CENTRIFUGALS FERTILISER SPREADERS

KC-RD

ORIGINAL MANUAL

ROCHA

INDEX

INTRODUCTION CHAP 1

By purchasing ROCHA equipment, you have made a truly wise choice and you will quickly realise the remarkable reliability and robustness of our product.

This equipment has been designed and built to high quality standards, in accordance with current regulations and respecting all the required safety levels. We hope that your work will fully meet your expectations.

The purpose of this manual is to enable users of the **Double plate mounted spreaders** to use and handle the equipment safely and effectively.

The advice and standards set out in this manual are intended to maximise the potential of your machine so that you can use it safely and with maximum efficiency.

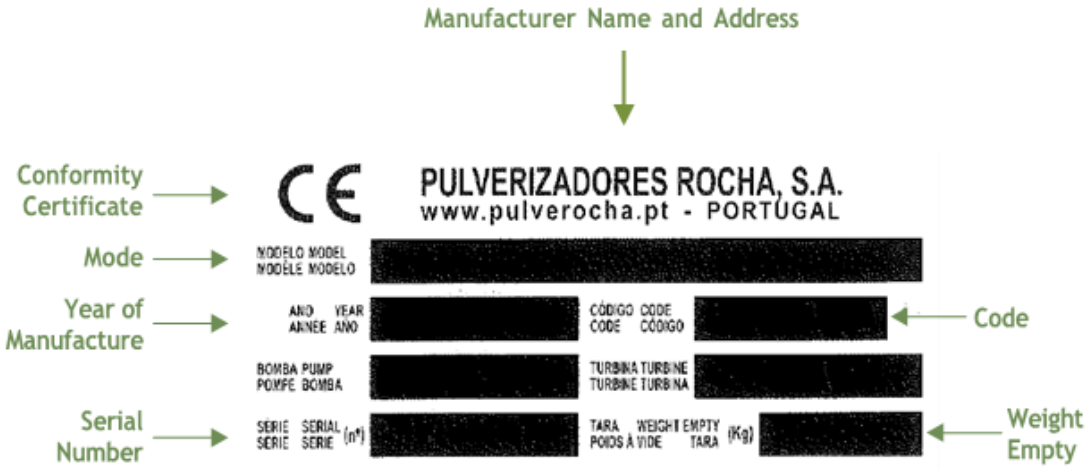
Any additional information should be obtained from our commercial technical services. Whenever necessary, use the information on the equipment's nameplate to help us identify the characteristics of your machine.

Only people who have received specific technical training should operate this equipment.

Make sure you understand the instructions in this manual before you start working with the equipment.

THIS MANUAL IS AN INTEGRAL PART OF THE MACHINE

MACHINE IDENTIFICATION CHAP2



The identification label placed on the machine chassis contains essential information that is required in order to correctly identify the equipment.

This data must be provided whenever accessories are requested or when technical support is necessary.

WARRANTY CONDITIONS CHAP3

1. The products sold by PULVERIZADORES ROCHA are submitted to rigorous quality control testing in order to minimize the occurrence of any defects.

2. All equipment is guaranteed for 24 months (NON-PROFESSIONAL USE - DL 67/2003) or 12 months (PROFESSIONAL USE - CC Art. 921) from the date of purchase.

2.1. Any defective components or parts due to manufacturing and /or workmanship defects shall be immediately substituted at no additional cost. However, workmanship and travel costs will be applicable.

2.2. When complaints are submitted, the parts in question must be sent for examination by our Technical Department.

3. The occurrence of any of the facts described below shall result immediately in the invalidity of the warranty:

3.1. The use of the equipment under abnormal work situations or coupled with motors/tractors/hand tractors with power specifications that differ from those recommended in the respective technical documents.

3.2. The substitution of any components or parts by others from 3rd parties.

3.3. Any structural alterations made to the equipment.

3.4. PULVERIZADORES ROCHA are not informed nor give their consent regarding any repairs made during the effective warranty period.

MACHINE DESCRIPTION CHAP4

WARNING: Working with agricultural machinery can be dangerous. Incorrect or careless use can result in serious injuries to the operator or third parties!

WARNING: It is mandatory to read the user manual carefully before starting any action with the equipment.

The KC-RD centrifugal spreader has been developed with the aim of spreading granular products, mainly chemical fertilisers and seeds, when driven by the tractor's power shaft (PTO). Any other application is an improper use.

The dimensions of this equipment are compatible with medium and large tractors. Its high impact resistance capacity, anti-corrosion components and lightweight, easy-to-disassemble tank give this machine the characteristics it needs for precision work.

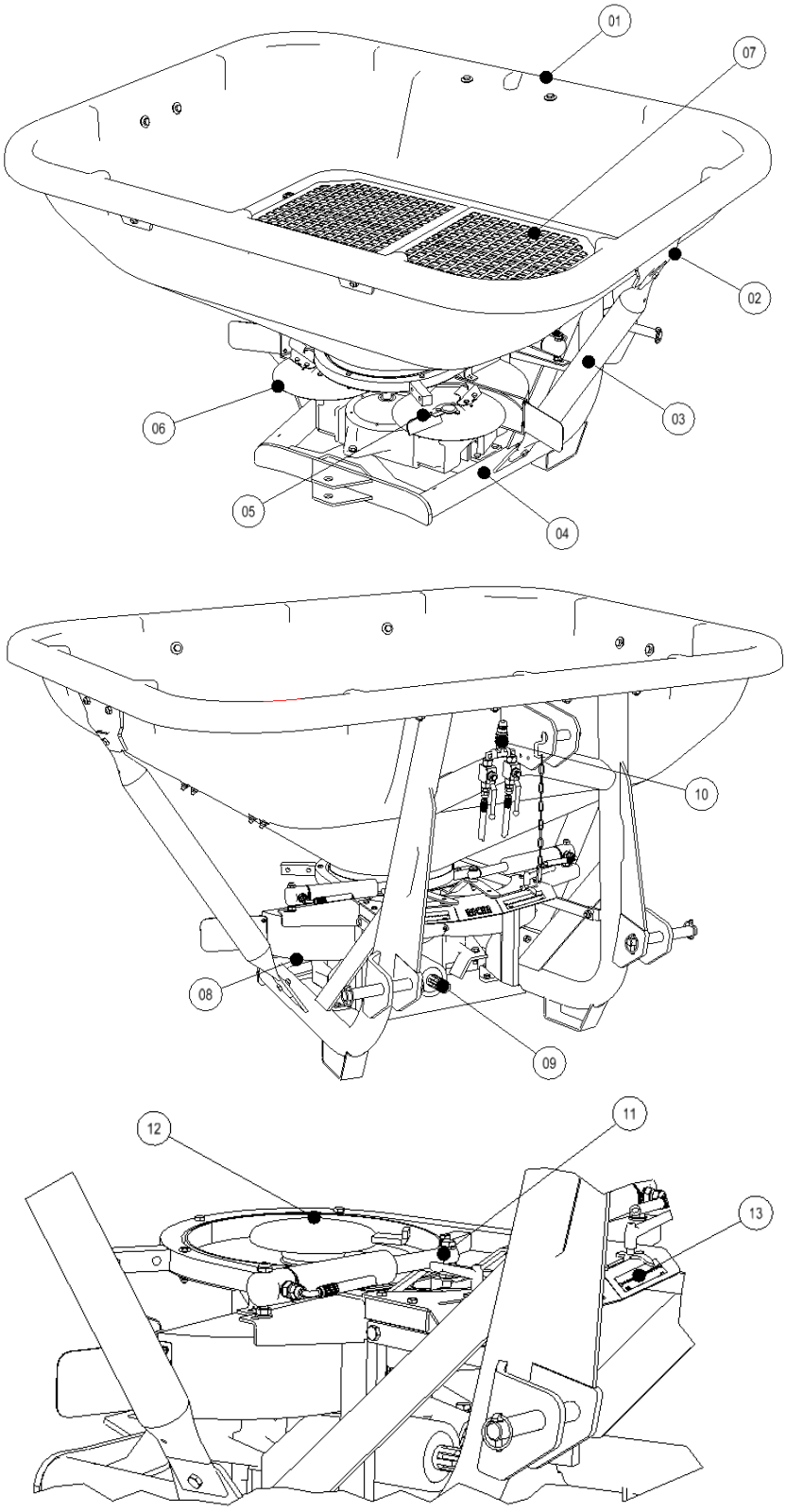
The components of this machine are made from a variety of materials, e.g. carbon steel, stainless steel, polyethylene, nylon, among others. The surface treatments applied are galvanisation, passivation and thermoset powder coating, which gives the machine's metal elements high resistance and durability, even in contact with highly corrosive products such as fertilisers.

This equipment has some particularly advantageous features, such as:

- Easy to adapt to agricultural tractors.
- Ease of operation and adjustment due to the built-in hydraulic and/or electro-hydraulic functions.
- Safety, quiet working and precision spreading.

This machine can be equipped with marginal spreading mechanisms, optional equipment, developed and validated in accordance with the standard environmental **EN 13739-2**.

The following image identifies the main elements of the KC-RD spreader.



01- HOPPER

02- CHASSIS

03- CHASSIS

04- CHASSIS

05- GEAR BOX

06- SPREADING PLATE

07- EXODUS NETWORK

08- PLATE ARMOUR

09- TRANSMISSION SHAFT

10- QUICK-CONNECT HYDRAULIC VALVE

11- MOVEMENT MECHANISM DOSING PLATES

12- AGITATOR PLATE

13- SCALE / DOSE REGULATION

Figure 4.1 - KC-RD fertiliser spreader

WARNING: This machine is designed for spreading granular products (chemical fertilisers and seeds). Its use for any other purpose is strictly forbidden!

The following table shows the main technical characteristics of the KC-RD Mounted Spreader.

Volumetric capacity	*(*)* 900 - 1500 litres
Load capacity	*(*)* 963 - 1605 kg (fertiliser density 1.07)
Weight	*(*)* 283 - 316 kg
Height	*(*)* 1115 - 1465 mm
Width	1910 mm
Length	1650 mm
Hitch system	At 3 points (type II and III)
Input speed (PTO)	540 rpm
Effective working width	See CHAP 12 of this manual
Gearbox	The unit consists of a monobloc box.

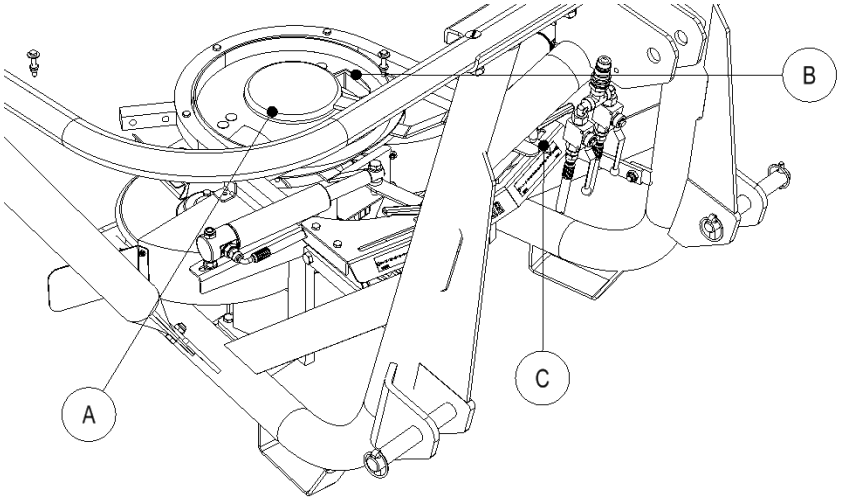
Table 4.1 - KC-RD technical characteristics

(*) Prices vary depending on the optional posture that can be fitted.

This fertiliser spreader has two centrifugal spreading plates and four types of vanes for each plate *(Figure 4.1)*. The mounting and arrangement of the vanes on the plates depends on the type of product to be spread and the desired reach (see spreading tables).

The agitator plate, mounted on the centre shaft of the Gearbox, has the function of keeping the flow of product to be spread constant and uniform. The geometry and movement of the agitator have been studied so as not to damage the integrity of the products to be spread and to divert any "blocks" of product that could block the dosing openings *(Figure 4.2).*

The amount of spreading is adjusted manually by positioning two levers, one for each plate, arranged as shown in the following figure. The positioning of the levers is determined according to the desired working conditions (see spreading tables - CHAP 12).



A - AGITATOR;

B - OPENING/CLOSING THE DOSAGE;

C - LEVER FOR ADJUSTING THE DOSE OF PRODUCT TO BE SPREAD.

