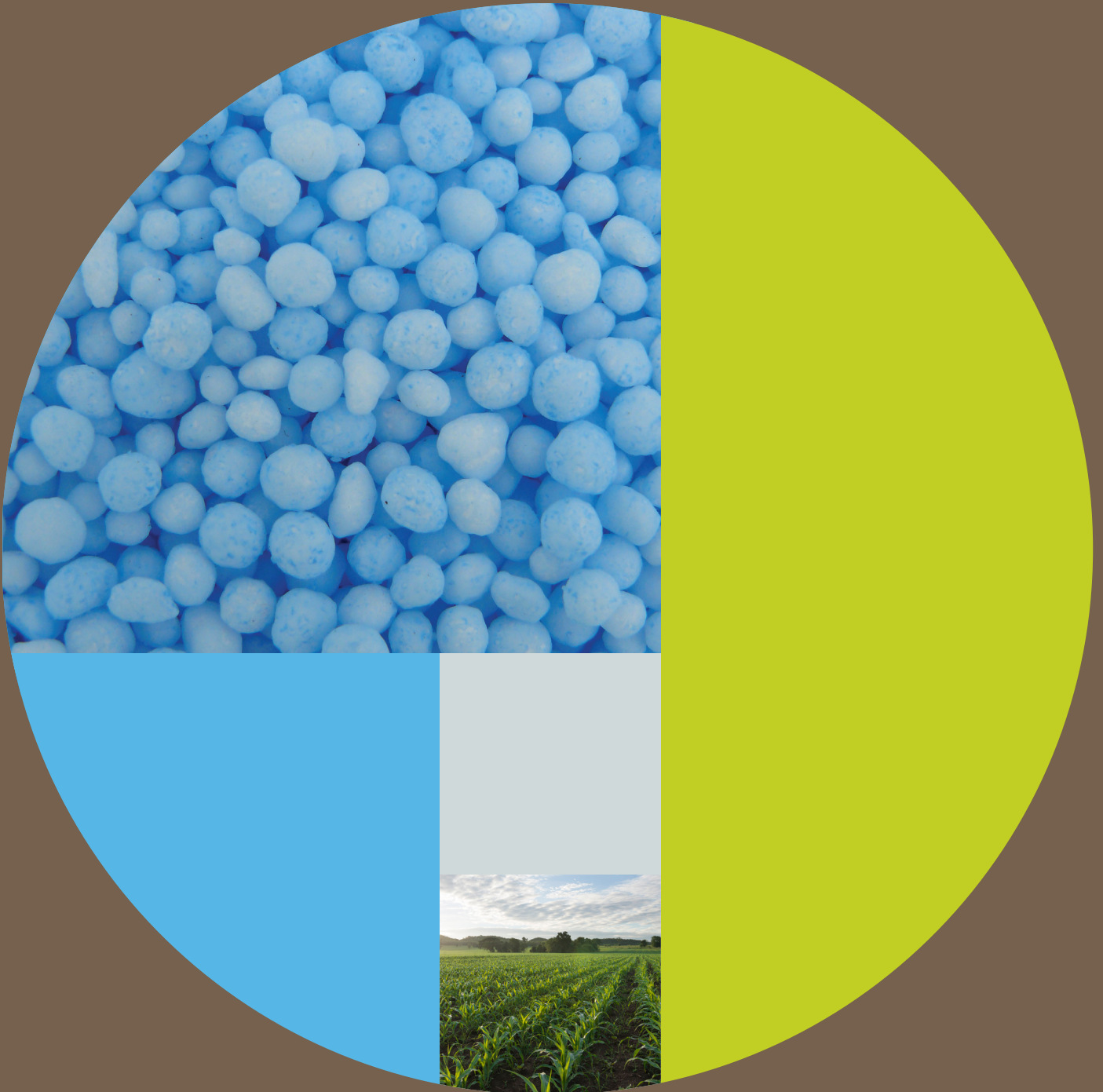




Knowledge grows

PROCOTE™ Manual





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PROCOTE™ is the product brand for all Yara fertilizer coatings.

The YaraVita® PROCOTE™ portfolio features fertilizer coatings with only micronutrients.

YaraAmplix™ PROCOTE™ portfolio features fertilizer coating containing biological products or a mix of biological products with micronutrients.

