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Aircrew Training Manual

Pilot certification is contingent on maintaining a current 14 CFR part 107 certification and Office of Indiana State Chemist category 11 certification. In addition to the certification requirements of continuing education for part 107 and category 11, and annual training hosted by the chief supervisor shall be attended to ensure current knowledge of rules, regulations, and operating procedures.

The pilot should be proficient in the topics listed below. Materials to help study the topics include FAA parts 107 and 137 rules and regulations, part 107 study guide, Office of Indiana State Chemist category 11 study guide, and specifications and flight manual of the unmanned aerial system the pilot is being certified with.

The following are topics in which the pilot's knowledge will be tested through written examination.

- Density Altitude
  - Effects of pressure on Density.
  - Effects of Temperature on Density.
  - Effects of Humidity on Density.
- Performance
  - Primary Factors: Takeoff and landing distance, rate of climb, ceiling, payload, range, speed, maneuverability, stability, and fuel economy.
  - Climb performance: Change in aircraft's weight produces twofold effect on climb performance.
- Measurement of Atmosphere pressure
  - Units of measurement.
  - Effects on weather of rising pressure and decreasing pressure.
- Effect of obstructions on wind
  - Ground topography and obstructions that affect flow of wind.
  - Intensity of turbulence and the effect of the aircraft performance.
- Low-Level Wind Shear
  - Microbursts effect of flight and detection.
  - Wind shear can affect flight at any altitude and can be undetected and a silent danger.
- Atmospheric stability
  - The factors that contribute to the stability of the atmosphere and impacts of instable/stable atmosphere
  - Inversion- Conditions and timing when when inversions are most likely to occur and the effects of an inversion on an aircraft.
- Temperature/Dew point Relationship
  - Methods by which air reaches the saturation point.
  - Dew and Frost- Weather conditions that cause dew and frost and potential effects on an aircraft.

- Clouds
    - Unstable/Stable Air and the associated clouds that form under each condition.
- Fronts
    - Weather conditions can rapidly change as the zone between the air masses move through a region.
- Ceiling
    - Lowest layer of clouds reported as being broken or overcast or vertical visibility into an obscuration like fog or haze.
    - Reports that provide routine observations of ceiling information (METAR).
- Visibility
    - Greatest horizontal distance at which prominent objects can be viewed with the naked eye.
    - Reports that provide routine observations of ceiling information (METAR).
- Weight
    - Center of Gravity
    - Weight and lift relationship
    - Performance effects on an aircraft when center of gravity and weight changes.
- Stability
    - Maneuverability- Governed by the aircraft's weight, inertia, size and location of flight controls, structural strength, and powerplant.
    - Controllability- capability of an aircraft to respond to the pilot's control.
- Load Factors
    - It is possible for a pilot to impose a dangerous overload on the aircraft structures.
    - An increased load factor increases the stalling speed and makes stalls possible at seemingly safe flight speeds.
    - Understand how load factors are affected in steep turns.
    - Understand how load factors are affected causing stalling speeds.
- Weight Balance
    - Effects of Weight- Lower maximum altitude, shorter range, reduced maneuverability, ect.
- Steps to taken before starting operations
    - Survey of the area to be work.
    - Potential takeoff and landing sites.
    - Risk mitigation techniques.
- Safe handling of economic poisons and proper disposal of used containers for those poisons.
    - Restricted-entry interval (REI).
    - Personal Protective Equipment (PPE).
    - Triple rinse procedures.
    - Location of pesticide information such as active ingredients, usages rates, ect.
- General effects of economic poisons and agricultural chemicals on plants, animals, and person, with emphasis on those normally used in the areas of intended operations.
    - Target pest of pesticide groups such as fungicides, insecticides, and herbicides.
    - General toxicity level of fungicides, insecticides, and herbicides to humans, animals, and plants compared to target pest

- Symptoms of poisoning of persons from economic poisons, the appropriate emergency measures to be taken.
    - Acute and Chronic pesticide exposure signs and symptoms.
    - Location of emergency information for spills and exposures.
- Performance capabilities and limitations of the aircraft being tested.
    - Maximum payload weight.
    - Maximum speed.
    - Maximum tolerable wind speed.

The following are topics in which the pilot's knowledge and skill will be tested orally and in practice.

Preflight preparation/procedures-

- The pilot will need to demonstrate the ability to conduct preflight procedures to prepare for the operation including team meetings, aircraft inspection, and request of necessary authorizations.
- The pilot will need to demonstrate the ability to survey the area of application and identify potential hazards and risk mitigation techniques.

Crew Resource management

- The pilot will need to demonstrate the ability to use crew resource management to effectively communicate the roles and expectations for the team members.

Takeoffs and landings

- The pilot will need to demonstrate the ability to safely and smoothly take-off and land using both manual and autonomous flight modes. Takeoffs and landings should be demonstrated with and without a payload.

Hovering maneuvers

- The pilot will need to demonstrate the ability to turn the front of the aircraft (rotor) to the left and to the right while maintaining position over a reference point while maintaining a constant altitude and rate of turn.

Performance maneuvers

- The pilot will need to demonstrate the ability to change altitude, speed, and direction while flying in both manual and autonomous modes. Performance maneuvers will need to be demonstrated with and without a payload.

Navigation

- The pilot will need to demonstrate the ability to identify where the aircraft is at all times during an operation and the ability to return the aircraft to the landing site while avoiding any obstacles that may be in the operational area.

Emergency operations

- The pilot will need to demonstrate the aircraft response when a loss of signal from the remote to the aircraft occurs.
- The pilot will need to demonstrate the ability to safely land the aircraft during an operation if an emergency occurs during flight.
- The pilot also needs to describe the appropriate response to a pesticide or chemical exposure that could occur during an operation.

Postflight procedures

- The pilot will need to demonstrate the ability to complete the necessary post-flight procedures such as daily maintenance and record keeping.
- Pilot should complete the necessary inspection and maintenance in accordance to the T30 Maintenance log.
- Pilot should fill out the required documents that record application information required by state and local laws.