



AMTEC
Agricultural Machinery Testing and Evaluation Center
1977

ACR 079:2024 CHECKLIST AND REMINDERS FOR THE AMTEC TEST CONDITIONS AND REQUIREMENTS FOR MULTI-ROTOR REMOTELY PILOTED AIRCRAFT (RPA)-POWERED SPRAYER

■ Application for AMTEC Test

The test applicant shall submit AMTEC-OP-F01 (Agricultural Machinery Test Application Form) together with the following requirements:

- AMTEC-OP-16 (Waiver for Machine Specifications)
- AMTEC-OP-18 (Data Privacy Consent Form)

■ Technical Specifications of the Machine

The test applicant shall submit any document/s indicating the specifications and other relevant information of the machine upon application for testing.

- Operator's manual with complete specifications as indicated in Annex B of PNS/BAFS 361:2023.
- Brochure
- Machine specifications sheet (shall be filled out upon request and receipt of copy from AMTEC in case the manual or brochure is not available)

■ Preparation and Operation of the Machine

During field performance test, the multi-rotor RPA-powered sprayer shall be ready for operation. The officially designated representative/skilled operator of the test applicant shall operate, demonstrate, adjust, repair, and decide on matters related to the operation of the machine. The operator shall be skilled and licensed in operating a multi-rotor RPA-powered sprayer.

■ Running-in of the Machine

A test run shall be conducted prior to the official test to check its condition and make necessary adjustments to the machine according to the recommendation of the test applicant and/or manufacturer. No other adjustments shall be permitted while the official test is on-going.

■ Test Site Condition

The following are the general considerations for the test site conditions:

- The test should be conducted in an area with permissible wind velocity as specified by the manufacturer in order to clearly observed the machine.
- The test shall be conducted during daytime.
- The maximum allowable wind speed shall conform to the manufacturer's recommendation. If there are no manufacturer's recommendations, then the maximum allowable wind speed shall not be more than 5 m/s.

■ Test Plot

The test applicant shall prepare at least two (2) test plots. Each test plot shall be:

- At least 5000 m² with length not less than 100 m; and
- Rectangular with sides in the ratio of 2:1 as much as possible.
- Shall be free flat and free of obstructions, such as trees, buildings, and other structures, that may hamper the flight path.

■ Other Test Necessities

The following shall also be adequately supplied during the conduct of the field performance test:

- Fully-charged battery pack;
- Fully-charged replacement battery packs after each test trial;
- Sufficient liquid test material for filling in the tank and for refilling;
- Tools for machine repair and adjustments; and
- Weighing scale with at least 100 kg capacity or graduated cylinder with at least 1000 mL capacity.



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Machine Setting

The multi-rotor RPA-powered sprayer shall be tested at the manufacturer's recommended setting for the following:

- Altitude of drone, m: _____
- Application rate, L/ha: _____
- Discharge rate, L/min: _____
- Traveling speed, m/s: _____

Recommended Travel Pattern

The test applicant shall decide on the recommended pattern of travel.

Requirements

AMTEC shall conduct various tests and verification on different parameters of the machine including the following requirements as per PNS/BAFS 360:2023.

Fabrication Requirements

Item	Requirement as per PNS/BAFS 360:2023
General	<input type="checkbox"/> The sprayer should be designed to withstand extreme weather conditions (e.g. intolerable wind condition, hot season, etc.). <input type="checkbox"/> The sprayer shall be provided with remote control equipped with safety feature in case of unintentional shutdown or malfunction. <input type="checkbox"/> The sprayer should be powered either by a rechargeable battery or by petrol enough to supply the flight time specified by the manufacturer. Extra batteries should be provided, as necessary. <input type="checkbox"/> The rated take-off weight specified shall be attained. <input type="checkbox"/> There shall be a provision for nozzle calibration of the sprayer. <input type="checkbox"/> There shall be a provision for nozzle calibration of the sprayer. <input type="checkbox"/> The sprayer shall be provided with safety features such as landing pads.
Spray tank	<input type="checkbox"/> The spray tank, including all parts, should be generally made of non-corrosive light materials. <input type="checkbox"/> Total volume shall be at least 5% greater than the tank nominal volume
Nozzles and atomizers	<input type="checkbox"/> Shall be properly installed to avoid disengagement during operation <input type="checkbox"/> Shall be secured at a fixed position and provided with a fast-acting anti-drip device
Bolts, nuts, screws, bearings, bushings, and seals	<input type="checkbox"/> Should conform to PAES 311:2001 (Engineering materials – Bolts and nuts for agricultural machines – Specifications and applications) or other international standards
Avionics	<input type="checkbox"/> Should be provided applicable to the design of the RPA
Nickel or lithium batteries	<input type="checkbox"/> Should conform to the PNS IEC 62133 (Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications) series
Others	<input type="checkbox"/> There shall be a provision for an empty-tank or low-battery indicators. An automatic return-to-home (RTH) mechanism shall be provided. <input type="checkbox"/> The RPA shall have a built-in Global Navigation Satellite System (GNSS) (e.g., Global Positioning System [GPS], GLONASS, etc.) or other navigation and positioning system. <input type="checkbox"/> Communication lights shall be provided (e.g., signal lights and blinkers) <input type="checkbox"/> A minimum of IP58 (splash proof) rating should be used as per PNS IEC 60529:2017 (Degrees of protection provided by enclosures [IP Code]).