Procote Product Safety

Procote products are safe to handle, but as with all products, certain safety precautions should be taken

PPE Required



Eye Protection



Impervious Gloves



Clothing Protection



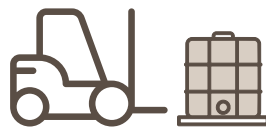
Dust Mask*

*Dust mask recommended when handling Procote B or BCMZ

Safety Tips



Do not stack Procote totes more than 2 high

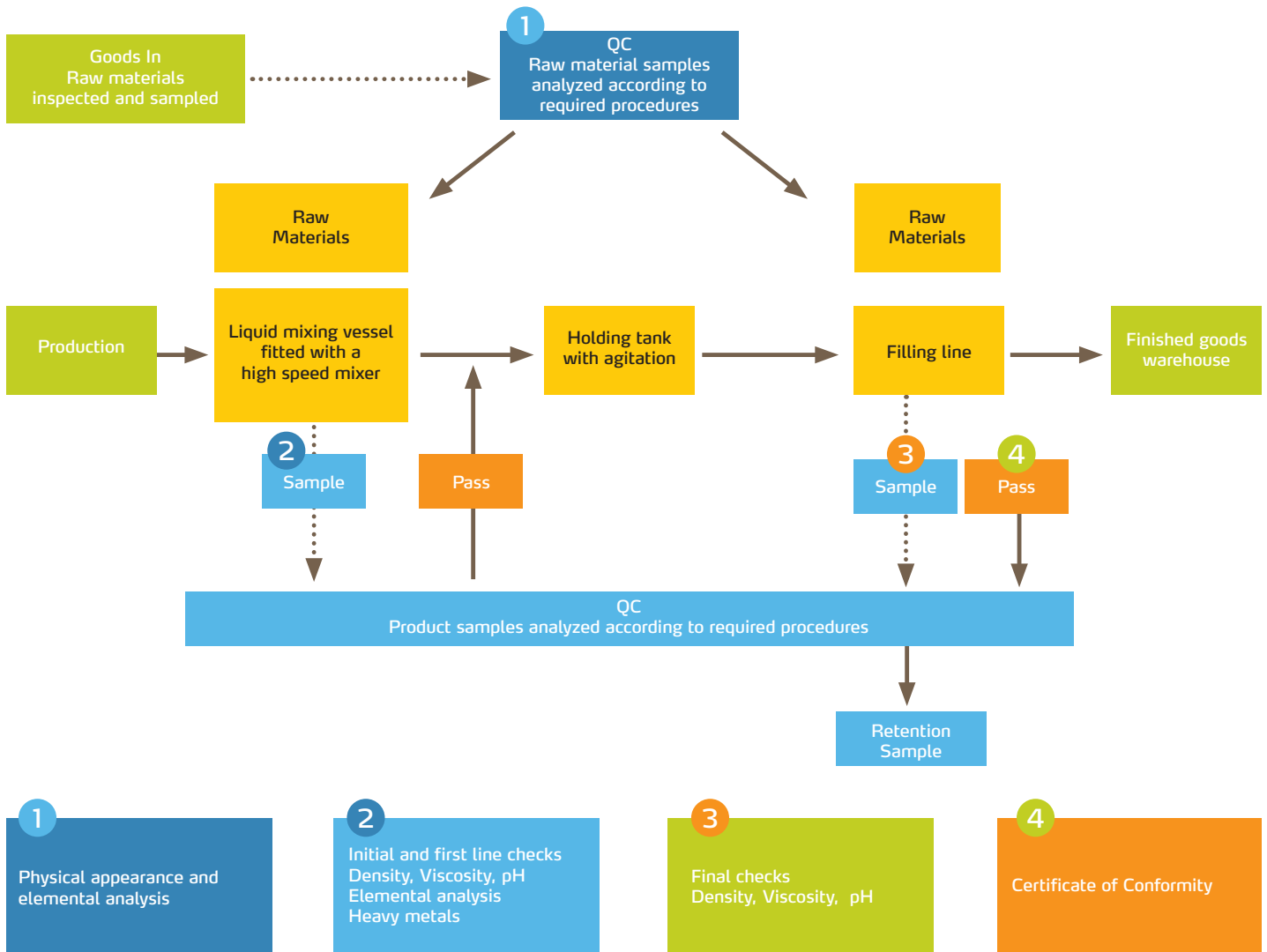


Use proper equipment and lifting techniques when moving and storing product

SDS sheets are available on Yara's website
Please visit [YaraCanada.ca](https://www.YaraCanada.ca) or [Yara.us](https://www.Yara.us)

Procote Quality Control Process

Yara takes great pride in the production and quality control of our product line. All Procote products go through multiple quality checks and standards during the production process.



