



The Vertical Flight  
Technical Society



## The AHS International

### Igor I. Sikorsky 24 Hour Hover Challenge



[www.vtol.org/challenge](http://www.vtol.org/challenge)

#Hover24

**Official Rules**

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# 1 Scope

The following are the rules for the American Helicopter Society (AHS) International Sikorsky 24 Hour Hover Challenge. The challenge is designed to stretch the efficiency and reliability of vertical flight aircraft by demonstrating 24 hours of continuous hovering flight.

## 1.1 Definitions

- 1.1.1 Aircraft: An Entrant's machine which is capable of supporting its weight exclusively through aerodynamic forces.
- 1.1.2 Aircraft Reference Point: A fixed location on the Aircraft, used to measure longitude, latitude and altitude data of the Aircraft, within 1m, relative to the Certified Reference Point.
- 1.1.3 Certified Ground Observer: An individual, or individuals, authorized by AHS International to observe the flight of an Aircraft and to collect data related to the performance of an Aircraft before, during and after a Prize Flight.
- 1.1.4 Certified Reference Point: The position of a sensor, on the ground, used to measure the position of the Aircraft Reference Point, during a prize flight.
- 1.1.5 Entrant: An individual or organization that has satisfied the eligibility and applications requirements, as approved by AHS International.
- 1.1.6 Controller: An individual associated with the Entrant who controls the system for transmitting flight commands or other system commands to the Aircraft.
- 1.1.7 Hover: A condition, where an aircraft maintains longitudinal position, latitudinal position and altitude with respect to a Hover Station, and is supported exclusively by aerodynamic forces.
- 1.1.8 Hover Station: A 20m radius sphere whose center location is measured with respect to the Certified Reference Point, as determined by the Certified Ground Observer prior to a Prize Flight.
- 1.1.9 Non-Productive Payload: An object or material that does not aid in the systems necessary for creating lift or control for the Aircraft, nor provide structure for the aircraft.
- 1.1.10 Out of Ground Effect Altitude: An Altitude that is defined as a distance at least 3.0 times the maximum dimension of the aircraft, measured from the Certified Reference Point to the Aircraft Reference Point.
- 1.1.11 Prize Flight: A period of time, during which the Entrant's aircraft is supported exclusively by aerodynamic forces, and observed by a Certified Ground Observer, in an attempt to satisfy the Flight Requirements of the Challenge.



## 2 Eligibility

- 2.1 The challenge is open to individuals and organizations capable of meeting the requirements of the application section.
- 2.2 Persons who have had membership in the AHS International 24 Hour Hover Challenge Committee and AHS International Technical Council are ineligible to compete.
- 2.3 Entrants cannot be accepted from Countries or persons prohibited by the United States Government.
- 2.4 Interpretation of eligibility of Entrants is at the sole discretion of the AHS International.



### **3 Application & Entrant Requirements**

- 3.1 The Entrant must submit to AHS International, no less than 120 days prior to a Prize Flight attempt, design and analysis documentation that substantiates the Aircraft's theoretical capability to satisfy all the rules, as well as a hazard analysis, ground operations plan and flight operations plan.
- 3.2 AHS International will seek to inform entrants of the application acceptance or rejection in no more than 60 days following receipt of an entrant application.
- 3.3 The Entrant must submit, to the AHS International office, an application form and fee of \$250 prior to each Prize Flight attempt period.
- 3.4 Entrants must submit to AHS International a proposed flight date and location for each Prize Flight attempt, with a maximum observation window of 7 days, no less than 60 days prior to the event. Entrants may make multiple attempts during observation window. The Entrant may reapply for a new flight date that is no less than 30 days from the last day of a previous attempt.
- 3.5 The Entrant must hold liability insurance in the amount of \$1,000,000 USD that also names AHS International and Sikorsky Aircraft Corporation as additional insureds. Evidence that such insurance is in effect must be submitted with the application for official observation.
- 3.6 Prize Flight attempt observation windows will be awarded based on the chronological order in which entrant applications and documentation are received.



## 4 Aircraft Requirements

- 4.1 The Aircraft shall carry, for the duration of the Prize Flight, a Non-Productive Payload having a mass of no less than 80 kg.
- 4.2 The Non-Productive Payload must be contained within a single, simple and continuous volume of space within the aircraft.
- 4.3 The Aircraft is prohibited from flying with a human pilot or passenger during a Prize Flight attempt.
- 4.4 During a Prize Flight, the Aircraft shall fly autonomously and/or receive commands from a Controller.
- 4.5 The Aircraft must have an airspeed sensor on the aircraft calibrated with a range of 0 to 20 m/s with an accuracy of less than 1 m/s.
- 4.6 The Aircraft must have a position sensor and live telemetry system for the position data, with latency of less than 1s and accuracy of less than 1m. The sensor position defines the Aircraft Reference point, and must be collocated with the Non-Productive Payload.
- 4.7 Energy, either chemical or electro-magnetic radiation, cannot be collected by the Aircraft from man-made sources separate from the aircraft except for the purpose of flight-control communication and aircraft position telemetry communication during a Prize Flight attempt.
  - 4.7.1 The Aircraft shall not trap gasses that have density lower than ambient air. All closed cavities of the Aircraft must be vented to the atmosphere.
- 4.8 No part of the machine shall be jettisoned during the flight including the rotor spin-up and takeoff.