Figure 4.2 - Dosage mechanism

OPTIONAL ACCESSORIES:

The KC-RD spreader can be equipped with the following optional accessories:

- **COVERAGE SCREEN**

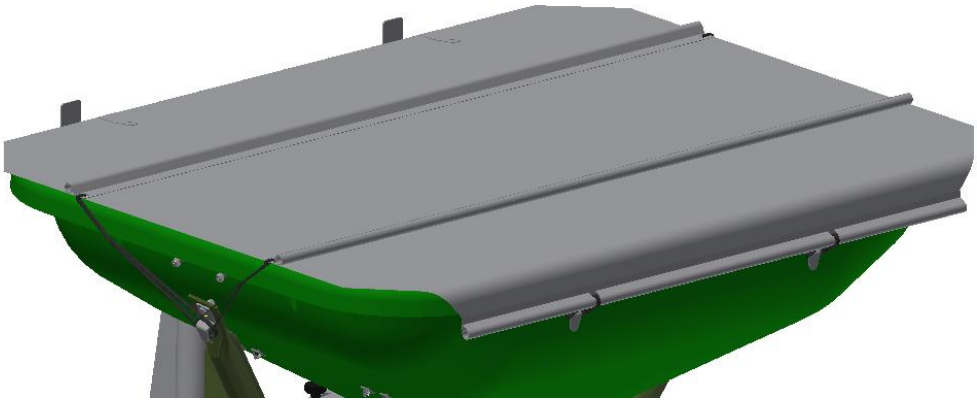


Figure 4.3 - Coverage screen for KC-RD

The coverage screen for KC-RD *(Figure 4.3)* protects the fertiliser and seeds inside the hopper from moisture and dirt. This optional accessory consists of a PVC screen and metal profiles that give it the necessary shape and rigidity. The structure, when extended over the hopper, is fixed to the machine using elasticated bands. This accessory is easy to adapt and remove.

- **BORDER LIMITER:**

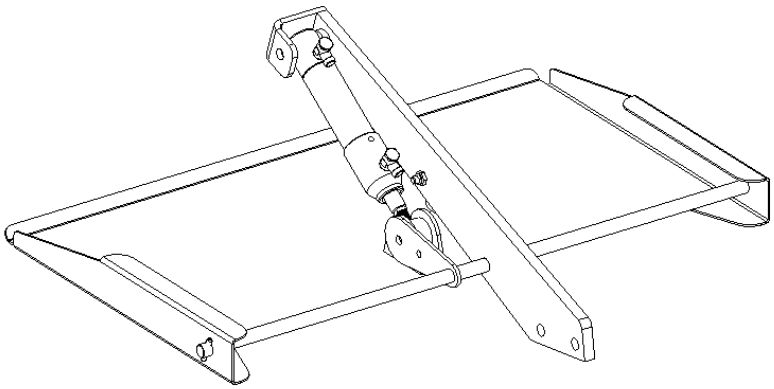


Figure 4.4 - Lateral border limiter "from the border"

Spreading "from the border" is possible with the KC-RD Spreader. To do this, you need to activate the optional side limiter *(Figure 4.4)* and normally drive in the lane closest to the boundary, according to the predefined working width *(Figure 4.5)*. Under these working conditions, it is possible to spread 100% of the desired dose within the border of the field.

You can adjust the spreading scheme, which varies depending on the characteristics of the product to be spread, by adjusting the position of the Side Limiter and the position (distance) of the tractor in relation to the border of the field *(see CHAP 6). In* this way you optimise the spreading scheme and reduce the environmental impact.

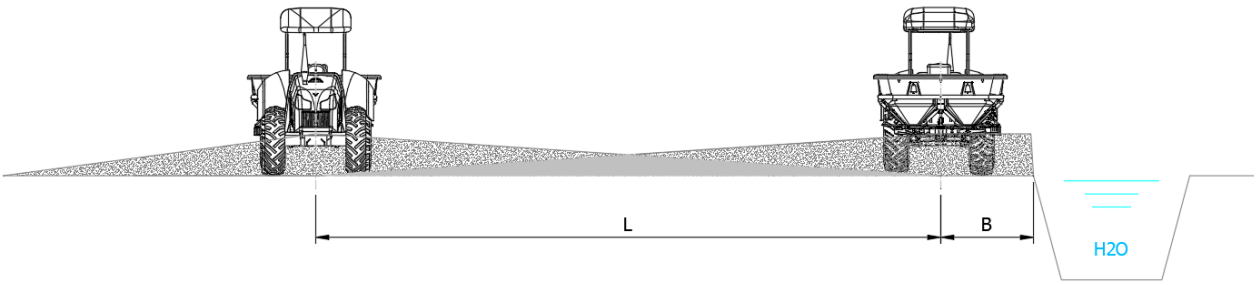


Figure 4.5 - Example of spreading "from the border"

The machine can be used to spread at full width (L) without using the device shown above. For this type of work, which is the most common, the machine performs a spreading scheme identical to the one shown in the following figure *(Figure 4.6)*, usually in the shape of a triangle, with an overlap of approximately 100%.

Sometimes, depending on the type of product, the dose to be applied, the working width, among other factors, a slightly different spreading pattern (trapezoid pattern) can be used. This type of spreading pattern usually has an overlap area of less than 100%.

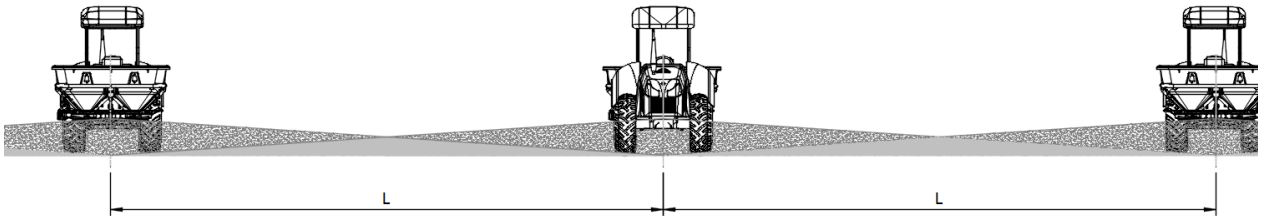


Figure 4.6 - Ex. triangle spread - 100% overlap

Note: For Border limiter settings, see CHAP 6**.**

- **BILATERAL LOCALISER:**

The bilateral locator was developed for intensive fertilisation of orchards or olive groves. When installed on the KC-RD spreader, this accessory allows the product to be deposited continuously next to the trees - fertilisation between rows - *(Figure 4.8)*, thus increasing efficiency and significantly reducing the appearance of weeds in the centre of the rows.

The work of this accessory can be optimised 100% when combined with the optional SONAR Kit. The SONAR sensors, once installed in conjunction with the Bilateral Locator, allow for localised fertilisation at the base of each tree, which is interrupted between passes.

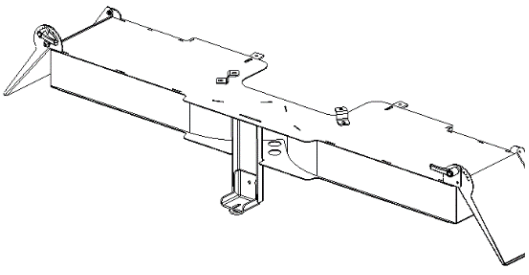


Figure 4.7 - Bilateral localiser

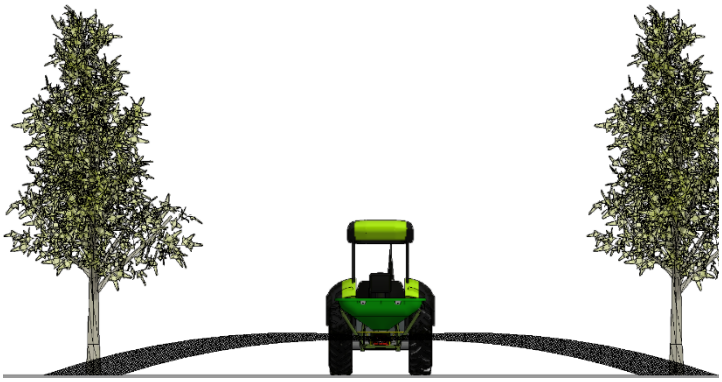


Figure 4.8 - Fertilisation between rows

INSTALLATION AND CONNECTION TO THE TRACTOR CHAP5

WARNING: It is essential to read the user manual carefully before starting any action with the machine.
WARNING: Coupling operations of agricultural machinery to tractors is dangerous! Make sure you comply with all safety rules.

In order to facilitate and protect the equipment, some accessories may be supplied disassembled from the machine. This is also why it is important to read and understand this user manual, which should be delivered with the machine. The user manual explains how to proceed when assembling these accessories.

WARNING: During coupling operations of agricultural machinery to tractors, the use of appropriate protective equipment is mandatory!

After receiving the equipment and before carrying out any operation, pay attention to the following:

- Check that the hopper of the spreader is clean, with no foreign objects inside. If not, remove it;
- Check that the tractor to be used is suitable (e.g. braking system, stability, power, load capacity and total weight);
- The KC-RD spreader is coupled to the tractor via the hydraulic system's 3-point mechanism,
- Make sure that the tractor's hydraulic system is capable of safely lifting at least 3000kg.

WARNING: Never stand under the equipment while it is suspended.

Working with agricultural implements involves risks. Therefore, before starting work on coupling the KC-RD and after carefully reading and understanding this instruction manual, we recommend that you carry out the following procedure for calculating maximum admissible loads and take the appropriate action to ensure your safety and that of third parties.

LETTER	DESCRIPTION	UNIT
A	Tractor tare weight without the machine attached (1)	Kg
B	Weight on the front axle of the tractor without the machine attached (1)	Kg
C	Weight on the rear axle of the tractor without the machine attached (1)	Kg
D	Total weight of the machine or front-mounted counterweights	Kg
E	Total weight of the machine or the counterweights attached to the rear	Kg
f	Distance between the centre of the machine or counterweights and the front axle centre	m
g	Tractor wheel base	m
h	Distance between the centre of the rear axle and the point of lever arm	m
i	Distance between the centre of the machine or counterweights and the centre of lever arm coupling point (2)	m
(1) Take into account accessories or the weight of water on the tyres.		
(2) If there are no indications, calculate i= half the length of the machine.		
* Consult the tractor's instruction manual for the necessary data.		
** Consult the tyre manufacturer for the necessary technical information.		
*** The data relating to the spreader is given in this instruction manual *(table 4.1. page 8)*.		

Table 5.1 - Data for calculating maximum admissible loads

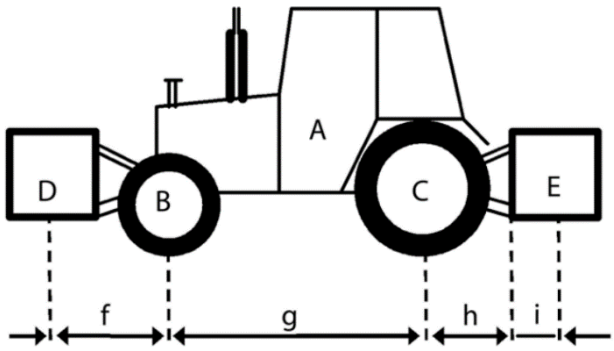


Figure 5.1 - Diagram for calculating maximum admissible loads

NOTICE:
Incorrect or careless use of agricultural machinery can result in very serious injuries to the operator or third parties!

CALCULATIONS:

- **Total weight (kg) =** $A + D + E$

  The total weight must not exceed the maximum admissible weight.

- **Axial load of the front axle (kg) =** $\frac{D * (f + g) + (B + g) - E * (h + i)}{g}$

  The axial load of the front axle must not exceed its maximum admissible load.

- **Axial load of the rear axle (kg) =** $Total\ weight - \ Axle\ load\ of\ the\ front\ axle$

  The axial load of the rear axle must not exceed its maximum admissible load.

  The minimum load on the tractor's front axle must be 20% of its tare weight.

  In this case, bearing in mind that the machine will be hooked up to the rear 3-point hydraulic mechanism, you should calculate the minimum counterweight required (in kg) to be mounted on the front of the tractor as follows:

- **Front counterweight (kg) =** $\frac{E * (h + i) - (B + g) + (0{,}2 * A * g)}{F + g}$

  If the result is negative, there is no need to mount extra counterweights on the front of the tractor.

  Important:

  - Make sure you work within the limit values indicated by the tractor manufacturer.
  - After installation, make sure that the actual loads on the axles are less than the maximum loads allowed on each axle (front and rear).
  - If you have a scale suitable for weighing vehicles at your disposal, use it to determine the total weight of the tractor and attached equipment and the loads on the front and rear axles.

WARNING: Once loaded, at least 20% of the tractor's total weight must be supported by the front axle and 45% by the rear axle. This ensures safe spreading of the loads!

WARNING: Coupling and uncoupling agricultural machinery involves the risk of injury and can cause seriously injured!

WARNING: This equipment includes elements that can cause cuts or crushing. The use of appropriate protective equipment is mandatory!