Product Specifications Table

Product	Nutrient	% w/w	Viscosity Range (cPs at 68°F)	Product Base	Weight Lb/Gal	Weight Kg/L	Color
YaraAmplix™ PROCOTE™ OPTIMIZE	Biostimulant	Humic and Fulvic Substances	100-400	Solvent	9.90	1.19	Black
YaraVita™ PROCOTE™ B	B	7.10	1800-3000	Canola Oil	11.80	1.42	Light blue
YaraVita™ PROCOTE™ BCMZ	B Cu Mn Zn	3.60 6.00 6.00 12.00	4500-5500	Canola Oil	13.92	1.67	Brown
YaraVita™ PROCOTE™ BMZ	B Mn Zn	3.80 6.30 12.70	4500-5500	Canola Oil	13.40	1.58	Light blue
YaraVita™ PROCOTE™ Cu	Cu	32.84	3500-4500	Canola Oil	12.71	1.59	Brown/ Red
YaraVita™ PROCOTE™ Fe	Fe	2.75	2000-3500	Solvent	11.00	1.32	Brown/ Red
YaraVita™ PROCOTE™ Mn	Mn	29.00	5000-6000	Canola Oil	14.40	1.73	Light blue
YaraVita™ PROCOTE™ Zn	Zn	42.60	2000-3000	Canola Oil	13.71	1.64	Light blue



Compatibility Matrix

Solid Fertiliser	Procote Product							
	PROCOTE Zn	Procote B	Procote BMZ	Procote Mn	Procote Cu	Procote BCMZ	Procote Fe	Procote OPTIMIZE
AN (straight)								
N-Straight (Class 5.1) and AN based NPK Class 5.1								
AN (<70% in a blend)								
CAN (<80% AN)	3.0 L/MT Max	4.0 L/MT Max	4.0 L/MT Max	4.0 L/MT Max			4.0 L/MT Max	4.0 L/MT Max
AXAN	3.0 L/MT Max	4.0 L/MT Max	4.0 L/MT Max	4.0 L/MT Max			4.0 L/MT Max	4.0 L/MT Max
SULFAN	3.0 L/MT Max	4.0 L/MT Max	4.0 L/MT Max	4.0 L/MT Max			4.0 L/MT Max	4.0 L/MT Max
NITRATE & MOP BASED Compound NPK (AN>45% & <80%)	2.5 L/MT Max	3.0 L/MT Max	3.0 L/MT Max	3.0 L/MT Max			3.0 L/MT Max	3.0 L/MT Max
NITRATE & SOP BASED Compound NPK (AN>45% & <80%)	2.5 L/MT Max	3.0 L/MT Max	3.0 L/MT Max	3.0 L/MT Max			3.0 L/MT Max	3.0 L/MT Max
NITRATE BASED Bulk Blend NPK (AN>45% & <80%)	3.0 L/MT Max	4.0 L/MT Max	4.0 L/MT Max	4.0 L/MT Max			4.0 L/MT Max	4.0 L/MT Max
NITRATE BASED Compound NPK (AN<45%)	3.0 L/MT Max	4.0 L/MT Max	4.0 L/MT Max	4.0 L/MT Max			4.0 L/MT Max	4.0 L/MT Max
NITRATE BASED Bulk Blend NPK (AN<45%)	3.0 L/MT Max	4.0 L/MT Max	4.0 L/MT Max	4.0 L/MT Max			4.0 L/MT Max	4.0 L/MT Max

Do not coat
 Warning
 Coating possible

Important Safety Information

- Never coat straight Ammonium Nitrate
- Never exceed 0.4% organic matter when impregnating a nitrate based fertilizer

This compatibility matrix is for safety guidelines in relation to the final organic carbon content present in the fertilizer after the application of Procote.

