intended load/resultant force. Example: For a 200kg load, we might want an anchor system capable of providing a 10:1 safety margin, or a 20kN rating. However, that same 200kg load may need to run through a directional pulley, either close to the ground or in the form of an artificial high directional (AHD). For this example, let's give our directional pulley a vector angle of 60° . That pulley and its associated anchor would then receive 173% of the load, or 346kg. Our directional anchor should probably be rigged with a 36kN pulley. With all physical factors considered, a 10:1 safety margin is a slippery target; the reality is that most of our rescue rigging is in the realm of a 6:1 or 7:1 safety margin.



Marginal Anchors



Marginal anchors are typically anything not considered bombproof. Collecting enough marginal anchors and make them into a usable, 100% reliable single collection point requires very advanced and experienced rigging skills in anchor construction. The best everyday practice should be, choose the point of the most advantageous location and make it bombproof by virtue of quality, low elongation back-ties connected to substantially strong anchor points that support the resultant force applied to the focused (forward) anchor.



Single Point Anchors

Single Point Anchors are typically rated to a minimum breaking strength of no less than 5000 lbs, or to a 10:1 safety margin for the intended load, whichever is the greatest. Conversely, multipoint anchor systems may be made up of a collection of multiple 'single point' marginal anchors when grouped together become a trustworthy anchor system. Anchors are the most critical component of any rope rescue system. The entire rescue is in jeopardy if the anchors are not reliable. Anchor systems are made up of two major elements; 1-choosing the best anchor (i.e. boulders, vehicles, trees, and bolts), and 2-rigging the anchor.

When dealing with structures, chose anchor points which are part of the inherent structure of the building. This includes columns, beams, anchors for window cleaning equipment, and elevator housings. Avoid corroded metal, weathered stonework, and deteriorated mortar. Avoid using vents, flashing, gutters, and chimneys.

Often a desirable anchor is off to the side of a needed direction of pull. Ideally, they should be directly above and close to the fall line. When this is not possible (which seems to be more times than not) advanced anchor rigging skills come into play, namely, focusing the direction of the main anchor to a viable position.



Engineered Rescue Anchors

As industrial rescue teams develop rescue plans, more engineered rescue anchors are being permanently installed. This action greatly enhances the safety and controlled speed of the rescue operation at previously determined rescue location.



Engineered Rescue Anchor

Anchor Straps

Anchor Straps and pre-stitched slings (including stitched prusik loops) come in a variety of shapes, sizes, and lengths. These rigging tools are commonly used by the fire/rescue service and general industry alike. Anchor straps promote rapid attachments with minimal rigging knowledge required.

Anchor straps are typically rigged with three basic configurations:

Inline – 100% of the manufacturer's rating. 

Choker – Approximately 60% to 70% of the manufacturer's rating. 

Basket – Approximately 200% of the manufacturer's rating. 



Wrap 3, Pull 2 Single Point Anchor

Based on the diameter of the anchor, select an appropriate length of webbing, wrap the webbing around the anchor 3 times, and tie an overhand follow through bend with its ends. Dress the wraps in a way that will position the bend on the first wrap and next to the anchor, pull the remaining two wraps and attach a carabiner. Attach the next link of the system to this carabiner.

Rope may be used in place of webbing. Be advised; when using rope tied around something like a boulder there is a tendency for the rope to roll up and over boulders that are tapered towards the top.



Tensionless Hitch

A Tensionless Hitch may be used when maximum strength of the rope is needed, i.e. highline operations.

The Tensionless Hitch is made by wrapping the line enough times around a bombproof anchor to take the tension off the knot on the last wrap.



Tie a Figure 8 Follow-through or a Bowline on the working end of the rope and connect this knot to the standing rope just in front of the first wrap. A Double-Overhand Noose also works well for this application. Avoid making the last wrap too loose. The knot at the end should have only enough tension on the standing part of the rope (usually a highline) to keep the last wrap secure. The knot is still not loaded, which is the goal of the Tensionless Hitch.

As a rule of thumb for the Tensionless Hitch, avoid using anchors that are less than 3 inches in diameter, anything smaller threatens to defeat the purpose of the hitch and introduces unwanted stress in the fibers of the rope.