In order to reduce the risk of accidents during the manoeuvres for coupling and uncoupling the machine to the agricultural tractor, take the following instructions into account:

- Make sure the tractor is braked (parking brake);
- Check that the electrical, mechanical and hydraulic elements of the tractor and implement are in good working order;
- Carry out coupling and uncoupling operations on stable, dry and level surfaces so that the machine does not risk tipping over or sliding out of control;
- Make sure that other people and animals are not in the danger zone during work;
- Do not stand between the tractor and the machine during coupling and uncoupling operations;
- Only engage the machine at the points provided for this purpose;
- Only engage and disengage the machine when the PTO shaft is stationary;
- Operate in accordance with the procedures described in this instruction manual;
- Attach the KC-RD spreader to the hydraulic system's 3-point mechanism by first hooking it to the lifting arms (2nd point) and then to the 3rd hooking point;
- Adjust the lift arm stabilisers so that the machine is centred in relation to the width of the tractor,
- Adjust the working height of the KC-RD Spreader, taking as a reference the distance between the field and the spreading plates *(Figure 5.2)*. After adjusting this dimension (800mm), you must now level the machine in relation to the field *(Figure 5.2)*.

Important: Position the spreader high and level with the field.

Figure 5.2 - Example of setting the machine in the working position.

NOTE: The cardan shaft supplied with the spreader is too long for most tractors.

Note that during the machine's up and down movements, the inner and outer shafts of the cardan must slide freely relative to each other. At the same time, you must ensure that the overlap of the shafts is sufficient for safe and effective power transmission in any position, especially when the working angle is more unfavourable *(Figure 5.4)*.

WARNING: Incorrect mounting of the cardan shaft can cause serious injury to the operator and damage to the implement or tractor!

To adjust the length of the cardan shaft correctly, proceed as follows:

- Raise the machine with the 3-point hydraulic mechanism until the PTO shaft and the implement shaft are at the same height (the position where the cardan shaft will be shortest);
- If possible, support the machine on a stand;
- Switch off the tractor and remove the key from the ignition;
- Brake the tractor properly (parking brake);

- Slide the inner and outer shafts of the cardan shaft until they disengage completely;
- Mount the tractor-side cardan half onto the tractor's PTO shaft;
- Mount the cardan half on the implement side onto the implement shaft,
- Use your hands to place both ends of the cardan shaft parallel to each other, as shown in the following figure.

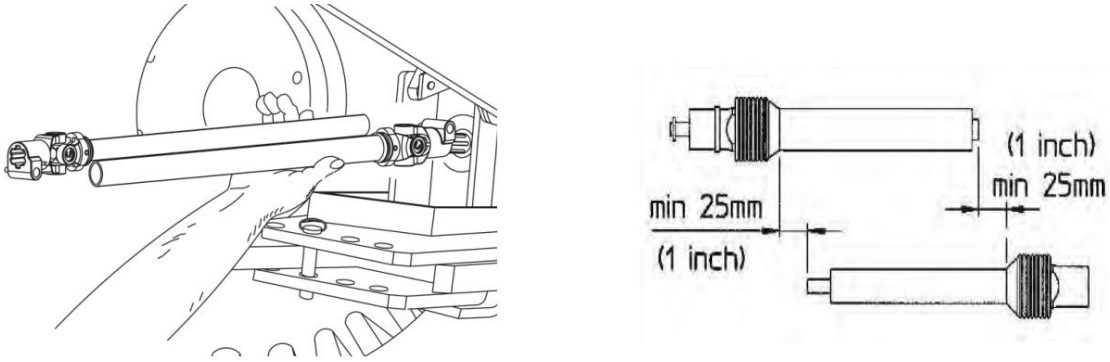


Figure 5.3 - Ex. adjusting the length of the cardan shaft

Note: The cardan shafts should overlap as much as possible, with a minimum of 150mm. At the ends, the shafts should have approximately 25mm of clearance when the PTO shaft and the implement shaft are at the same height *(Figure 5.3)*.

- Cut the shafts enough so that the gap is approximately 25mm;
- Cut the plastic protection at the same distance;
- Remove any burrs from the ends;
- Fit the shaft halves together;
- Couple the complete cardan shaft to the machine and tractor;
- Check that the safety pins on the cardan shaft have been properly engaged,
- Raise the machine to the highest working point.

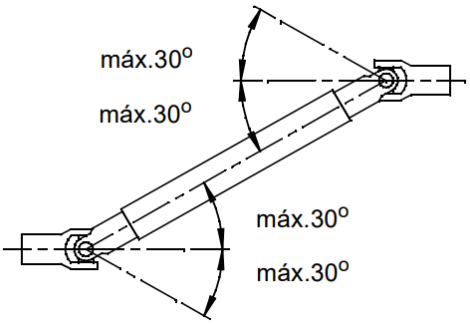


Figure 5.4 - Ex. maximum working angle of the cardan shaft

The maximum working angle allowed for the cardan shaft is 30º on each side *(Figure 5.4)*, taking the tractor PTO shaft and the implement PTO shaft as references.

This is the largest admissible distance between the PTO shaft and the machine shaft.

To check the correct dimensions, proceed as follows:

- Raise the machine to its highest position;
- If possible, support the machine on a stand;
- Switch off the tractor and remove the ignition key;
- Brake the tractor properly (parking brake);
- Check that the angle of the cardan shaft is less than 30º;
- Check that the inner and outer shafts of the cardan shaft are at least 150mm apart;
- Loosen the cardan shaft on the tractor side and disengage it completely;
- Apply lubricant to the entire surface;
- Reassemble the cardan shaft on the tractor, without forgetting the protective plastic tubes;
- Check that the safety pins on the cardan shaft have been properly engaged;
- Attach the safety chains to the cardan shaft,
- Properly attach the chains to a fixed point on the tractor and machine respectively.

WARNING: Always attach the safety chains to the plastic protection tubes. Once the protection tubes are rotating, they can wrap around other elements and cause injury to the operator and/or damage to the equipment.

WARNING: Incorrect mounting of the cardan shaft can cause serious injury to the operator and damage to the implement or tractor!

HOSES AND CONTROL CABLES:

The KC-RD spreader is not equipped with the following extra components as standard:

- Application computer;
- Border limiters;
- Bilateral localiser;
- SONAR kit;
- GSP,
- Light kit.

In the standard configuration, to connect your spreader's hydraulic circuit to the tractor, you simply have to connect the machine's hydraulic valves *(Figure 5.5)* to the tractor's hydraulic valve(s) *(Figure 5.6)* to independently control the opening and closing of the spreader's metering mechanisms.

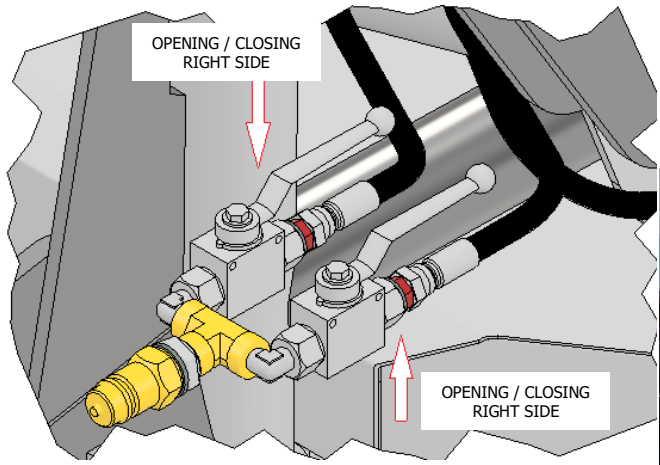


Figure 5.5 - Opening/closing the dosing mechanisms of the KC-RD

Figure 5.6 - Ex. tractor quick coupling valve

- Check the state of repair of the tractor's hydraulic quick-connect valves;
- Check that the Spreader's hydraulic valve is in good condition;
- Connect the quick-connect valve to the tractor;
- Install the pipes in such a way that they do not get caught or damaged during the working movements of the equipment;
- Check that there are no leaks in the hydraulic circuit. If there are any leaks in the circuit, eliminate them immediately *(See CHAP 8 - checking and maintenance)*.
- For information on the tractor's hydraulic circuit, please refer to its instruction manual or contact the tractor's representative/manufacturer.

WARNING: Make sure that the machine's cables, hoses and control elements are properly stowed. Do not allow them to be activated or deactivated unintentionally.

CONNECTION OF OPTIONAL EQUIPMENT:

- **Border limiter:**

The lateral Border limiter *(Figure 4.4)* must be connected to the KC-RD spreader as follows:

- Check the state of repair of the tractor's hydraulic quick-connect valves;
- Connect the quick-connect valves of the respective Border limiter taking the following into account:
  a) The hose labelled with a red ring *(Figure 5.7)* - Pressure line,
  b) The hose labelled with a blue ring *(Figure 5.7)* - Return line.

Figure 5.7 - Identification of the hoses and quick-connect valves of the Border Limiters

- Install and position the hydraulic hoses so that they don't get caught or damaged during the equipment's working movements;
- Check that there are no leaks in the hydraulic circuit. If there are any leaks in the circuit, eliminate them immediately *(See CHAP 8 - checking and maintenance)*.
- Test the operation (opening and closing) of the Border limiter. Make sure its movement is controlled and free of obstacles.
- For information on the tractor's hydraulic circuit, please refer to its instruction manual or contact the tractor's representative/manufacturer.

- **Light kit:**

To connect the optional light kit to the tractor, the following must be taken into account:

- Check the tractor's electrical socket(s) for dirt and clean them properly if necessary;
- Plug the 7-pin electrical plug into the tractor's socket,
- Install the electrical cables in such a way that they do not get caught or damaged during the working movements of the equipment.

Figure 5.8 - Ex. 7-pin electrical socket

Figure 5.9 - Ex. 7-pin electrical plug

- Check that the light kit is working properly;
- Check that the different lights light up according to their function;
- Check that the indicators light up in the correct order. If the flashing signals are interchanged, check the phase connection *(See CHAP 8 - checking and maintenance)*.

- **SONAR kit for bilateral localiser:**

If your spreader is optionally equipped with the SONAR bilateral localiser kit, you should take the following instructions into account when connecting it:

- Plug the 3-pin plug into the socket between the computer panel and the control box *(Figure 5.10);*
- Install the electrical cables in such a way that they do not get caught or damaged during the working movements of the equipment;
- Check that the cables are undamaged. If the wiring is faulty, replace the cable *(See CHAP 8 - checking and maintenance)*;

- Install the computer control panel in the tractor cab. Make sure it is secure, has good visibility for reading and is easily accessible for handling;
- Connect the male quick-connect valve - 1 - *(Figure 5.11)* to a tractor pressure line;
- Connect the male quick-connect valve - 3 - to a tractor pressure line;
- Connect the female quick-connect valve - 2 - to a return line to the tractor housing,
- For further information on the application computer, please contact our technical and commercial services.

Figure 5.10 - SONAR kit (panel + connection box)

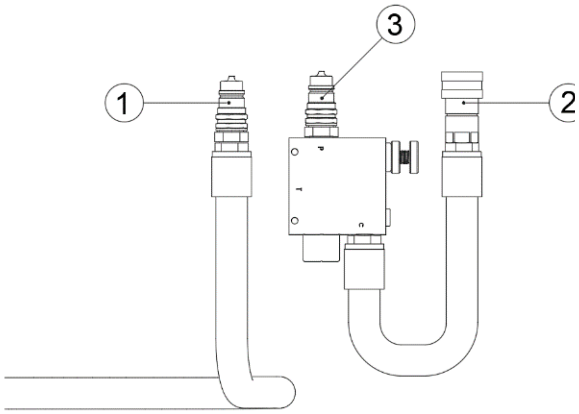


Figure 5.11 - Hydraulic connections

Important: The oil-hydraulic circuit of the SONAR kit consists of a nitrogen accumulator, among other elements. This element may only be handled and/or operated by people who have received specific training. It is absolutely essential that the energy trapped inside the accumulator is drained or isolated before any operation on the SONAR kit's oil-hydraulic circuit.

WARNING: The pressure stored inside the accumulator can escape accidentally and cause serious injury.

WARNING: It is mandatory to read the user manual carefully before starting any operation with the equipment.

INTENDED USE OF THE MACHINE CHAP6

SETTING THE MACHINE TO WORK:

Before starting work with the spreader, you must take into account all the safety aspects applicable to this type of equipment. Read this instruction manual carefully, in particular *CHAP 7 (safety warnings and accident prevention).*

WARNING: Adjustment operations must be carried out exclusively by the operator, whenever possible with the tractor switched off and the key removed from the ignition.

WARNING: This machine may only be operated by qualified staff! Make sure that no one is near the equipment during adjustment and operation.

Start by setting the working speed. To do this you must take into account the characteristics of the tractor, the product(s) to be spread, the state of the field and slope as well as the weather conditions (wind intensity, humidity, etc...).

To ensure that the product is applied correctly, make sure that the PTO speed is 540 rpm when working. On most tractors, the standardised PTO speeds are indicated on the revolution counter. Some tractors have a specific revolution counter for this parameter.

If in doubt about the PTO speed setting, consult the tractor's instruction manual or use a portable revolution counter (Figure 6.1) to check the output speed.

IMPORTANT: For correct spreading it is important to keep the PTO speed at 540rpm when working!