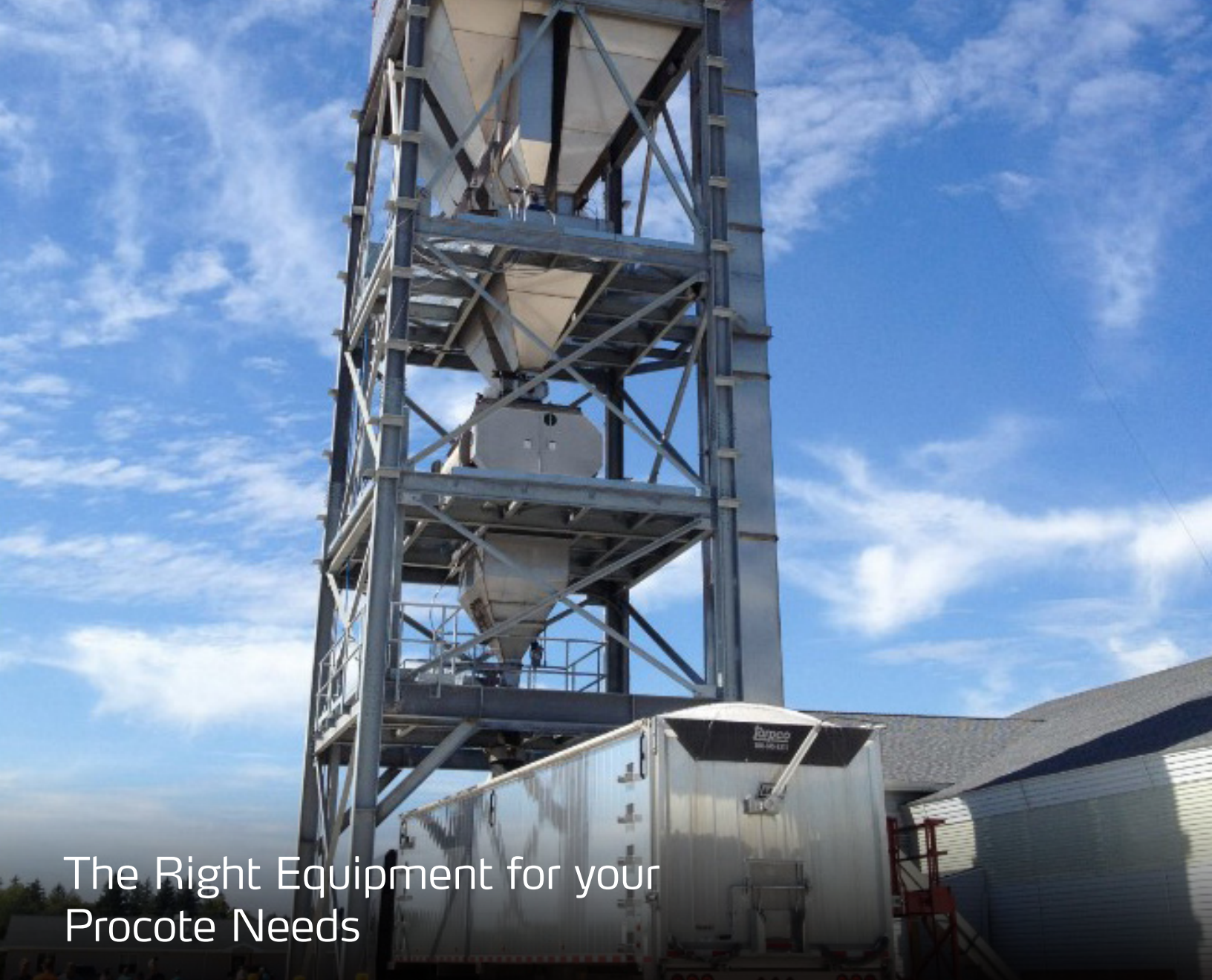
It defines maximum amounts of Procote per type of fertilizer so not to exceed the safety limit of 0.4% of organic carbon.

This matrix does not address the final physical quality of the fertilizer. Small scale application trials using the actual fertilizer materials should be conducted to test compatibility prior to full scale production.

Compatibility Matrix

Solid Fertiliser	Procote Product							
	Procote Zn	Procote B	Procote BMZ	Procote Mn	Procote Cu	Procote BCMZ	Procote Fe	Procote OPTIMIZE
NON-NITRATE BASED Compound NPK								
NON-NITRATE BASED Bulk Blend NPK								
NON-NITRATE NP Blends								
NON-NITRATE NK Blends								
PK Blends								
TROPICOTE								
UREA								
AMIDAS								
AMMONIUM SULPHATE								
POTASSIUM CHLORIDE (MOP)								
POTASSIUM SULPHATE (SOP)								
DIAMMONIUM PHOSPHATE (DAP)								
MONOAMMONIUM PHOSPHATE (MAP)								
SINGLE SUPERPHOSPHATE								
TRIPLE SUPERPHOSPHATE								
DICALCIUM PHOSPHATE (DCP)								

Do not coat
 Warning
 Coating possible



The Right Equipment for your Procote Needs

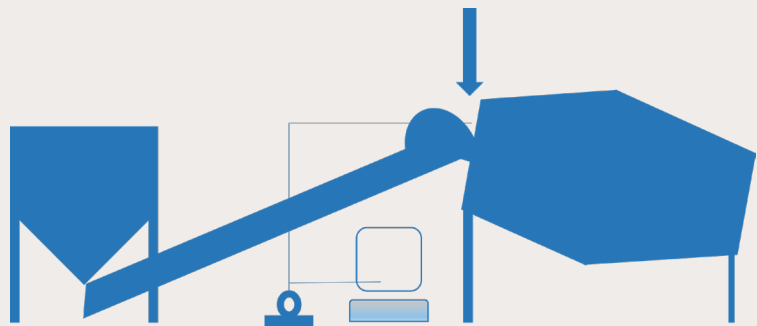
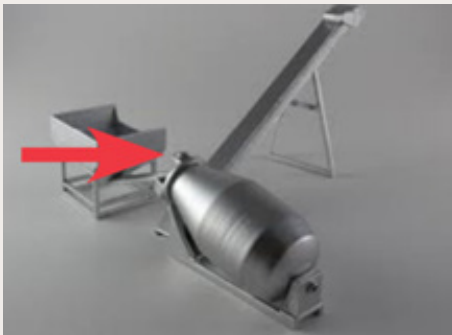
Procote can be effectively applied with all types of fertilizer blenders. Equipment requirements will vary based on your blender type. Whether it's a new blender, or simply retro-fitting an existing operation, Yara can help assess specific equipment needs.

