

System Validation Testing Report – Ingress Protection Test, Upper AFO Assembly

Team: P15001: Active Ankle Foot Orthotic

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Related System: AB: Use AFO

The test is being completed to determine if AFO will meet our Ingress Protection requirements, as specified by our engineering requirements. Our Ingress Protection code (IP) is “54”. There are 2 components of the IP code; the first number is the solid object protection code, while the second number is the water protection code. This test was to verify our water component of the IP code. A 4 in the IP code indicated that the AFO must be protected against the “splashing of water”, by testing for water splashing against the enclosure from any direction having no harmful effect.

This IP test was completed specifically on the upper system of our AFO, which includes the backpack and everything included inside it. The backpack contains the waterproof box, which protects the electronics inside the backpack. Over a full day’s use, the AFO could see splashes of water contacting the AFO if it being worn outside, whether it is from rainwater or splashing from other sources. Most of the AFO is washable and therefore could withstand the splashing without any problem. The upper system must be tested against this water requirement because it contains electronic components, some of which that cannot contact water. This test is to verify the fact that the upper system was designed to meet these IP requirements, taking into account the waterproof tight box as well as the backpack.

Supplies:

- 1.) Upper Component of AFO
 - a. Upper Component Housing
 - b. Backpack
- 2.) Sink with tap water
- 3.) Paper towels
- 4.) Allen wrench

Setup:

The upper component of the AFO must be assembled, as required by the final prototype, to test to see if the final assembly meets our requirements. However, the upper component housing was not used. If

the test with just the backpack had failed, we would then repeat the test with the upper component housing present

Procedure(s):

Test:

1. Assemble Upper Component of AFO by zipping all zippers on the backpack
2. Turn on tap water with sink and hold UC near water stream
3. Perform splash test
 1. Run had through running water, splashing water toward UCH
 2. Be sure water is making contact with UC, especially on mating surfaces
 3. Continually rotate UC so all surfaces are contact
 4. Perform test for 2 minutes, fully covering UC
 5. MAKE SURE UC DOES NOT MAKE CONTACT WITH RUNNING STREAM OF WATER---- THIS IS BEYOND OUR INGRESS PROTECTION CODE AND ENGINEERING REQUIREMENTS



4. Dry UC outside surface with paper towels
5. Disassemble UC
6. Analyze inside of backpack, looking for water evidence

Results:

After analyzing the inside of the backpack it was found there was no evidence of water entry into the backpack. The backpack was splashed repeatedly for a minute, but no water had entered the backpack, either through the zippers or the material. Therefore, it was not necessary to repeat the test with the waterproof box that houses our electronic components.

Conclusion:

- a.) Our AFO, and specifically the upper component assembly, passed the waterproof test and meet our Ingress Protection Code requirements.