## 5 Flight Requirements

- 5.1 Following takeoff, the Aircraft is required to Hover above Out of Ground Effect Altitude for a cumulative duration of 24 hours inside three separate Hover Stations, without landing.
  - 5.1.1 The duration of time spent in each Hover Station is measured with respect to the difference in time between the Aircraft Reference Point entering and exiting the Hover Station volume.
  - 5.1.2 Flight time during which wind speeds exceed 5 meters per second will not count towards cumulative Hover duration.
  - 5.1.3 Each Hover Station shall be at least 1 kilometers from every other Hover Station, as measured from their respective centroids.
- 5.2 The Aircraft's position while conducting Hover, during a Prize Flight, will be measured with respect to the Aircraft Reference Point. The Aircraft Reference Point shall be clearly identified in the Design Substantiation Requirements Document and verified by the Certified Ground Observer.
- 5.3 The Entrant must submit to an inspection of the Aircraft prior to and following each flight attempt.
- 5.4 Major deviations from the Ground Operations Plan and the Flight Operations Plan will disqualify a flight, which will be at the judgment of the Certified Ground Observer.



## 6 Evaluation of Entrant and Prize Flight

- 6.1 Interpretation of Eligibility, Application, Aircraft Requirements and Flight Requirements is at the sole discretion of AHS International.
- 6.2 AHS International reserves the right to amend the rules.
- 6.3 These rules shall remain in force until such time as AHS International considers it necessary to amend them, or the prize has been won.
- 6.4 A single Prize shall be awarded to the first Entrant whose Aircraft satisfies the Flight Requirements described in this document, as determined by the Technical Council of AHS International.
- 6.5 There will be only one “winner” of the Prize; there will be no “ties” and only one prize will be awarded.
- 6.6 AHS International will make its selection based upon the evidence gathered by the Certified Ground Observer.



## **7 Limitation of Liability; Indemnification**

- 7.1 Neither AHS International nor Sikorsky Aircraft Corporation (which for purposes of this Section 7 shall be deemed to include its parent, Lockheed Martin Corporation) shall be liable to Entrant for losses, expenses, injuries, or damages arising out of or related to the challenge or Entrant's participation in the challenge due to any act or omission of AHS International, Sikorsky Aircraft Corporation, or their respective employees or agents, or any third person, whether based on breach of contract or warranty, negligence or other tort, or strict liability, unless directly and solely caused by the gross negligence or willful misconduct of AHS International or Sikorsky Aircraft Corporation. AHS International and Sikorsky Aircraft Corporation each disclaim all warranties, express or implied, related to the challenge.
- 7.2 Neither AHS International nor Sikorsky Aircraft Corporation shall be liable to Entrant for any indirect, special or consequential damages, including lost profits.
- 7.3 Notwithstanding any other provision of these Rules, the maximum liability of AHS International or Sikorsky Aircraft Corporation to Entrant will not exceed \$5,000; recovery of such amount shall be the Entrant's sole and exclusive legal remedy. Any claim against AHS International or Sikorsky Aircraft Corporation by Entrant not submitted to, as applicable, AHS International or Sikorsky Aircraft Corporation within thirty (30) days of the close of the challenge shall be forever waived, and no suit or action shall be brought against AHS International or Sikorsky Aircraft Corporation more than one (1) year after the challenge.
- 7.4 Entrant shall indemnify and hold harmless AHS International, Sikorsky Aircraft Corporation and their respective officers, directors, agents and employees from and against any and all liabilities, damages, actions, losses, claims, costs, and expenses (including reasonable attorney's fees) on account of personal injury, death, or damage to or loss of property arising out of or contributed to by any act, omission, negligence, fault, or violation of a law or ordinance by Entrant, its employees, agents, contractors, members, exhibitors, patrons, or invitees. The foregoing shall not apply with respect to any liability, damage, or loss directly and solely caused by the gross negligence or willful misconduct of the entity or person seeking indemnification.



## 8 Award of Prize

- 8.1 The winner shall be awarded a cash prize of \$50,000 USD following the final determination of the flight evaluation.
- 8.2 Any taxes owed by the winner as a result of receipt of the cash prize shall be the responsibility of the winner.