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Climbing wall hydraulic cylinder failure

We have received details from a UK inspection body of an incident on a climbing wall attraction manufacturer by the US company Vertical Reality. The wall uses a hydraulic cylinder type belay system. The incident occurred when an adult man jumped from the wall approximately half way up. The shock of his weight on the belay system caused both the primary and secondary hydraulic cylinders to blow of their shaft seal retaining caps. This released any hydraulic pressure and allowed the man to almost free fall (there was still resistance from the pulley system) to the ground. The man sustained minor injuries to one ankle, was assessed by on-site first aid and was not sent to hospital.

There are a number of points to note in relation to this incident as follows:

- Operators should be aware that there is a maximum weight limit for these devices of 250lb (17.85 stone, 113.4Kg) (taken from the manual).
- Operators should carefully check the retaining cap every time they change the shaft seals and ensure they do not over tighten the cap screws as this could over stress or damage the cap.
- Daily checks of the hydraulic system may reveal leaking at the shafts. Operators should remember that this leaking may not be shaft seal wear but may be a sign of shaft seal cap failure.

Cast components are known to be brittle and whether this was the cause of this particular failure is unknown.



The image above shows the double cylinder set-up on the belay system and the two retaining caps secured by Alan key studs.



The above images show the two failed seal retaining caps. Both have had their bolting lugs sheared completely off.