

Team E: Standards and Regulations

IEC 60529 and eCFR Title 7 Subtitle B Chapter I Subchapter M Part 205 Subpart 206

eCFR Title 7 Subtitle B Chapter I Subchapter M Part 205 Subpart 206

eCFR - Electronic Code of Federal Regulations

Title 7 - Agriculture

Subtitle B - Regulations of the Department of Agriculture

Chapter I - Standards, Inspections, Marketing Practices

Subchapter M - Organic Foods Production Act Provisions

Part 205 - National Organic Program

Subpart 206 - Crop Pest, Weed, and Disease Management Practice Standard

Part 205 Overview

205.201 Organic System Plan

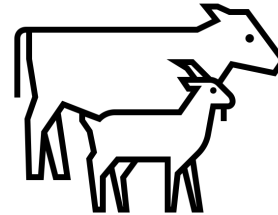


205.202-207 Organic Produce and Crops

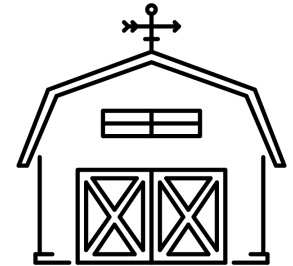


205.206 - Pest, Disease, and Crop Management

205.236-240 Livestock



205.270-300 Facility and Handling



205.206 Crop Pest, Weed, and Disease Management Practice Standard

This applies to:

- Farmers
- Farm Suppliers

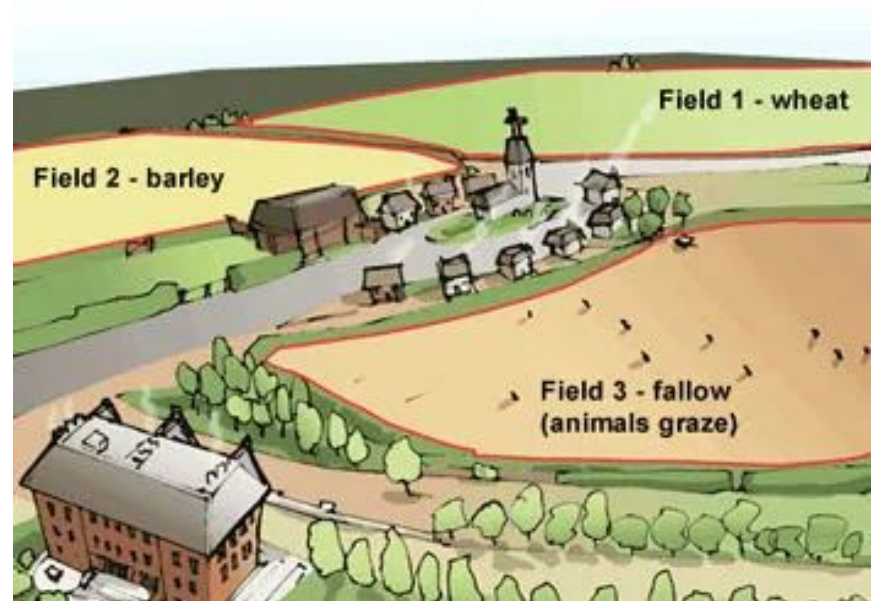
Why:

- “Certified Organic”
- Eligibility for organic farming subsidies



Prescriptions

- Required of Management: Fallow cycling, sanitation practices, responsible decision making
- Provisions for certain synthetic materials
 - National List of synthetic substances
- Prohibition of future nearby construction using specific lumber preservatives



Pest, Weed, and Disease Control

- **Allowed for Pest Control:** Nonsynthetic lures/traps, Habitation for/introduction of pests' enemies
- **Allowed for Weed Control:** specific mulches, livestock grazing, mowing/cultivation, fire/electrical removal
- **Allowed for Disease Control:** Mitigation practices, biological/botanical/mineral inputs



How it applies to Wholesome Robotics

Documentation

- The robot's use would need to appear in the Organic System Plan

Materials

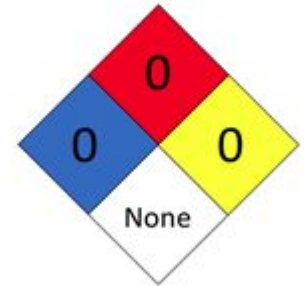
- No hazardous materials on the Robotanist
- No interaction/runoff from synthetic materials