Figure 6.1 - Revolution counter

- **COMBINATION OF VANES:**

The KC-RD spreader has two spreading plates, combined with 143mm and 150mm long vanes, which must be combined in pairs on each plate *(Figure 6.2)*. Each vane is mounted in different positions on the plate *(F1, F2, F3, F4 and F5),* which allows the machine to be configured according to the products to be spread and the possible working width(s) *(see CHAP 12 - spreading tables)*.

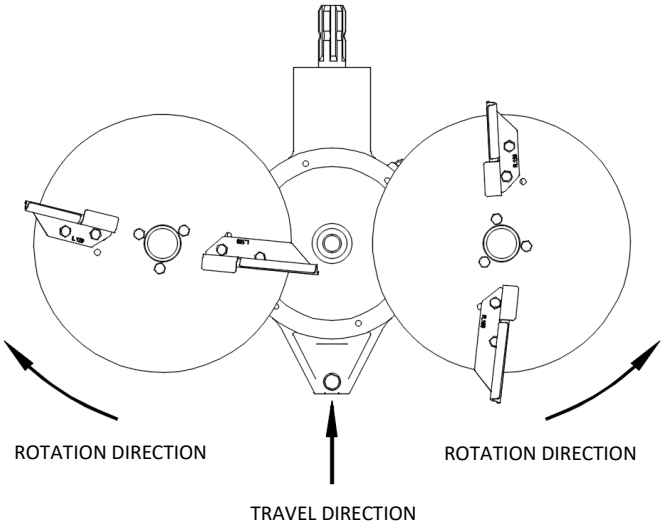


Figure 6.2 - Example of combining vanes.

Figure 6.2 shows the direction of rotation of the spreading plates in relation to the movement of the machine. In the same figure you can see an example of how the vanes are mounted, bearing in mind that the holes in each plate are not symmetrical.

To make it easier to adjust the KC-RD spreader, the plates are labelled *L (left) and R (right)*.

The holes in the plate that define the different fin positions are also labelled *F1 (hole 1); F2 (hole 2); F3 (hole 3), F4 (hole 4) and F5 (hole 5)*.

The vanes, in turn, are identified with the letter L (left) and R (right), followed by a number that identifies the length of the fin; (example: *R143 - right fin, length 143mm)*.

IMPORTANT: The spreader vanes are assembled according to the work to be carried out. See CHAP 12 of this manual!

TRAVEL DIRECTION

ADJUSTING THE MACHINE ACCORDING TO THE PRODUCT:

The spreading tables are an important tool in the machine adjustment process, as they provide approximate data for the proper spreading of some of the most representative products. As such, it is important that you know the following product properties before consulting the tables.

- GRAIN TYPE - defines the shape and surface of the product;
- GRANULOMETRY - the relationship between grain sizes;
- SPECIFIC WEIGHT OR DENSITY - weight per unit volume (kg/dm^3).

In the spreading tables (CHAP 12 of this manual), you will find the information you need to adjust your machine according to the properties of the product to be spread.

IMPORTANT: Select the spreading table based on the product's properties and not its designation!

Note: The properties of different types of products can differ to such an extent that incorrectly selecting a spreading chart whose values do not correspond to the properties of the product you are going to apply can result in poor spreading and consequent crop damage.

- **CONTACT WITH CHEMICAL PRODUCTS:**

During filling, adjustments or testing, you may come into contact with fertiliser or other chemical substances. If this is the case, wear suitable protective clothing, gloves, a mask and footwear. Contact with chemicals can cause serious bodily injury.

WARNING: Avoid contact with fertiliser or other chemical substances!

WARNING: Before handling the chemicals to be spread, carefully read the product information sheet that should be available to you from the product supplier!

- **DETERMINE THE TYPE OF PRODUCT BY ITS SHAPE AND SURFACE:**

TYPE	SURFACE	FORM
GRANULATED	Rough	Approximately round; sometimes ovalised; no sharp Borders.
GRANULATED	Very smooth	Approximately round; sometimes ovalised; no sharp Borders.
GRANULATED	--	Granulated organic material.
SLUG PELLETS	Variable	The grains can vary between the various types; they can have different characteristics.
MINERAL	Very rough	Angular, with sharp corners and Borders.
PEARLED	Very smooth	Completely round, hollow, sometimes with a small cavity on the surface.
CRYSTALLINE	Smooth	Elongated, cylindrical, round-shaped, hollow, sometimes with a small cavity on the surface.
MIXED	Mixture of granules with different surfaces; can be differentiated according to previous descriptions	Mixture of granules with different shapes; can be differentiated according to the previous descriptions.

Table 6.1 - Characterisation of some product types.

Figure 6.3 - Some product types.

- **DETERMINE THE TYPE OF PRODUCT BY ITS GRANULOMETRY:**

Determining the granulometry of a product means "measuring" the relationship between the number of grains of different sizes. To be able to carry out this operation, you must first have a grain sizer (not supplied with the machine) identical to the one in the following figure *(Figure 6.4)*.

The grain sizer usually has 4 compartments separated by sieves. The meshes of the sieves are different sizes so that they can separate the grains into different groups depending on their size.

Figure 6.4 - Example of a fertiliser grain sizer

By way of example, we present the following procedure that you should always adopt to determine the granulometry of products using this type of grain sizer:

- Fill the compartment whose sieve has the widest mesh and keep the other compartments closed with the lid *(Figure 6.5)*;

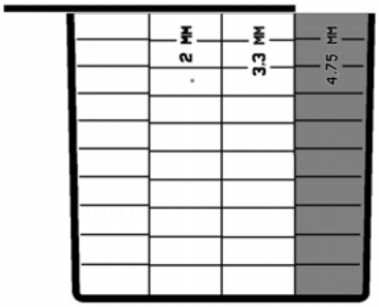


Figure 6.5 - grain sizer filling

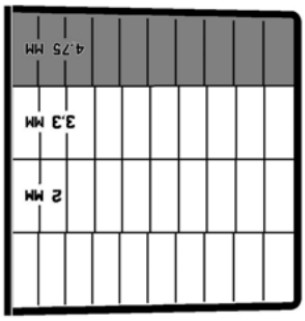


Figure 6.6 - Ex. preparation of results

- Close the grain sizer with the cover and turn it 90º *(Figure 6.5)*;
- Hold the position and shake the sieve until the smallest grains no longer pass through the smallest sieves;
- Place the grain sizer in its normal position and read the results in the different compartments *(Figure 6.6)*;

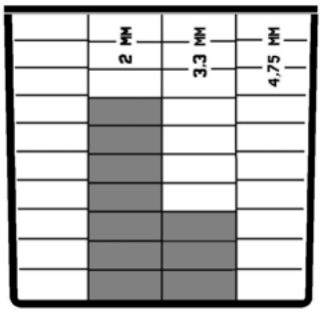


Figure 6.7 - Ex. particle size reading

CONCLUSIONS:

- The results obtained *(Figure 6.6)* show a grain size of **0-70-30-0**;
- The sum of the percentages must always be 100%,
- With small, spherical grains it may be necessary to round up the values.

ON THE MEASUREMENT:

- Repeat the procedure 3 times, taking samples at random, and recording the values obtained. Then calculate the average.
- If 10% or more of the product's grains are smaller than 2.0mm, this type of product is usually difficult to spread, especially in medium/long-range applications.
- If 80% to 100% of the grains in the product are between 2.0 and 4.75mm in size, this product is usually easy to spread, regardless of the size of the remaining grains in the fertiliser.
- If 20% or more of the product's grains are larger than 4.75mm, it will be difficult to spread.

IMPORTANT: Granulometry is the most important product property when it comes to spreading quality.

- **DETERMINE THE PRODUCT'S SPECIFIC WEIGHT:**

The specific weight is the weight measured in kg of 1 litre of fertiliser and can be given as kg/l = kg/dm^3 or tonne/m3.

To determine the specific weight of the product to be applied, you need a scale and a measuring glass *(Figure 6.8)*.

Figure 6.8 - Ex. equipment for determining specific weight

PROCEDURE:

- Hang the clean, dry glass on the scales;
- Calibrate the scale to 0;
- Fill the measuring beaker with the product;
- Tap the glass on a stable surface 4 to 5 times to "compact" the product;
- Top up the measuring beaker;
- Weigh the product;
- Repeat the procedure 3 times, record the values obtained and calculate their average.

- **WORKING WIDTH *(L)***

The definition of the working width (L) is another variable that must be taken into account when applying the product. The working width can be conditioned, as has already been explained, by the field conditions and the characteristics of the product to be spread. The working width should be chosen using the spreading tables - chapter 12 of this manual.

Spreading fertiliser or seeds with plate spreaders always leaves a lower concentration of the product at the ends of the working range (triangular spreading curve). For even spreading, each pass must be made in such a way that there is an overlap over the previous pass, to compensate for the ends where the product concentration is lower (see illustrative example in figure 4.8).

IMPORTANT: The overlapping is done to even out the concentration of product over the entire working surface!

The range of the KC-RD spreader is, for most products to be spread, more than 12m wide, which can make it difficult to see and locate between passes.

If your spreader is not equipped with a GPS system and you want to achieve uniform spreading, we advise you to mark the field beforehand, after determining the working width, in order to help you when spreading *(Figure 6.9)*.

IMPORTANT: Make a mark on the field, e.g. with stakes, to guide you when driving.

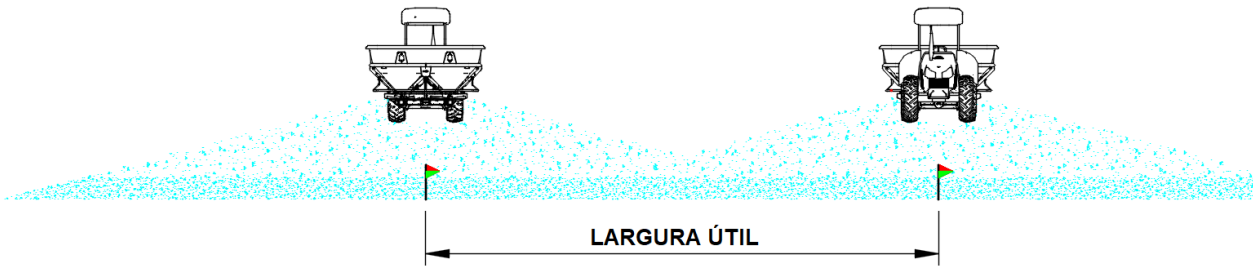


Figure 6.9 - Example of marking the passages on the field

- **PROTECT THE ENVIRONMENT:**

Applying doses that are too high or spreading chemical products outside the margins of the field have serious consequences for the environment. Protect the environment by using correct product doses and working methods that guarantee precision in their application.

The KC-RD spreader is built with the possibility of adapting border limitation systems. If you would like information on this optional equipment, please contact our technical and commercial services.

- **MARGIN REGULATION**

As we've seen before, it is sometimes necessary to make adjustments to the border of the field (see the examples shown in figures 4.5, page 10 of this instruction manual). With the KC-RD Spreader you can carry out this work easily and precisely. To do this, the optional devices shown in CHAP 4 of these instructions must be fitted to the machine.

- **LIMIT THE SPREAD FROM THE BORDER USING THE LATERAL BORDER LIMITER**

If you want to limit the spreading to complete half of the spreading scheme *(Figure 6.9)*, limitation "from the Border", you should proceed as follows:

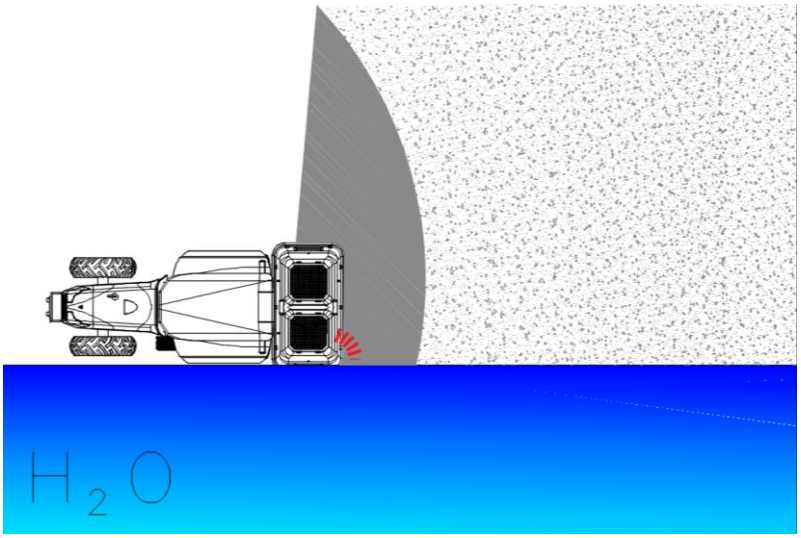
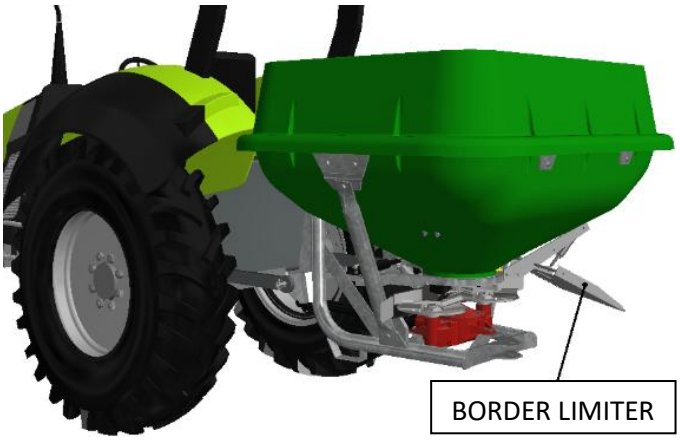


Figure 6.10 - Spreading limitated "from the Border"

- From the tractor, activate the side Border limiter, which must initially be in the retracted position;
- Position the tractor next to the borde, as shown in the image opposite *(Figure 6.10),*
- Drive parallel to the Borde during application.

