



Maintenance and Safety Directive

Reference: Auto-Belay cable and hardware replacement schedule

Introduction:

Due to several unfortunate accidents in the climbing wall industry that have been caused by climbing cables (wire rope) and related hardware issues, Spectrum Sports Intl is issuing this M&SD to inform owners and operators of their responsibility to maintain cables and hardware for safety reasons. It should be noted that Spectrum Sports, Int'l. customers have not had a cable/hardware failure to this date; we want it to stay this way. *It should be noted that the issues/accidents have not been a fault of engineering and manufacturing, but have been a result of inadequate inspection and maintenance. It is absolutely necessary to do daily inspections and regular maintenance to prevent accidents!*

This Directive is being sent to each jurisdiction so that the jurisdiction inspectors will know the requirements for the inspection of cables and hardware and require that they be replaced per this Directive. This is for all Spectrum Sports Int'l. climbing walls, mobile and/or stationary models. It is also being sent to insurance providers so they will know what to expect of their customers.

Background:

Spectrum uses ¼ inch class 6 x 37 cables (wire rope) with a 4500 lb minimum rated static strength. With a 250 lb climber, the safety factor is 18. Quasi-static testing of the each spool of cable has given results of actual strength 4500 lbs to 6500 lbs and Impulse testing has given results of 3900 to 5000 lbs. The pulleys diameter provides a (D/d) of 23 which fall within the Wire Rope Corporation of America listed minimum (D/d) for 6 x 37 rope range of 20-26.

Even though the cable has a good safety factor and is within the accepted ranges, it is continually being flexed under load as it moves around the pulleys. The flexing causes fatigue in the wires that make up the cable. In addition, moisture and dirt are pulled into the cable bundles and center core of the cable. This contamination causes corrosion that reduces the life of the cable. As the cable is used it wears the wires so they become damaged. The fatigue, corrosion and wear make the cable a component that has a limited time life or in other words, the cable only lasts for a limited time. It must be inspected carefully on a regular basis and replaced a minimum annually, whether the cable looks bad or not.

Spectrum has cycle tested the cable and has found that the cable put on SSI products will cycle an average of over 40,000 climbs before any failure occurs. Giving it some safety factor, it should be replaced at 35,000 to 40,000 climbs. If you are doing a lot of climbs, then the cables should be replaced more often than the required 12 calendar months. The cable and hardware

should be replaced if the cable ever sees 40,000 climbs. **Safety should be the first consideration!**

It should also be noted that all cable is not manufactured to the same standard. It is not recommended that you run down to the local hardware store and buy whatever ¼ inch cable they carry. Spectrum buys a specific class of cable, tests each lot to assure that the cable meets engineering requirements stated on the cable manufactures Certificate of Conformance and then makes-up the cables to meet engineering requirements.

The ends of the cable are terminated with 2 each F6-Oval 1-1/4 zinc coated Copper swage sleeve connector using the correct swaging crimper and go-no-go gages. A critical inspection point is at the junction of the cable to the swaged sleeve.

The hardware associated with the cable – pulleys, pulley bolts, quick links, swivels, carabineers, bolts, pulley cart bearings, etc –are also subject to fatigue and wear and thus become time life components. Failure to do the inspection and replacement may result in a failure, which in turn results in injury or the death of a customer. **If we don't take care of safety, insurance will become so costly that no one will be able to afford climbing walls.**

Action:

Regardless of ownership we have taken steps to inform state inspectors, insurers and/or new or old operator/owners of any of our climbing wall products of the following mandated actions:

1. NEW SPECTRUM POLICY: A warning sticker will be placed upon each new Auto-Belay device that is installed on a wall or sold to a customer stating "IT IS MANDATORY THAT EACH CABLE IS REPLACED WITH A CERTIFIED SPECTRUM SPORTS CABLE EVERY 12 CALANDER MONTHS FROM DATE OF PURCHASE. REFER TO YOUR OWNERS MANUAL".
2. MAINTENANCE AND SAFETY DIRECTIVE: M&SD-1001: **Reference:** Auto-Belay cable and hardware replacement schedule has been developed and will be sent to all of SSI's customers/Spectrum wall owners along with 3 or 4 each of the warning stickers. The warning sticker shall be attached by the customer to the Auto-Belays in a prominent place as a reminder to wall owners to replace the cables and hardware.
3. REPLACEMENT PARTS: Cables will be serialized starting August 1, 2003 and will have a Serialized Certificate of Conformance accompanying each cable. This means that each cable on all customer owned Spectrum climbing walls will have Serial Number tags by August 1, 2004. Any wall after August 1, 2004 that does not have serialized cables will be in violation of Spectrum Safety requirements and should be taken out of service.
4. WALL OWNERS/OPERATORS SHALL DO ONE OF THE FOLLOWING:
 - a. NO MATTER THE AGE OF THE CABLE: The owner or operator should replace the cable (wire rope) if any of the following conditions are true:
 1. If any of the individual wires in a strand have a flat spot of more than ½ the diameter of the smallest wire.
 2. If there is a single broken wire in any strand.
 3. If there are 40,000 or more climbing cycles on a wall.
 4. If the cables have been on the wall for 12 calendar months.

5. If there are any twists, frays, or kinks.
 6. If there is any signs of corrosion on strands or individual wires.
 - b. WALLS LESS THAN 12 CALENDAR MONTHS OLD: Inspect the cables and hardware prior to each day's use of the wall. The inspection should include a careful visual inspection of the entire cable and hardware, and a physical inspection by wrapping a rag around the cable and sliding it full length of the cable in both directions to determine if a wire strand is broken. If any single wire strand is broken, the cables should be replaced before further use. **Record the inspection in the walls daily maintenance and safety log.** Change the cable and hardware with Spectrum Certified parts when the wall is 12 calendar months old.
 - c. CABLES HAVE BEEN CHANGED LESS THAN 12 CALENDAR MONTHS AGO: Inspect the cables and hardware prior to each day's use of the wall. The inspection should include a careful visual inspection of the entire cable and a physical inspection by wrapping a rag around the cable and sliding it full length of the cable in both directions to determine if a wire strand is broken. If any single wire strand is broken, the cables should be replaced before further use. **Record the inspection in the walls daily maintenance and safety log.** Change the cable and hardware with Spectrum Certified parts when the wall is 12 calendar months old.
 - d. CABLES HAVE BEEN IN SERVICE FOR 12 OR MORE CALENDAR MONTHS: The wall should be removed from service and the cables and hardware **shall** be replaced with Spectrum certified parts before any further use of the climbing walls. No exceptions! Use of cables and hardware after 12 calendar months is a violation of Spectrum's maintenance and safety standards.
 - e. CABLES THAT HAVE BEEN REPLACED WITH NON-APPROVED CABLE: The wall should be removed from service and the cables and hardware shall be replaced with Spectrum certified parts before any further use of the climbing wall. No exceptions! Use of cables and hardware after 12 calendar months is a violation of Spectrum's maintenance and safety standards. No exceptions!
 - f. WALLS THAT HAVE CONSISTENT HEAVY USAGE: If the wall has a lot of usage every day for most of the year, it will possibly go over 40,000 climbs in a year. Also, if the cables are exposed to high humidity (particularly close to a salty environment) they may experience excess corrosion and/or stress corrosion of the single wire strands. **Any sign of corrosion requires that the cables be replaced with Spectrum certified parts.** Safety is the key issue!
5. REPLACING OF PARTS: Customers may do their own work on their walls if they have the proper tools and equipment or they may have Spectrum trained and certified service personnel do the replacement and annual inspection. Authorized parts (serialized cables) and service should be ordered from Spectrum Sports Int'l.

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