Typical Equipment Requirements

- Pump
- Scale and Indicator
- Manual Batching or Automation of Pump
- Pipework / Hoses
- Agitation / Conditioning Equipment
- Cold Weather Equipment
- Yara has skilled Application Specialists on staff to assist with the proper selection of your equipment needs
- Yara has relationships with most major fertilizer blender manufacturers
- Please also refer to your local manufacturer for specifics for your location

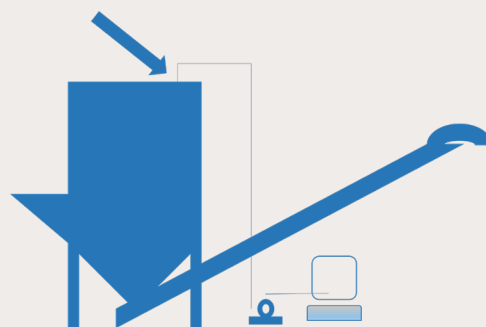
Types of Blenders and Application Points

Horizontal Batch Blender



- Procote can be applied directly into the drum blender
- Procote can be applied to fertilizer on the conveyer prior to entering the drum blender
- Set a stream to spray as far back into the blender as possible
- Ensure Procote is always sprayed onto fertilizer product – do not spray onto bare metal or an empty belt

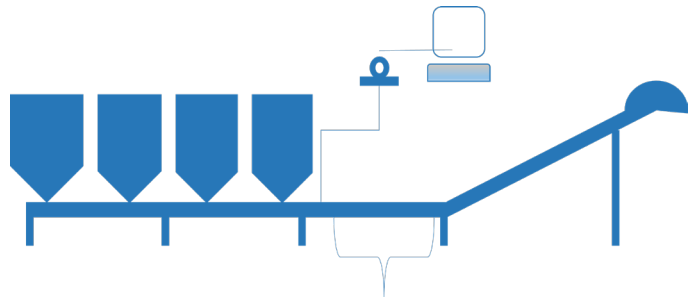
Vertical Batch Blender



- Procote is sprayed directly into the blender
- Do not spray in the middle or sides of the blender
- Add Procote at 50% blend
- Insert hose at the inspection plate (if available)
- If inspection plate is not available, consider how to get hose to top of blender
- Do not spray on the belt
- Do not use a spray ring

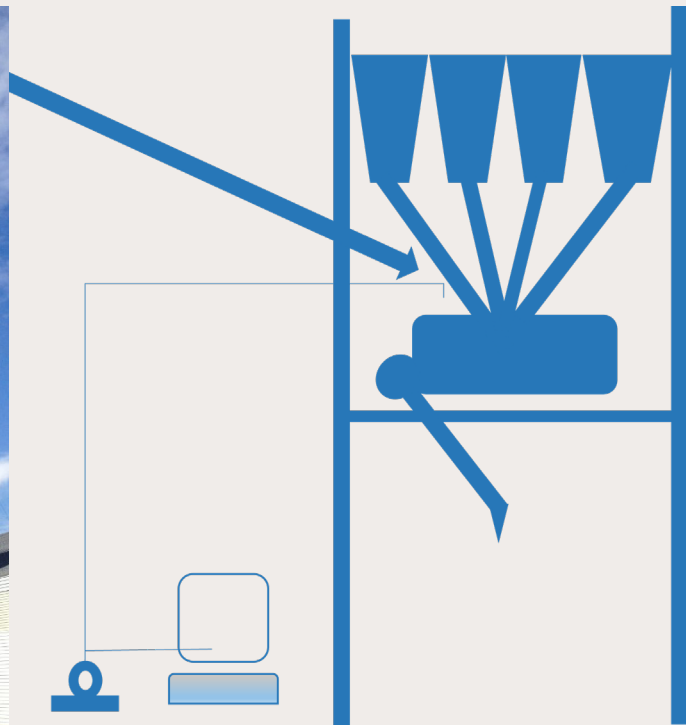
Always Refer to Yara Application Specialists
or blender manufacturer for unique situations.