In this way it is possible to complete the spreading scheme, for most products, with total coverage. With this Border limiter it is not possible to achieve triangular or trapezoidal spreading schemes.

The lateral Border limiter makes it possible to reduce the environmental impact in situations where it is not permitted to spread products beyond the Border of the field *(Figure 6.10)*.



This system can be fitted to the KC-RD spreader on the left or right of the machine.

Unless specified by the customer, the standard Side Limiter will be manufactured and mounted on the right-hand side of the machine, as shown in the figure *(Figure 6.11)*.

Figure 6.11 - Standard limiter installation

- **FILLING THE MACHINE**

During filling, adjustments or testing, you may come into contact with fertiliser or other chemical substances. If this is the case, wear suitable protective clothing and footwear. Contact with chemicals can cause personal injury.

WARNING: Avoid contact with fertiliser or other chemical substances!

WARNING: Before handling the chemicals to be spread, carefully read the product information sheet that should be available to you from the product supplier!

Mixing various types of fertilisers can cause chemical reactions, resulting in the formation of vapours, solids or toxic liquids. The results can cause personal injury or material damage.

Only use combinations of fertilisers if these are permitted by the manufacturers. If in doubt, consult your supplier.

Always read the safety data sheets of the products you are spreading and follow the instructions on them.

WARNING: Chemical reactions can cause serious bodily injury and damage to equipment and nature!

When filling the spreader, you will have to handle large quantities of products, often chemicals. To do this, use stable means of transport and lifting.

Never stand under suspended volumes when filling the machine.

If you need to leave the tractor, switch it off and remove the key from the ignition.

Never set the machine down on the field during filling operations. Suspended machines are designed to be loaded in the suspended position on the tractor.

Do not put the full machine down on the floor. This could damage your machine!

Make sure that other unprotected people and animals do not approach the equipment during work.

- **THE FIRST PASSAGE**

As mentioned above, this machine has spreading tables to help you regulate the equipment. The tables show data for the main fertilisers and seeds used in agriculture in general.

However, there may be a need to adjust the flow rate of a particular product depending on its properties (shape, granulometry, density) which, as we have seen, vary relatively easily from batch to batch.

To check the spreading rate, we recommend carrying out the following test, which is shown below as an example.

- Empty bags of product into the hopper (e.g. 100kg);
- Let's assume that we want to spread NAC 27% with the following characteristics, already determined, as explained in this manual.
- Granulometry: 00-10-80-10;
- Density: ~1.05 kg/dm^3;
- Dose to be spread: 300 kg/ha;
- Working width: 18m,
- Tractor forward speed: 10 km/h.

On page 54 - CHAP 12 (spreading tables) - we find a product whose characteristics are similar to the one we're going to apply *(Figure 6.12)*.

NAC 27% (00-00-90-10) - DENSITY: 1.00 kg/dm³ **(benchmark)**

Position Scale	Flow (kg/min)	Tractor speed (km/h)					working width (m)	Vanes position	
		6	8	10	12	14		143	150
27	22,3	124	93	74	62	53			
30	27,5	153	115	92	76	65			
33	37,1	206	155	124	103	88			
36	46,7	259	194	156	130	111			
39	56,2	312	234	187	156	134			
42	65,8	366	274	219	183	157			
45	78,0	434	325	260	217	186			
48				301	251	215	18	F3	F1
51	102,5	569	427	342	285	244			
54	112,4	624	468	375	312	268			
57	126,0	700	525	420	350	300			
60	139,7	776	582	466	388	333			
63	153,3	852	639	511	426	365			
66	166,9	927	695	556	464	397			
69	178,7	993	745	596	496	426			
72	190,6	1059	794	635	529	454			

Figure 6.12 - Information taken from the spread tables

As you can see in the figure above, these are the values closest to the desired ones.

- NAC 27%;
- Granulometry: 00-00-90-10;
- Density: ~1.00 kg/dm^3;
- Dose to be spread: 301 kg/ha, at a forward speed of 10km/h.
- Working width: 18m.
- Position of the spreading scales: Position 48

From the same table we take the data for mounting the vanes on the spreader plates. For this case we will have:

- D 143 and E 143 vanes in the holes F3
- D 150 and E 150 vanes in the holes F1

The assembly procedure for the vanes is described on page 24 of this instruction manual. Once the vanes have been assembled,

- Adjust the position on the spreading scales (always the same on both sides). In this case 48 for the dose of 301 kg/ha!
- Always set the PTO speed to 540rpm!

Now do the following calculation:

- $d = \frac{P*10000}{Q*L} = \frac{100*10000}{301*18} \cong 185\ metros$
- *d= distance travelled in metres;*
  P= weight of the product placed in the hopper;
  L= effective working width;
  Q= dose to be applied in kg/ha.

- **CONCLUSIONS:**
  - If the product is consumed before it has travelled the 185 metres, it must close the opening in the scale proportionally.
  - If after travelling the distance there is any fertiliser left in the hopper, you should open the opening on the scale proportionally.

WARNING: Adjustment and fine-tuning must be carried out exclusively by the operator, always with the tractor switched off and the key removed from the ignition.

- **DURING THE SPREADING**

During spreading, whenever possible, work with the tractor cab closed, as the dust from the products, when inhaled, can cause serious injury.

Make sure that the filters in the air intakes of the tractor cab are suitable for this type of work. Consult the tractor's user manual and, if in doubt, replace the filters.

If the tractor does not have a cab or if the cab insulation is not effective, wear personal protective equipment suitable for this type of work.

WARNING: Inhalation of chemicals is dangerous. The use of suitable protective equipment is mandatory!

When exposed to adverse environments, most products absorb water, which easily causes their characteristics to change. In certain cases, large blocks can form which directly interfere with the spreading scheme.

If you are going to work with the Spreader in an environment where there is humidity, we advise you to use a properly sealed cover screen, which is optional equipment for this machine. See the description of this equipment on page 9 of these manual.

Do not leave the product inside the Spreader for too long. The humidity in the air contributes to block formation.

Clean the spreader thoroughly after each use, including the metering mechanisms, plates, vanes, etc.).

SAFETY WARNINGS AND ACCIDENT PREVENTION CHAP7

The operator's safety or that of other people and animals exposed to the operation of this equipment is our main concern.

A significant proportion of the accidents recorded in the use of machinery and equipment are due to non-compliance with basic safety, regulation and equipment handling rules.

WARNING: It is mandatory to read the user manual carefully before starting any operation with the equipment.

WARNING: This machine may only be operated by qualified staff! Make sure that no one is near the equipment during adjustment and operation.

This manual has been developed with the aim of ensuring safe and effective actions relating to the operation and handling of the Centrifugal Spreaders.

Make sure you have the necessary knowledge to operate the spreaders and the tractor from which you are using the implement. Information on agricultural tractors should be consulted in the respective user or manufacturer's manual.

It is the operator's responsibility to read, understand and comply with all the safety actions described in this manual before starting to work with the Spreader. If you have any questions, please contact our technical and commercial services.

Remember, you are the key to safety. Good practices not only protect you, but also the people around you. Study the instructions in this manual and make them an integral part of your safety programme.

Please note that this safety section is exclusive to this type of machine (Centrifugal Spreader). Follow all the safety recommendations described in this manual and always bear in mind:

SAFETY IS YOUR RESPONSIBILITY, THE ASSERTIVENESS OF YOUR ACTIONS CAN PREVENT SERIOUS ACCIDENTS!

The following information is intended to alert the operator to prohibitions, dangers and requirements, as well as other important safety information when using Centrifugal spreaders.

It is forbidden to approach the equipment while it is in operation.

It is forbidden to leave the equipment with the ignition key in the tractor.

No flames or hot objects near the hydraulic components.

It is forbidden to carry out any maintenance while the equipment is in operation.

It is forbidden for individuals under the influence of alcoholic beverages or narcotics to manoeuvre this equipment.

Danger! Keep a safe distance from the spreader when it is suspended during loading and unloading manoeuvres.

Danger! The spreader can cause serious cuts.

Danger! The spreader can cause crushing of limbs.

Danger! The spreader can project fragments. Do not let people or animals near the operating equipment.

Danger! The hydraulic pressure in the equipment must not exceed 200 bar.

Personal protective gloves must be worn.

The use of personal protective shoes is mandatory.

You must wear a personal protective mask with a suitable filter.

OTHER IMPORTANT WARNINGS:

- Don't wear loose clothing, jewellery or other items that could get caught in the machine. If necessary, secure your hair properly.
- Switch off the tractor and remove the ignition key before carrying out any work.
- Take appropriate protective measures by wearing personal protection against dust and debris projection if the tractor does not have an enclosed cab.
- The use of this equipment by operators who are not in good health is prohibited.
- Always wear the personal protective equipment required by law, such as ear defenders, goggles, gloves, masks, safety footwear, etc.
- Respect environmental rules for the use of lubricants and/or other cleaning and maintenance products.
- Always have first aid equipment at hand.
- If you notice abnormal vibrations while using the equipment, stop immediately, switch off the equipment and the tractor and check the cause(s). Do not work with the equipment again until the problem has been resolved.
- Never work with the equipment if you detect leaks in the hydraulic elements.
- Drive carefully on uneven field.
- Carry out a risk analysis of the work site before any operation. Check if there are any obstacles that you need to pay special attention to (trees, walls, electricity or media poles, etc.).
- Never approach or allow to approach the machine when it is switched on, there is a high risk of being hit by the plates or projections.
- Before switching on the Spreader's plates, make sure that no one is near the machine.

CHECKING AND MAINTENANCE CHAP8

The use of machinery requires certain procedures to be taken into account, not only during operation, but also when checking and maintaining the equipment. These actions must be carried out with rigour because they directly affect the performance and durability of the equipment and the safety of the operators.
When carrying out checks and maintenance work, you should be aware of any hazards that may arise during these operations. This work must be carried out by qualified personnel. Please note the following warnings.

- **SAFETY WARNINGS**


Before carrying out any cleaning or maintenance work, switch off the tractor's engine and wait until all moving parts in the spreader have come to a standstill. Remove the key from the ignition!


All repair work should only be carried out in specialised workshops.


Welding work, work on the electrical and hydraulic system may only be carried out by specialised technicians.


Do not make any changes to the equipment's electrical or hydraulic circuits.


Centrifugal spreaders have cutting elements. Whenever possible, the cutting elements should be protected to avoid accidents.


All maintenance work must be carried out by trained personnel.


The use of appropriate protective equipment is mandatory for any maintenance work.


Spare parts must at least fulfil the technical requirements laid down by the manufacturer. This is ensured by using only original parts.


Make sure that maintenance and cleaning work is carried out under the appropriate safety conditions.

- **GENERAL MAINTENANCE - FREQUENCY**

Carry out a general check of your Spreader and any adjustments at the end of each working day (looseness, oil leaks, lack of lubrication, noises, foreign bodies, etc.). The frequency of other checks and maintenance should be carried out in accordance with the table below.
Note: Most of the components of the spreaders are secured with self-locking nuts. **For safety reasons, do not reuse self-locking nuts.**

WARNING: SPREADER CHECKS OR MAINTENANCE MUST BE CARRIED OUT WHEN THE TRACTOR IS STATIONARY AND WITHOUT THE KEY IN THE IGNITION.

POINTS TO BE CHECKED	DAILY	WEEKLY	ANNUALLY
LEAKS IN THE HYDRAULIC CIRCUIT	X		
GENERAL STRUCTURE INTEGRITY	X		
FOREIGN BODIES (clods, debris, stones, etc.) INSIDE THE GEARBOX	X		
GENERAL CONDITION OF PLATES AND VANES	X		
GENERAL CONDITION OF THE AGITATORS	X		
CARDAN SHAFT (state of repair and lubrication)	X		
BOLTING		X	
GEARBOX (noises; gaps; leaks, etc....)		X	
GENERAL CLEANING		X	
CRUSHING NETS AND ANTI-COMPACTION CONES		X	
AGITATOR BEARINGS			X
WEAR ELEMENTS			X

Table 8.1 - Checks to be carried out - frequency

ACTION TO TAKE	DAILY	WEEKLY	ANNUALLY
LUBRICATION	X		
CLEANING THE EQUIPMENT	X	X	
REPLACE AGITATOR BEARINGS AND RETAINERS (if necessary)			X
REPLACING LUBRICANT IN THE GEARBOXES			X
REPLACE VANNES (if necessary)			X
REPLACE AGITATORS (if necessary)			X

Table 8.2 - Preventive maintenance - frequency

Maintenance must be carried out at the defined intervals or whenever justified.
Pay attention to the procedures described below. These procedures are intended to help you carry out maintenance work on your Spreader in the most correct, safe and effective way.