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■ Performance Requirements																												
Criteria	Requirement as per PNS/BAFS 360:2023																											
General	Shall have no major breakdown or malfunctions (e.g. failure of components, etc.)																											
Field capacity, ha/h	As per manufacturer's specification																											
Flight time, s	As per manufacturer's specification																											
Discharge rate, L/min	As per manufacturer's specification																											
Field application rate, L/ha	As per manufacturer's specification																											
Frame	Shall be able to withstand its load without any noticeable cracks																											
Droplet classification	<p>Shall attain a droplet classification as described in Table 1. If not specified, the droplet classification with corresponding volume median diameter (VMD) should be Medium</p> <p>Table 1. Droplet size classification (American Society of Agricultural and Biological Engineers [ASABE], 2020).</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>VMD, μm</th> <th>Droplet classification</th> <th>Use</th> </tr> </thead> <tbody> <tr> <td><60</td> <td>Extremely fine</td> <td>-</td> </tr> <tr> <td>61-105</td> <td>Very fine</td> <td>-</td> </tr> <tr> <td>106-235</td> <td>Fine</td> <td>Good cover</td> </tr> <tr> <td>236-340</td> <td>Medium</td> <td>Most products</td> </tr> <tr> <td>341-403</td> <td>Coarse</td> <td>Systemic herbicides</td> </tr> <tr> <td>404-502</td> <td>Very coarse</td> <td>Soil herbicides</td> </tr> <tr> <td>503-665</td> <td>Extremely coarse</td> <td>Liquid fertilizer</td> </tr> <tr> <td>>665</td> <td>Ultra coarse</td> <td>Liquid fertilizer</td> </tr> </tbody> </table>	VMD, μm	Droplet classification	Use	<60	Extremely fine	-	61-105	Very fine	-	106-235	Fine	Good cover	236-340	Medium	Most products	341-403	Coarse	Systemic herbicides	404-502	Very coarse	Soil herbicides	503-665	Extremely coarse	Liquid fertilizer	>665	Ultra coarse	Liquid fertilizer
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■ Safety, Workmanship and Finish																												
Item	Requirement as per PNS/BAFS 360:2023																											
General	<ul style="list-style-type: none"> <input type="checkbox"/> The RPA-powered sprayer shall be free from any manufacturing defects that may be detrimental to its operation. <input type="checkbox"/> Any uncoated metallic surfaces should be free from rust upon inspection. <input type="checkbox"/> The RPA-powered sprayer shall be free from sharp edges and surfaces, except for the rotor blades, that may injure the pilot during the operation. <input type="checkbox"/> Warning notices shall be provided in accordance with PNS/BAFS 330:2022 (Technical means for ensuring safety – Guidelines). <input type="checkbox"/> Standard parts and components for the same brand and model should be maintained. <input type="checkbox"/> There shall be provision for access to parts during repair, maintenance, and operation. <input type="checkbox"/> All wiring terminals for power devices (e.g., switch, automatic pressure regulator, etc.) shall be properly insulated so that it may prevent short-circuit and corrosion. <input type="checkbox"/> Sprayer tank should be emptied after use for safety purposes. 																											
Personal Protective Equipment (PPE)	<input type="checkbox"/> Shall be provided in accordance with Rule 1080 of Occupational safety and health standards of Occupational Safety and Health Center (OSHC) – Department of Labor and Employment (DOLE)																											