Declining Weight Blender / Volumetric Blender



- Minimum 8 feet (2.5 M) is required for full coverage
- Apply Proco after the last hopper so the entire blend will be coated
- Integrated injection systems can be provided by most blender manufacturers

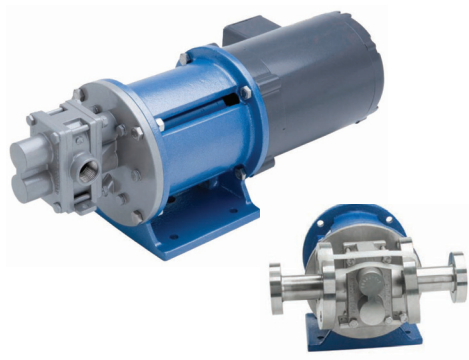
Tower Blender (All types)



- Make sure Proco is applied to fertilizer granules
- Minimize the amount of Proco sprayed onto bare metal
- Most fertilizer blender manufacturers have points of application already built in high efficiency mixers

Always Refer to Yara Application Specialists
or blender manufacturer for unique situations.

Pumps



- The pump is the heart of the system and must be chosen properly to meet output demand
- Procote is a viscous product and requires specific equipment to properly pump and apply
- Yara recommends the use of a positive displacement gear pump with a built-in pressure safety device
- **Air diaphragm pumps are not recommended**
There is too much head pressure against the pump due to the thickness of the product
- **Metering pumps are not recommended**
Procote is better measured by weight displacement
- Pump must have a pressure relief valve
- Seasonal flushing of the pump is recommended
- All pumps can be incorporated into fully automated systems
- Filters are not required

Disclaimer:

Yara does not promote one type/brand of pump over another. Each system varies in their requirements for input, horsepower, and voltage ratings. Please work with your equipment supplier to provide the solution that best fits your operation.

Scales

Because of the viscosity of Procote, weight displacement is more accurate than metering devices to ensure proper application rates. Application sites currently utilize 2 types of systems for this process.

Controlled Scale

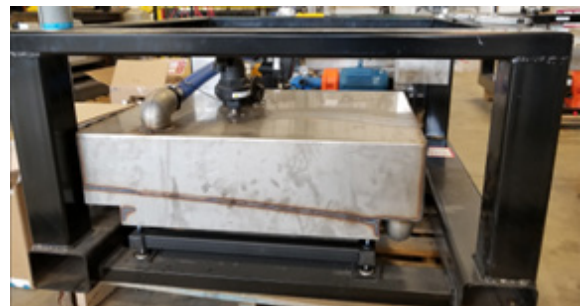
4 inch X 4' 5,000 lb scale with appropriate control.



Scale Tank

Procote is sent to scale tanks before being pumped into the blending system. This allows for certification when dosing small amounts of liquid.

This is Canada specific at this time.



Batch Control

Batch control is unique to each location.
Discuss with your equipment supplier the most suitable option for your needs.

Manual Operation



Independent Batching

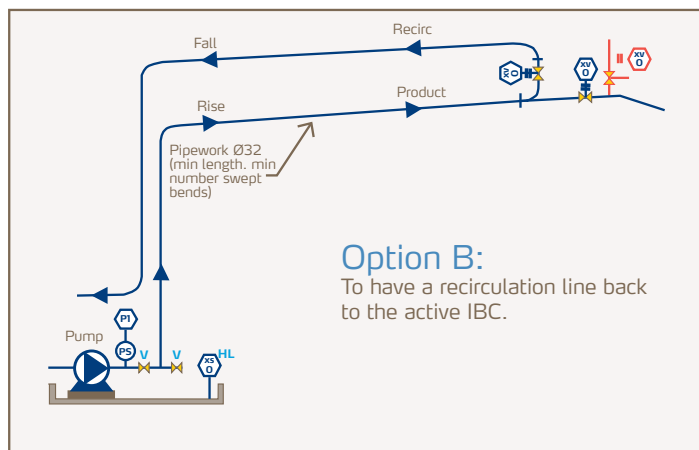
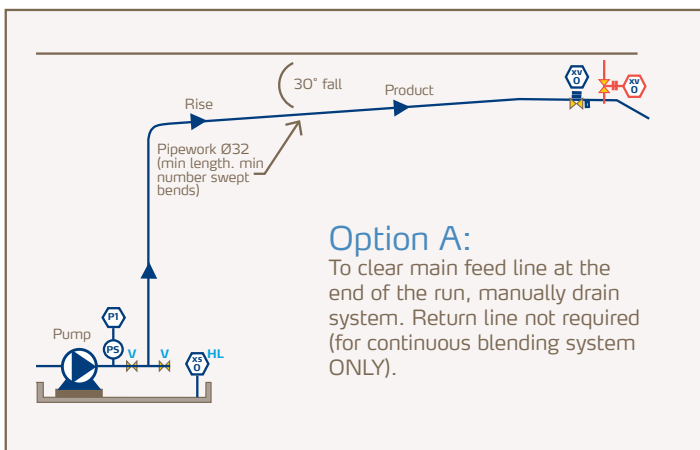


3rd Party Computer Automation



Pipework and Hoses

To avoid product build-up in the pipelines Yara suggests two options for plumbing your system.