- **Screws:** It is very important that you check the tightness of nuts and bolts 8 hours after first using the machine. Some components may need to be readjusted.

- **Leaks in the hydraulic circuit:** Whenever you detect a leak in any component of the hydraulic circuit, you should immediately have the damaged element repaired or even replaced. Oil leaks cause the equipment to lose efficiency and can lead to other serious machine malfunctions. Spilled hydraulic oil is a serious contributor to environmental pollution.

- **General integrity of the machine frame:** Make sure that the machine frame and its optional equipment are in good condition.

- **Foreign bodies in the machine:** Remove any debris that sometimes accumulates at the bottom of the hopper, next to the dewatering nets, or even next to the agitators. These bodies can cause blockages and thus reduce the dose of product to be spread.

- **Plates and vanes:** Check the state of repair of the Spreader's plates and vanes on a daily basis. If any of these elements show obvious signs of wear or damage, they should be replaced.

- **Agitators:** Regularly check the state of repair of the Agitators.

- **Cardan shaft:** The Cardan shaft (Figure 8.2) is one of the components you should check every day you work with the machine and, in this particular case, lubricate properly at the same intervals.

    - **Inspection:** Check the general operation of the Cardan shaft. If you detect anything strange (noise and vibrations), stop the machine safely and check the anomaly. Correct the problem before putting it back into operation.
    - **Lubrication:** The Cardan shaft should be lubricated daily with **NLGI 1-4 grease.**

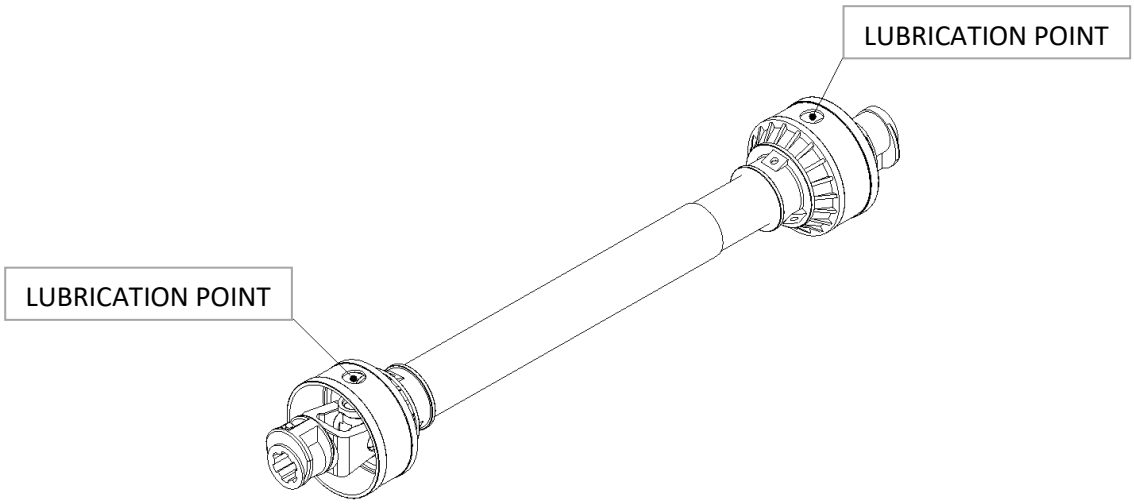


Figure 8.2 - Example of a transmission cardan shaft

To lubricate the points indicated, use a lubrication pump identical to the one in the following figure *(Figure 8.3)*.

Figure 8.3 - Example of a lubrication pump

- **Gearbox:** Check the condition of this vital machine element carefully.
    - **Inspection:** If you detect noises, looseness or lubricant leaks, you must immediately stop the machine safely and identify their source. Have the damaged component(s) repaired or replaced if necessary.

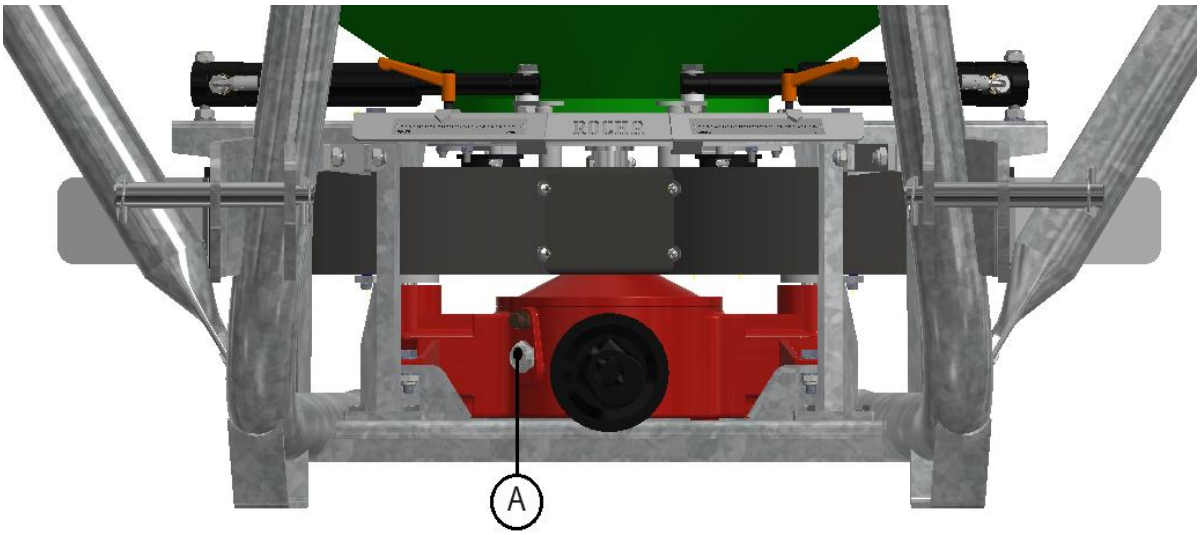


Figure 8.4 - Lubricant level of the Gearbox

- **Lubrication:** Under normal working conditions, gearboxes do not require lubricant replacement. However, we recommend replacing it after 10 years of operation. This interval should be halved (5 years) if the spreader is subjected to intensive work and under severe conditions of fertiliser dust and/or frequent water jets (machine cleaning operations).

- **Checking the lubricant level:** To check the lubricant level of the Gearbox, proceed as follows:
    - Unscrew the level plug - **A** - from the housing (sump).
    - The lubricant level is correct when it reaches the bottom Border of the hole.
    - If the level is low, you should replace the lubricant up to the point mentioned.
    - Tighten the level cue again.

Important: The lubricant to be applied to the box should be **GALP TRANSOIL HP FL 90**, or equivalent. The box contains a total of approximately **1.2 litres** of lubricant.

WARNING: REMOVE OIL IN AN ENVIRONMENTALLY FRIENDLY MANNER. FIND OUT ABOUT THE REGULATIONS IN FORCE!

- **Springtooth nets and anti-compaction cones:**
  - The springtooth nets (Figure 4.1), as already explained, prevent foreign bodies from passing through to the spreader mechanism.
    Check that they are in good condition.
  - The integrity of the Anti-Compaction Cones (Figure 4.1) is very important, as these elements have a direct effect on the proper functioning of the agitator and this, in turn, on the efficiency of the spreading.
  - After bringing the machine to a safe stop, lift the springtooth nets and check that the Anti-Compaction Cones are in good working order. If in doubt, replace them.

- **General cleaning:** Most of the products to be spread, especially fertilisers, are very corrosive and can therefore cause oxidation in some of the machine's components. This is mainly why cleaning the spreader is very important for its preservation.
  - Wash the spreader dosing mechanism properly (Figure 4.2).
  - If washing at high pressure, do not direct the water jet at the machine's electrical and hydraulic elements, or at the machine's stickers.
  - After washing and drying the equipment, protect the stainless-steel metal parts with an environmentally friendly anti-corrosive agent.

MALFUNCTION PROCEDURE CHAP9

When handling spreaders, abnormal situations may arise that interfere with their correct operation or prevent them from working. The following table lists the most common situations and how to solve them.

MALFUNCTION	CAUSE	SOLUTION
Product spreading is not uniform.	- Obstruction of the dosing plates; - The position of the scale is not correct; - Spreading vanes incorrectly fitted; - The PTO speed is not at 540 rpm, - The spreader is not levelled; - Misinterpretation of the spreading tables, - The agitator is crushing the product.	- Clear the dosing plates; - Check and adjust the position of the scale; - Confirm the assembly instructions given in the tables; - Adjust the PTO speed, - Level the spreader as indicated in this manual; - Read the instructions in chapter 12 carefully, - Check the condition of the agitator and replace the bearing if necessary.
Excess product during application.	- The product is of poor quality (soft, broken, several types mixed together); - The number of revolutions of the distribution plates is too high, - The tractor speed is slow.	- Check the granulometry of the product (see chapter 6 of this user manual). - Adjust the PTO speed to 540 rpm, - Adjust the tractor speed (See chapter 12 of these user manual).
Product failure during application.	- Poor grain quality. 80% of the grains must have a diameter between 2.0 and 4.75 mm; - Misinterpretation of the tables.	- Check the granulometry of the product (See chapter 6 of these manual). - Check the data in the most approximate table (See chapter 12 of these manual). - Work with a shorter range.

MALFUNCTION	CAUSE	SOLUTION
Excessive vibration or noise.	- Slack in the PTO crossheads due to excessive wear;	- Replace the crossheads according to the instructions in the Cardan shaft manual;
	- Cardan shaft assembly is not correct	- Check the TPO shaft`s length and working angle (see chapter 6 of these user manual).
	- Excessive slack in the tractor's hydraulic arms;	- Stabilise the tractor arms, keeping the machine centred;
	- The spreading plate is damaged.	- Repair the plate or if in doubt replace it.
	- The agitator is damaged,	- Replace the agitator,
	- The gearbox is damaged.	- Check the gearbox conditions;
		- Check the oil level;
		- If the problem persists, contact your dealer.

TRANSPORT, HANDLING AND STORAGE CHAP10

Transporting or moving the KC RD spreader when it is not coupled to the tractor, is an operation that requires certain precautions. **Before transporting the machine, pay attention to the following warnings.**

1. SAFETY WARNINGS


All work must be carried out by properly trained and authorised personnel.


Use appropriate means of transport and lifting devices that comply with the rules and are in good condition.


Before selecting the transport devices, check the weight of the machine. The exact weight of each model is engraved on the machine's nameplate.


Determine the transport route in advance and eliminate possible obstacles.


Check that all the devices to be used are operational.


Secure all devices that could cause danger, even if they are only in use for a short period of time.


Always move empty equipment with care.


Ensure the stability of the machine during handling or transport. If necessary, adjust the length of the cables or straps to ensure the stability of the machine.


Transport the machine as close to the field as possible.


Field the machine carefully on the loading platform of the transport vehicle or on firm field.

DISMANTLING THE MACHINE CHAP11

2. ENVIRONMENTAL RESPONSIBILITY

Protecting the environment is a growing concern for machinery and equipment manufacturers. The selection of recyclable materials, the use of biodegradable lubricants and the concern to build increasingly energy-efficient machines are some examples of this responsibility.

By ensuring the regular maintenance of their machinery and equipment, owners are contributing not only to optimising consumption, but also to reducing atmospheric pollution and environmental noise and, consequently, to the health of the planet.

- **DISMANTLING THE EQUIPMENT**

At the end of its useful life, don't dispose of this equipment in the environment. As well as contributing to environmental pollution, you are endangering people and animals.

When "disposing" of the machine, you must take into account the environmental regulations in force with regard to the environment and the recycling of the materials that make it up.

The materials used in the construction of this equipment are 100% recyclable. Materials must be grouped by type before collection for dismantling.

Turn to companies that specialise in collecting and dismantling this type of equipment, or if in doubt, contact the manufacturer or legal representative of the equipment.

SCATTERING TABLES CHAP12

TECHNICAL ADVICE ON SPREADING

The quality of mechanised fertiliser and seed spreading depends largely on the methods used in the field by the machine operator.

1) At the headfields and during manoeuvring operations, you should stop spreading and if possible, switch off the PTO. When starting a pass, you should avoid spreading product beyond the limits of the field. To this end, and taking into account the equipment's settings, only activate spreading once the machine is in a position where this is guaranteed.