Weeding

- Electronic and mechanical end effectors are organic

Pest and Disease control

- Mitigation is a desirable strategy



International IEC 60529 – Ingress Protection

What is IEC 60529 - Ingress Protection

IP Ratings

IP

Ingress Protection
Marking

6 **5**

SOLID **WATER**
Protection Protection



Motivation

Provide users with more detailed information than vague marketing terms

“Waterproof Phone”



iPhone XR
IP67

iPhone XS
IP68

“Water-resistant Phone”



Quechua 5
IP54

Applicable for all commercial products



These are code letters signifying an Ingress Protection Rating



First Digit:
Level of protection from solid objects

Second Digit:
Level of protection from water

0		Not Protected
1		Protected against solid objects greater than 50mm
2		Protected against solid objects greater than 12.5mm
3		Protected against solid objects greater than 2.5mm
4		Protected against solid objects greater than 1mm
5		Protected against dust
6		Dust tight

0		Not Protected
1		Protected against vertically dripping water
2		Protected against dripping water when tilted 15°
3		Protected against spraying water
4		Protected against splashing water
5		Protected against jetting water
6		Protected against powerful jetting water
7		Protected against temporary immersion in water
8		Protected against continuous

Reading an IP Rating

IP54: Protected against Dust

Protected against Splashing Water





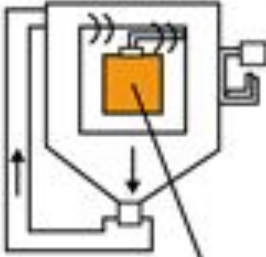
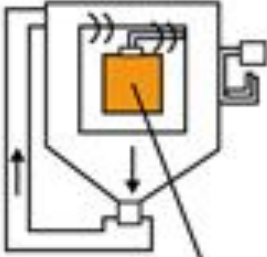
IP6X: Dust Tight

~~No protection against Water~~ ← Water Resistance not assigned

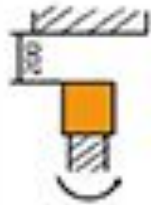



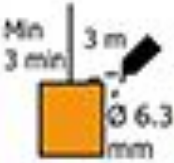
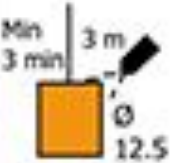
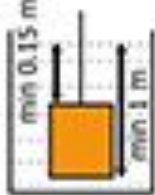
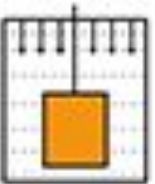

X designation shouldn't be automatically misconstrued as a lack of protection.

Note: The ratings for water ingress are not cumulative beyond IPX6.

Testing Method: Protection from Solids

0	1	2	3	4	5	6
Non protected	50 N sphere Ø 50 mm	10/30 N "Test finger"/sphere 12,5 mm	3 N rod Ø 2,5 mm	1 N wire Ø 1 mm	Dust protected	Dust tight, same test as 5
	 <p>Sphere Ø 50 mm</p>		 <p>Ø 2,5 mm</p>	 <p>Ø 1 mm</p>	 <p>Max depression: 20 mbar Max extraction rate: 60 x volume/hour</p>	 <p>Max depression: 20 mbar Max extraction rate: 60 x volume/hour</p>

Testing Method: Protection from Water

0	1	2	3	4	5	6	7	8	9
Non protected	Water drop protected	Water drop protected, indication max 15°	Spraying water protected	Splashing water protected	Water jets protected	Powerful water jets protected	Water immersion protected	Continuous water immersion protected	Pressure washer
									

Extension: IP69K

High-pressure, High-temperature wash-down applications.

Test:

Sprayed Water

Temperature 80 °C

Pressure 8–10 MPa

Application:

Road vehicles, Food industry and Car wash Centers etc.



Motors used in Food Industry

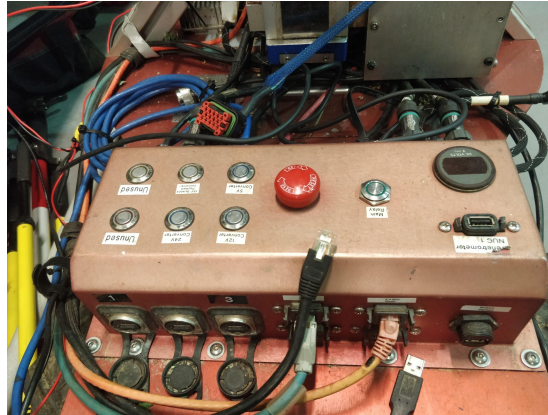
How it applies to Wholesome Robotics



Water droplets on Plants



Water logging in the field



Methods implemented for Protection from Water

Questions?