Pipework

- All pipework should be anti-static
- Do not use 90 degree fittings
- All bends should be swept over a radius of >150 degrees to reduce pressure drops
- Pipework should be installed with a fall to aid in draining.
- Procote requires heating when temperatures drop below 20°C (68°F), this may include the piping
- Minimum 1 inch piping is suggested
- It is recommended to use stainless steel piping or high impact plastic
- Ensure the PSI rating for the hose exceeds the maximum pump discharge pressure by at least 10%
- Plumb the pipes/hoses in a manner that allows pressurized air to purge the lines

Hoses

- Improper hoses can lead to starvation of the pump on the suction side
- Correct hose selection will prevent ruptures leading to unwanted spills



Heating Equipment

- Thermostatic controlled blanket to keep tote at constant temperature
- Use of an insulated and heated building/shed is recommended in extreme temperature conditions
- Heat trace tape is needed on the output line to keep product at a constant temperature
- Insulation should be applied over the taped tubing



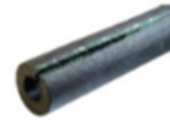
Heating blanket



Climatized container



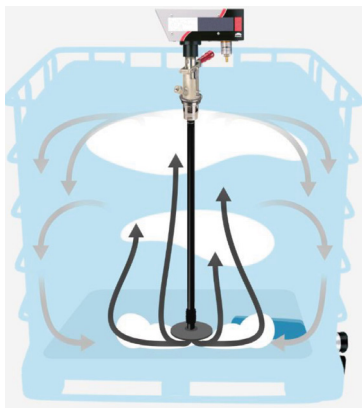
Insulated tape



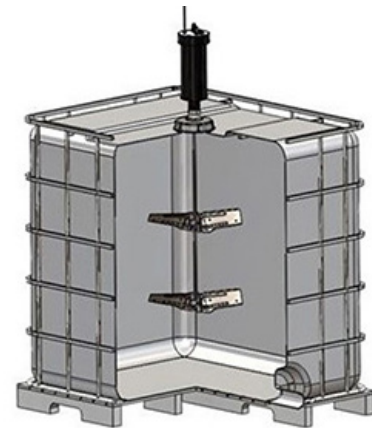
Pipe Insulation

Agitation Equipment

Closed air mixing system



Mechanical blade mixer/Paddle Mixer



Air Wand

To be used as a tool (not a 100% solution) An air wand can be utilized as an aid to agitation or in unique situations.



If using the Procote 500L totes, a simple modification may be required when using the closed air mixing system or a paddle mixer. Please contact your Yara Application Specialist for advice.

Handling Tips

Heat

- Procote must be maintained at 68 F (20°C)
- Temperature management will help:



Product consistency



Flowability



Tote Clean out

Procote MUST be brought to at least 68 F (20°C) BEFORE agitation or pumping can begin.

- Cold weather, even cool overnight temperatures can impact product flowability
- The totes contain 1000L / 264 gallons of product, so plan ahead as it may take a couple of days to bring the ENTIRE tote up to temperature
- The use of heat blankets or heated rooms may be necessary to facilitate the warming of a Procote tote
- Check the temperature of the tote. Agitate and check if the temperature has acclimated to 68°F (20°C)
- You may find that the center of the tote has not fully warmed. If this is the case, repeat with more heat until the entire tote is brought to 68°F (20°C)
- In extreme temperature conditions, a heated shed may be necessary to maintain optimum operating conditions
- If using a heated storage unit, acclimatize Procote for a minimum of 36 hours in this controlled environment
- Supplemental heat blankets may be beneficial to aid in the heating process