2) Fertiliser and seed grains are generally very light and once thrown, their trajectory can vary depending on the wind. During spreading operations, if the wind speed is very high (over 3m/s), you should stop work, otherwise the product may be spread very unevenly on the field.

3) Fertilisers with a regular grain size promote uniform spreading. We suggest you take this into account when selecting the product(s) to apply.

WARNING: Spreading uniformity can vary significantly depending on the environmental conditions present. Wind and uneven field are factors to take into account during work.

WARNING: The spreading tests carried out with this equipment were carried out in the laboratory, under optimum atmospheric conditions, in the absence of field irregularities and with products of small size variations.

4) The diagram on the following page *(Figure 12.1)* shows, by way of example, one of several possible approaches to spreading fertiliser or seeds on the field. The aim is to ensure complete spreading, with no gaps or repetitions over the area to be covered, while respecting the standards and limitations of the field.

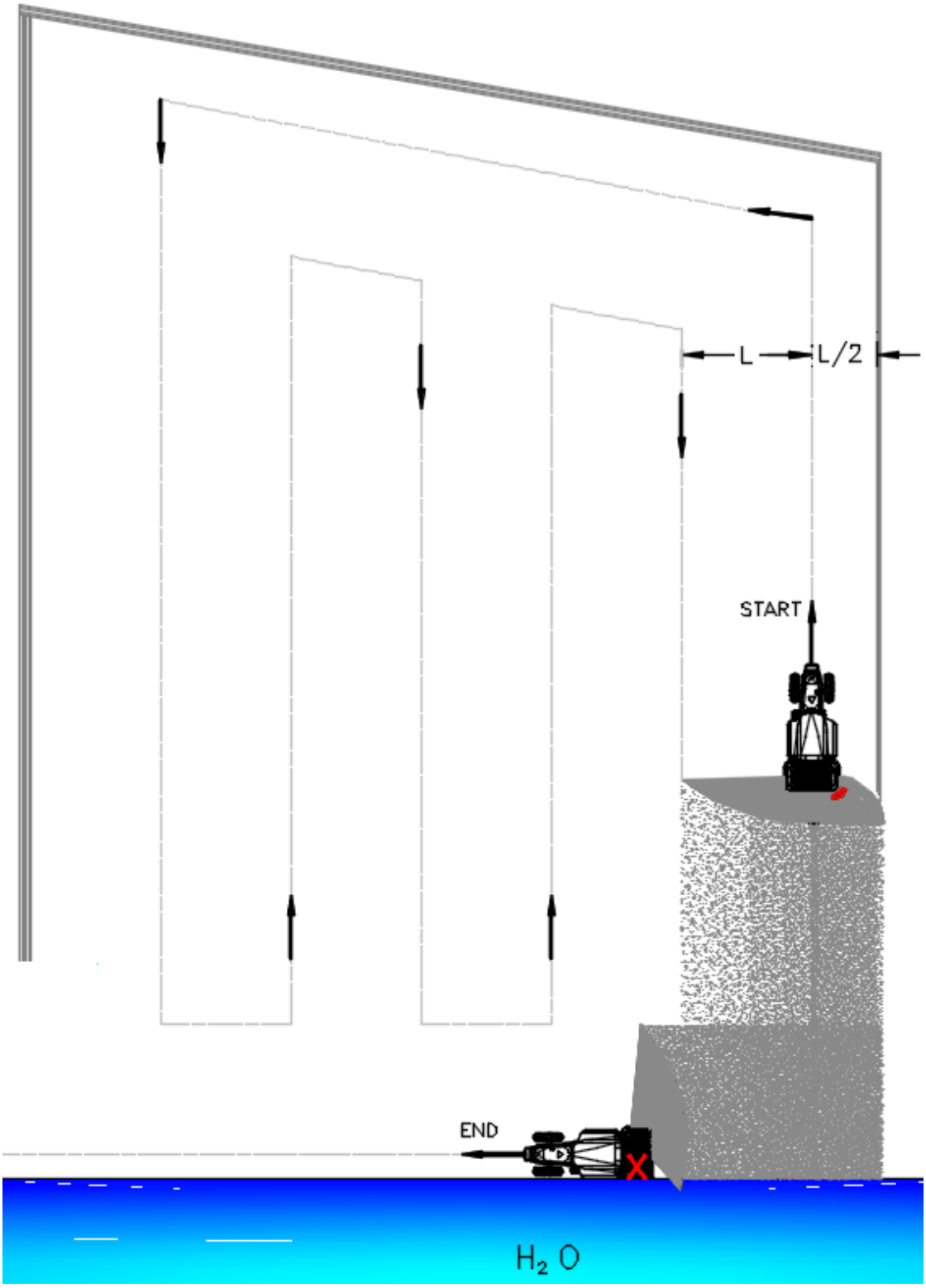


Figure 12.1 - Example of spreading on the field

CONSULTATION AND INTERPRETATION OF DISTRIBUTION TABLES

The spreading tables presented in this CHAP refer to some of the fertilisers and seeds most commonly used in agriculture in general. These tables were drawn up by means of rigorous tests on the KC-RD Spreader, carried out in an accredited laboratory (EECAS), and as such under optimum conditions for analysing and obtaining results.

The tests were carried out in accordance with the specifications of the UNE-EN 13739-2 standard, both in analysing the uniformity of transversal spreading and in analysing the efficiency of the Border Limiters (from the Border and to the Border).

In the transversal spreading uniformity tests, it was possible to verify that the coefficient of variation (CV) was less than 15%, as required by the aforementioned standard.

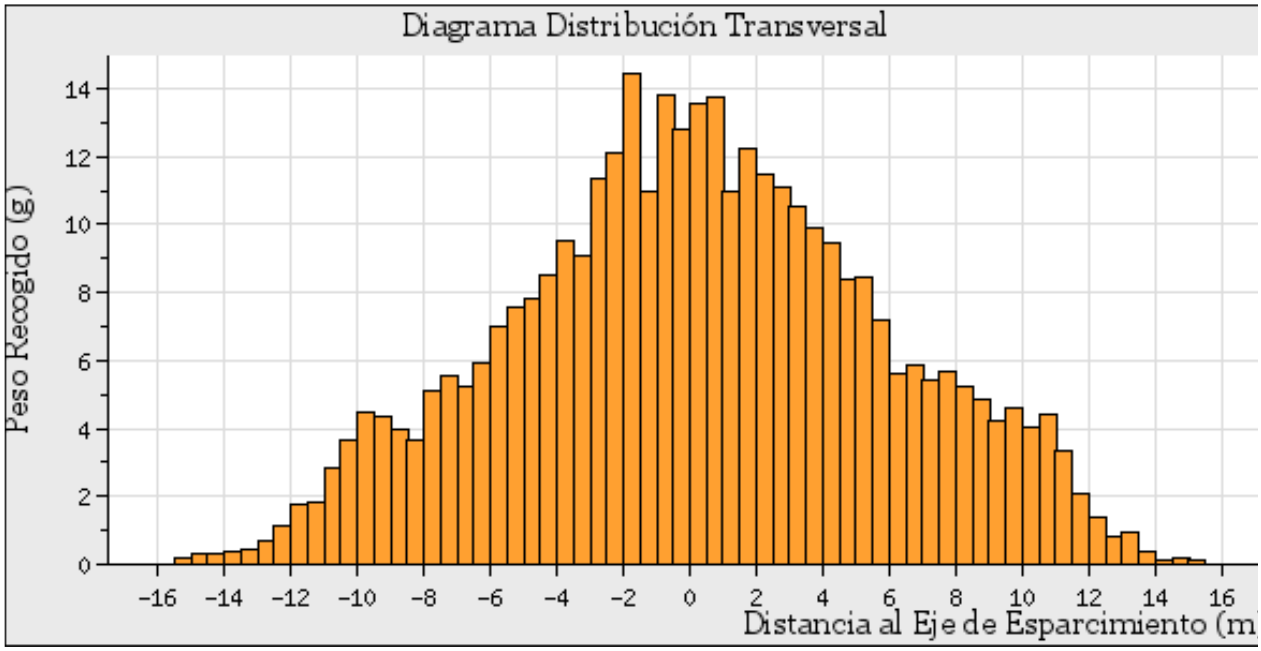


Figure 12.2 - Ex. transverse spreading with Nac27% @18m with CV<15%

The following example shows how to consult and interpret the spread tables in order to obtain an optimised spread. Always use this method to determine the best possible setting for your KC-RD spreader.

- **EXAMPLE:**

Product to be spread: NAC 27% (05-05-80-10) - Density: 1.06 kg/dm³

Dose to be spread: 300 kg/ha

Working width: 18m

Tractor forward speed: 10 km/h

a) Select table for **NAC 27%**; Useful working width **18m**

b) Select the value closest to the desired dose (300kg/ha) in the column referring to the tractor's forward speed (10km/h). The closest value in this case is **301kg/ha, as shown** in the following figure.

NAC 27% (00-00-90-10) - DENSITY: 1.00 kg/dm³ **(benchmark)**

Position Scale	Flow (kg/min)	Tractor speed (km/h)					working width (m)	Vanes position	
		6	8	10	12	14		143	150
27	22,3	124	93	74	62	53			
30	27,5	153	115	92	76	65			
33	37,1	206	155	124	103	88			
36	46,7	259	194	156	130	111			
39	56,2	312	234	187	156	134			
42	65,8	366	274	219	183	157			
45	78,0	434	325	260	217	186			
48				301	251	215	18	F3	F1
51	102,5	569	427	342	285	244			
54	112,4	624	468	375	312	268			
57	126,0	700	525	420	350	300			
60	139,7	776	582	466	388	333			
63	153,3	852	639	511	426	365			
66	166,9	927	695	556	464	397			
69	178,7	993	745	596	496	426			
72	190,6	1059	794	635	529	454			

Figure 12.5 - Example of a table query

c) The table also provides data for adjusting the scales and fitting the VANES according to the desired results.
   - Scale adjustment position: 48
   - VANES to be mounted: (D150 + E150) in hole F1; and (D143 + E143) in hole F3 *(see mounting example on page 24 of this manual)*.

Note: The rotational speed of the PTO must always be 540 rpm.

NAC 27% (00-00-90-10) - DENSITY: 1.00 kg/dm³ (benchmark)

Position Scale	Flow (kg/min)	Tractor speed (km/h)					working width (m)	Vanes position	
		6	8	10	12	14		143	150
24	17,0	121	91	73	61	52	14	F3	F1
27	22,3	159	119	95	79	68			
30	27,5	196	147	118	98	84			
33	37,1	265	199	159	132	114			
36	46,7	333	250	200	167	143			
39	56,2	402	301	241	201	172			
42	65,8	470	353	282	235	201			
45	78,0	557	418	334	279	239			
48	90,3	645	484	387	322	276			
51	102,5	732	549	439	366	314			
54	112,4	803	602	482	401	344			
57	126,0	900	675	540	450	386			
60	139,7	998	748	599	499	428			
63	153,3	1095	821	657	547	469			

24	17,0	106	80	64	53	46	16	F3	F1
27	22,3	139	104	83	70	60			
30	27,5	172	129	103	86	74			
33	37,1	232	174	139	116	99			
36	46,7	292	219	175	146	125			
39	56,2	351	264	211	176	151			
42	65,8	411	308	247	206	176			
45	78,0	488	366	293	244	209			
48	90,3	564	423	339	282	242			
51	102,5	641	480	384	320	275			
54	112,4	703	527	422	351	301			
57	126,0	788	591	473	394	338			
60	139,7	873	655	524	436	374			
63	153,3	958	719	575	479	411			
66	166,9	1043	782	626	522	447			

NAC 27% (00-00-90-10) - DENSITY: 1.00 kg/dm³ (benchmark)

Position Scale	Flow (kg/min)	Tractor speed (km/h)					working width (m)	Vanes position	
		6	8	10	12	14		143	150
27	22,3	124	93	74	62	53	18	F3	F1
30	27,5	153	115	92	76	65			
33	37,1	206	155	124	103	88			
36	46,7	259	194	156	130	111			
39	56,2	312	234	187	156	134			
42	65,8	366	274	219	183	157			
45	78,0	434	325	260	217	186			
48	90,3	502	376	301	251	215			
51	102,5	569	427	342	285	244			
54	112,4	624	468	375	312	268			
57	126,0	700	525	420	350	300			
60	139,7	776	582	466	388	333			
63	153,3	852	639	511	426	365			
66	166,9	927	695	556	464	397			
69	178,7	993	745	596	496	426			
72	190,6	1059	794	635	529	454			

27	22,3	111	83	67	56	48	20	F3	F1
30	27,5	138	103	83	69	59			
33	37,1	185	139	111	93	79			
36	46,7	233	175	140	117	100			
39	56,2	281	211	169	141	120			
42	65,8	329	247	197	165	141			
45	78,0	390	293	234	195	167			
48	90,3	451	339	271	226	193			
51	102,5	513	384	308	256	220			
54	112,4	562	422	337	281	241			
57	126,0	630	473	378	315	270			
60	139,7	698	524	419	349	299			
63	153,3	766	575	460	383	328			
66	166,9	835	626	501	417	358			
69	178,7	894	670	536	447	383			
72	190,6	953	715	572	476	408			
75	202,4	1012	759	607	506	434			