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■ Safety, Workmanship and Finish																					
Item	Requirement as per PNS/BAFS 360:2023																				
Noise Level	<p><input type="checkbox"/> The noise level shall conform to Rule 1074.01 to 1074.03 of Occupational safety and health standards of OSHC-DOLE, as shown in Annex A (Occupational safety and health standard [Rule 1074.01– 1074.03]):</p> <p>Table A.1. Permissible noise exposure (OSHC-DOLE, 2020)</p> <table border="1"> <thead> <tr> <th>Duration per day, h</th> <th>Sound levels (slow response), dB(A)</th> </tr> </thead> <tbody> <tr><td>8</td><td>90</td></tr> <tr><td>6</td><td>92</td></tr> <tr><td>4</td><td>95</td></tr> <tr><td>3</td><td>97</td></tr> <tr><td>2</td><td>100</td></tr> <tr><td>1½</td><td>102</td></tr> <tr><td>1</td><td>105</td></tr> <tr><td>½</td><td>110</td></tr> <tr><td>¼</td><td>115</td></tr> </tbody> </table> <p><input type="checkbox"/> There shall be earmuffs or other ear protective devices provided for the pilot or controller to use when the noise level exceeds 92 dB(A) during a six-hour operation.</p>	Duration per day, h	Sound levels (slow response), dB(A)	8	90	6	92	4	95	3	97	2	100	1½	102	1	105	½	110	¼	115
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Battery	<p><input type="checkbox"/> The battery shall have the following protective measures as specified in ISO 21384-2:2021 (UAS — Part 2: UAS components).</p> <p><input type="checkbox"/> Installation shall be able to firmly support the applicable inertial loads.</p> <p><input type="checkbox"/> The battery shall automatically cease to charge if any of the protection fails to perform its function provided as follows:</p> <ol style="list-style-type: none"> Protection for high and low voltages; Overcharge control; Protection for overheating; and Alert or warning mechanism for fault and abnormal situations <p><input type="checkbox"/> In case of damage caused by shock, drop, impact, exposure to moisture or short circuit, the battery shall be treated in accordance to ISO 21384-2:2021 (UAS — Part 2: UAS components).</p>																				
<p>■ Suspension and Termination of Test</p> <p>If the test site conditions and test plot do not conform with the recommended quantity and characteristics, AMTEC shall not proceed with the test. Should the test applicant request the conduct of the test despite the non-conformity to the test requirements identified by AMTEC, the applicant shall sign the AMTEC Waiver for Nonconformity to Test Requirements.</p> <p><input type="checkbox"/> AMTEC-OP-F24 (Waiver for Nonconformity to Test Requirements)</p> <p>If the machine stops due to breakdown or malfunction during the test run, thus affecting the machine's performance, or if there are any presence of extreme weather factors (i.e. strong wind velocity), the test shall be suspended. If the machine cannot continue the operation, the test shall be consequently terminated.</p>																					



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■ Other Assistance During Test

1. For field and laboratory tests outside the AMTEC premises, the applicant shall shoulder the transportation expenses (i.e. fuel, toll fees, vehicle rental, plane fare, sea fare, etc.) of the AMTEC Staff assigned for the testing activity.
2. The applicant is requested to assist the AMTEC Staff in looking and/or making arrangements for hotel accommodation and food near the test site.
3. The applicant shall provide drinking water to the AMTEC Staff during the testing activity.
4. The applicant shall provide any form of shed or sunshade (e.g. tent, umbrella, etc.) for the test equipment, samples (if applicable) and AMTEC Staff during the testing activity in the field.
5. The applicant is requested to assist the AMTEC Staff in finding any means to access a safe and convenient restroom near the test site during the testing activity.

■ Testing Fee

1. The testing fee for multi-rotor RPA-powered sprayer is PhP 13,000.
2. To proceed with the AMTEC test, the test applicant shall settle at least 50 % of the testing fee which is non-refundable but transferrable.
3. In cases of additional testing during the field, the test applicant shall immediately submit the required documents and settle at least 50% of the testing fee within 5 working days after the testing proper.
 Additional testing, number of machines: _____
4. Payment/s shall be directed to the following:
 Through UPLB Cashier's Office (8AM to 12PM): AMTEC Trust Fund Code No. 8271632-40A2040101000
 Through Landbank (8:30AM to 3PM): UPLB Trust Fund Account No. 1892100507 or UPLB FI Account No. 1892-1003-29

■ Other Reminders

1. All manufacturers, fabricators, assemblers, and importers (MFAI) shall secure a Certificate of Conformity (CC) from the Bureau of Agricultural and Fisheries Engineering (BAFE) which guarantees that their agricultural and fisheries machinery conforms with PNS/BAFS PABES or other relevant standards identified by BAFE. More information about the application for CC can be found at <http://bafe.da.gov.ph/index.php/certificate-of-conformity-of-manufacturers-fabricators-assemblers-distributors-dealers-importers-and-exporters/>.
2. All MFAI shall employ an Agricultural and Biosystems Engineer (ABE), as mandated by RA 10915 (ABE Law), who shall facilitate all activities and concerns pertinent to AMTEC testing and BAFE requirements. Do you currently have an ABE in your roster of employees? Yes No