Agitation

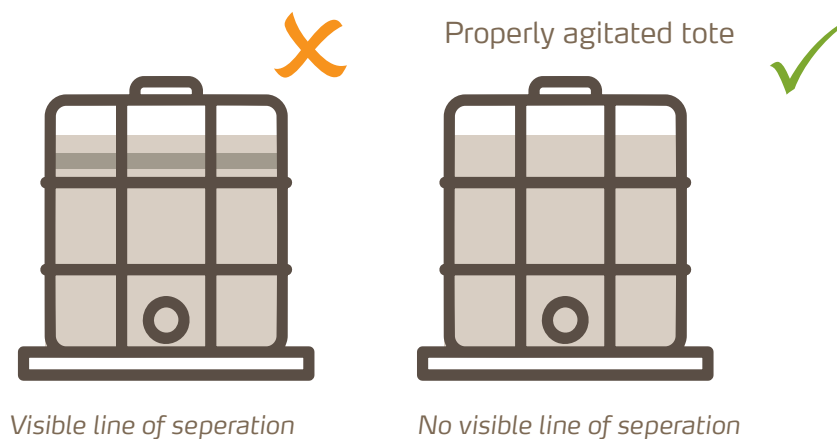
Use agitation equipment to homogenise blend prior to use. Initial agitation of 30 minutes is recommended to evenly re-disperse nutrients in the suspension. When the tote is being used on a regular basis a quick maintenance of 5-10 minutes is recommended each morning before use.

Held-over and partial totes from previous years should also be heated and agitated using the above guidelines.

The entire tote must be brought up to temperature (68° F or 20 C) before agitation can begin.

The easy way to assess the thickness of Procote is by simply raising and lowering the mix tube or blades. If the Procote feels consistent from top to bottom, the tote is ready for use. If there is thickness at the bottom, agitate further.

Do not agitate while pumping product – the movement of the scales can affect the metering process.




Tote Tilt

To aid in proper draining of the tote, it is recommended to tilt the tote towards the drain valve. There is equipment available that can automatically tilt the tote forward as the product drains. However, this can also be accomplished with a simple 4X4 block of lumber set underneath the back side of the tote.



Pre-Season / Startup Checklist

Checklist	Status 
Bring Procote to the ideal temperature of 68 F / 20° C	<input type="checkbox"/>
Entire tote must be brought to temperature before agitation and use	<input type="checkbox"/>
Check temperature	<input type="checkbox"/>
Agitate for 5 - 10 minutes	<input type="checkbox"/>
Check temperature again	<input type="checkbox"/>
Agitate Procote to create a homogeneous mixture. The visible oil line of separation should disappear, and the thick layer at the bottom should be blended into a consistent mixture before use	<input type="checkbox"/>
Test that the pump turns on freely by bumping into manual mode	<input type="checkbox"/>
Ensure the scales turn on and are registering accurately	<input type="checkbox"/>
Run a check on the heat tape to ensure lines flow properly with product	<input type="checkbox"/>
Check the output hose leading to the blender and spray bar. Ensure it is fully open by using air to clean any foreign debris	<input type="checkbox"/>
If using Procote in an automated blending system, refer to the blender and automation manuals to properly prime the system	<input type="checkbox"/>

End of Season Checklist

Main system (Pump, Motor, Scales and Stand)	Status <input checked="" type="checkbox"/>
Purge and drain all Procote from the entire plumbing system. Use an air purge connection if supplied, or the lowest drain location	<input type="checkbox"/>
Disconnect the line from the discharge side of the pump and contain product	<input type="checkbox"/>
Run crop oil, canola oil, or mineral oil through the pump and lines to dilute the Procote. TIP: Run the system in manual mode to get the oil through the pump and drain into a bucket	<input type="checkbox"/>
To help prevent rust, blow or spray off the pump and other components. Address any rust issues by removing the rust, priming, and re-painting these areas	<input type="checkbox"/>
If possible, ensure the power is disconnected from all components to protect from power surges while not in use. Follow automation company's recommendations	<input type="checkbox"/>
Agitation Equipment	Status <input checked="" type="checkbox"/>
Unhook air hose and remove agitation equipment	<input type="checkbox"/>
Clean agitation equipment	<input type="checkbox"/>
Store in a dust-free, dry area	<input type="checkbox"/>
Heat Blanket	Status <input checked="" type="checkbox"/>
Remove blanket from the tote	<input type="checkbox"/>
Refer to heat blanket manual for cleaning	<input type="checkbox"/>
Refer to heat blanket manual for storage conditions	<input type="checkbox"/>

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About Yara

Yara's knowledge, products and solutions grow farmers and industrial customers' businesses profitably and responsibly, while nurturing and protecting the earth's resources, food and environment.

Our fertilizers, crop nutrition programs and technologies increase yields, improve produce quality, and reduce environmental impact from agricultural practices. Our industrial and environmental solutions reduce emissions and improve air quality from industry and transportation, and serve as key ingredients in the production of a wide range of goods.

Founded in 1905 to solve emerging famine in Europe, Yara today has a global presence with more than 12,000 employees and sales to more than 150 countries. www.yara.com