NPK 15-15-15 (05-10-85-00) - DENSITY: 1.00 kg/dm³ (benchmark)

Position Scale	Flow (kg/min)	Tractor speed (km/h)					Working width (m)	Vanes position	
		6	8	10	12	14		143	150
24	21,5	154	115	92	77	66	14	F4	F1
27	27,8	198	149	119	99	85			
30	34,0	243	182	146	121	104			
33	44,8	320	240	192	160	137			
36	55,6	397	298	238	198	170			
39	66,3	474	355	284	237	203			
42	77,1	551	413	330	275	236			
45	90,5	647	485	388	323	277			
48	104,0	743	557	446	371	318			
51	117,4	838	629	503	419	359			
54	130,8	934	701	561	467	400			
57	144,8	1034	775	620	517	443			
60	158,7	1134	850	680	567	486			
63	172,7	1233	925	740	617	529			
66	186,6	1333	1000	800	666	571			

24	21,5	135	101	81	67	58	16	F4	F1
27	27,8	173	130	104	87	74			
30	34,0	213	159	128	106	91			
33	44,8	280	210	168	140	120			
36	55,6	347	260	208	174	149			
39	66,3	415	311	249	207	178			
42	77,1	482	361	289	241	207			
45	90,5	566	424	339	283	242			
48	104,0	650	487	390	325	278			
51	117,4	734	550	440	367	314			
54	130,8	818	613	491	409	350			
57	144,8	905	679	543	452	388			
60	158,7	992	744	595	496	425			
63	172,7	1079	809	647	540	462			
66	186,6	1166	875	700	583	500			
69	199,4	1246	935	748	623	534			

NPK 15-15-15 (05-10-85-00) - DENSITY: 1.00 kg/dm³ (benchmark)

Position Scale	Flow (kg/min)	Tractor speed (km/h)					Working width (m)	Vanes position	
		6	8	10	12	14		143	150
27	27,8	154	116	93	77	66	18	F4	F1
30	34,0	189	142	113	94	81			
33	44,8	249	187	149	124	107			
36	55,6	309	232	185	154	132			
39	66,3	369	276	221	184	158			
42	77,1	428	321	257	214	184			
45	90,5	503	377	302	251	216			
48	104,0	578	433	347	289	248			
51	117,4	652	489	391	326	279			
54	130,8	727	545	436	363	311			
57	144,8	804	603	483	402	345			
60	158,7	882	661	529	441	378			
63	172,7	959	719	576	480	411			
66	186,6	1037	778	622	518	444			
69	199,4	1108	831	665	554	475			
72	212,2	1179	884	707	589	505			
75	225,0	1250	938	750	625	536			
78	237,8	1321	991	793	661	566			

30	34,0	170	128	102	85	73	20	F4	F1
33	44,8	224	168	134	112	96			
36	55,6	278	208	167	139	119			
39	66,3	332	249	199	166	142			
42	77,1	386	289	231	193	165			
45	90,5	453	339	272	226	194			
48	104,0	520	390	312	260	223			
51	117,4	587	440	352	293	252			
54	130,8	654	491	392	327	280			
57	144,8	724	543	434	362	310			
60	158,7	794	595	476	397	340			
63	172,7	863	647	518	432	370			
66	186,6	933	700	560	467	400			
69	199,4	997	748	598	499	427			
72	212,2	1061	796	637	531	455			
75	225,0	1125	844	675	563	482			
78	237,8	1189	892	713	595	510			
81	251,7	1259	944	755	629	539			
84	265,6	1328	996	797	664	569			

NPK 15-15-15 (05-10-85-00) - DENSITY: 1.00 kg/dm³ (benchmark)

Position Scale	Flow (kg/min)	Tractor speed (km/h)					Working width (m)	Vanes position	
		6	8	10	12	14		143	150
30	34,0	155	116	93	77	66	22	F4	F1
33	44,8	204	153	122	102	87			
36	55,6	253	189	152	126	108			
39	66,3	302	226	181	151	129			
42	77,1	350	263	210	175	150			
45	90,5	412	309	247	206	176			
48	104,0	473	354	284	236	203			
51	117,4	534	400	320	267	229			
54	130,8	595	446	357	297	255			
57	144,8	658	493	395	329	282			
60	158,7	721	541	433	361	309			
63	172,7	785	589	471	392	336			
66	186,6	848	636	509	424	364			
69	199,4	906	680	544	453	388			
72	212,2	965	723	579	482	413			
75	225,0	1023	767	614	511	438			
78	237,8	1081	811	649	540	463			
81	251,7	1144	858	686	572	490			
84	265,6	1207	905	724	604	517			

BARLEY (00-00-00-00) - DENSITY: 0.00 kg/dm³ (benchmark)

Position Scale	Flow (kg/min)	Tractor speed (km/h)					Working width (m)	Vanes position	
		6	8	10	12	14		143	150
39	13,8	172	129	103	86	74	8	F3	F1
42	16,9	211	158	127	106	91			
45	21,4	267	200	160	134	115			
48	25,9	323	242	194	162	138			
51	30,3	379	284	227	190	162			
54	34,8	435	326	261	218	186			
57	40,3	503	377	302	252	216			
60	45,7	571	428	343	286	245			
63	51,2	639	480	384	320	274			
66	56,6	708	531	425	354	303			
39	13,8	138	103	83	69	59	10	F3	F1
42	16,9	169	127	101	85	72			
45	21,4	214	160	128	107	92			
48	25,9	259	194	155	129	111			
51	30,3	303	227	182	152	130			
54	34,8	348	261	209	174	149			
57	40,3	403	302	242	201	173			
60	45,7	457	343	274	229	196			
63	51,2	512	384	307	256	219			
66	56,6	566	425	340	283	243			
69	57,8	620	465	372	310	266			
72	58,9	674	506	404	337	289			
75	60,1	731	548	438	365	313			
78	61,2	787	590	472	394	337			

BARLEY (00-00-00-00) - DENSITY: 0.00 kg/dm³ (benchmark)

Position Scale	Flow (kg/min)	Tractor speed (km/h)					Working width (m)	Vanes position	
		6	8	10	12	14		143	150
42	16,9	141	106	85	70	60	12	F3	F1
45	21,4	178	134	107	89	76			
48	25,9	215	162	129	108	92			
51	30,3	253	190	152	126	108			
54	34,8	290	218	174	145	124			
57	40,3	335	252	201	168	144			
60	45,7	381	286	229	190	163			
63	51,2	426	320	256	213	183			
66	56,6	472	354	283	236	202			
69	57,8	517	388	310	258	221			
72	58,9	562	421	337	281	241			
75	60,1	609	457	365	304	261			
78	61,2	656	492	394	328	281			
81	77,7	721	541	433	360	309			
84	94,3	785	589	471	393	337			

42	16,9	121	91	72	60	52	14	F3	F1
45	21,4	153	115	92	76	65			
48	25,9	185	138	111	92	79			
51	30,3	217	162	130	108	93			
54	34,8	249	186	149	124	107			
57	40,3	288	216	173	144	123			
60	45,7	326	245	196	163	140			
63	51,2	365	274	219	183	157			
66	56,6	404	303	243	202	173			
69	57,8	443	332	266	221	190			
72	58,9	481	361	289	241	206			
75	60,1	522	391	313	261	224			
78	61,2	562	422	337	281	241			
81	77,7	618	463	371	309	265			
84	94,3	673	505	404	337	289			

OATS (00-00-00-00) - DENSITY: 0.00 kg/dm³ (benchmark)

Position Scale	Flow (kg/min)	Tractor speed (km/h)					Working width (m)	Vanes position	
		6	8	10	12	14		143	150
27	6,6	82	61	49	41	35	8	F3	F1
30	8,6	108	81	65	54	46			
33	14,4	180	135	108	90	77			
36	20,1	252	189	151	126	108			
39	25,9	324	243	194	162	139			
42	31,7	396	297	237	198	170			
45	38,8	485	364	291	243	208			
48	45,9	574	431	344	287	246			
51	53,1	663	498	398	332	284			
30	8,6	86	65	52	43	37	10	F3	F1
33	14,4	144	108	86	72	62			
36	20,1	201	151	121	101	86			
39	25,9	259	194	155	130	111			
42	31,7	317	237	190	158	136			
45	38,8	388	291	233	194	166			
48	45,9	459	344	276	230	197			
51	53,1	531	398	318	265	227			
54	60,2	602	452	361	301	258			
30	8,6	72	54	43	36	31	12	F3	F1
33	14,4	120	90	72	60	51			
36	20,1	168	126	101	84	72			
39	25,9	216	162	130	108	93			
42	31,7	264	198	158	132	113			
45	38,8	323	243	194	162	139			
48	45,9	383	287	230	191	164			
51	53,1	442	332	265	221	190			
54	60,2	502	376	301	251	215			
57	69,0	575	431	345	288	246			
60	77,8	648	486	389	324	278			

UREA (00-05-90-05) - DENSITY: 0.94 kg/dm³ (benchmark)

Position Scale	Flow (kg/min)	Tractor speed (km/h)					Working width (m)	Vanes position	
		6	8	10	12	14		143	150
21	9,2	92	69	55	46	39	10	F3	F1
24	13,7	137	103	82	69	59			
27	18,2	182	137	109	91	78			
30	22,8	228	171	137	114	98			
33	30,0	300	225	180	150	129			
36	37,3	373	280	224	187	160			
39	44,6	446	335	268	223	191			
42	51,9	519	389	311	260	222			
45	60,9	609	457	365	304	261			
48	69,9	699	524	419	349	299			
51	78,8	788	591	473	394	338			
54	87,8	878	659	527	439	376			
57	97,6	976	732	586	488	418			
60	107,4	1074	806	644	537	460			
63	117,2	1172	879	703	586	502			
66	127,0	1270	953	762	635	544			
21	9,2	77	57	46	38	33	12	F3	F1
24	13,7	114	86	69	57	49			
27	18,2	152	114	91	76	65			
30	22,8	190	142	114	95	81			
33	30,0	250	188	150	125	107			
36	37,3	311	233	187	156	133			
39	44,6	372	279	223	186	159			
42	51,9	433	324	260	216	185			
45	60,9	507	381	304	254	217			
48	69,9	582	437	349	291	249			
51	78,8	657	493	394	328	282			
54	87,8	732	549	439	366	314			
57	97,6	813	610	488	407	349			
60	107,4	895	671	537	448	384			
63	117,2	977	733	586	488	419			
66	127,0	1058	794	635	529	454			
69	136,8	1140	855	684	570	489			
72	146,7	1222	917	733	611	524			

UREA (00-05-90-05) - DENSITY: 0.94 kg/dm³ (benchmark)

Position Scale	Flow (kg/min)	Tractor speed (km/h)					Working width (m)	Vanes position	
		6	8	10	12	14		143	150
24	13,7	98	73	59	49	42	14	F3	F1
27	18,2	130	98	78	65	56			
30	22,8	163	122	98	81	70			
33	30,0	215	161	129	107	92			
36	37,3	267	200	160	133	114			
39	44,6	319	239	191	159	137			
42	51,9	371	278	222	185	159			
45	60,9	435	326	261	217	186			
48	69,9	499	374	299	249	214			
51	78,8	563	422	338	282	241			
54	87,8	627	470	376	314	269			
57	97,6	697	523	418	349	299			
60	107,4	767	575	460	384	329			
63	117,2	837	628	502	419	359			
66	127,0	907	680	544	454	389			
69	136,8	977	733	586	489	419			
72	146,7	1048	786	629	524	449			
75	156,5	1118	838	671	559	479			
78	166,3	1188	891	713	594	509			
81	173,5	1239	929	743	619	531			

UREA (00-05-90-05) - DENSITY: 0.94 kg/dm³ (**benchmark**)

Position Scale	Flow (kg/min)	Tractor speed (km/h)					Working width (m)	Vanes position	
		6	8	10	12	14		143	150
24	13,7	86	64	51	43	37	16	F3	F1
27	18,2	114	85	68	57	49			
30	22,8	142	107	85	71	61			
33	30,0	188	141	113	94	80			
36	37,3	233	175	140	117	100			
39	44,6	279	209	167	139	119			
42	51,9	324	243	195	162	139			
45	60,9	381	285	228	190	163			
48	69,9	437	327	262	218	187			
51	78,8	493	370	296	246	211			
54	87,8	549	412	329	274	235			
57	97,6	610	458	366	305	261			
60	107,4	671	503	403	336	288			
63	117,2	733	549	440	366	314			
66	127,0	794	595	476	397	340			
69	136,8	855	641	513	428	367			
72	146,7	917	687	550	458	393			
75	156,5	978	734	587	489	419			
78	166,3	1039	780	624	520	445			
81	173,5	1084	813	650	542	465			
84	180,6	1129	847	677	564	484			