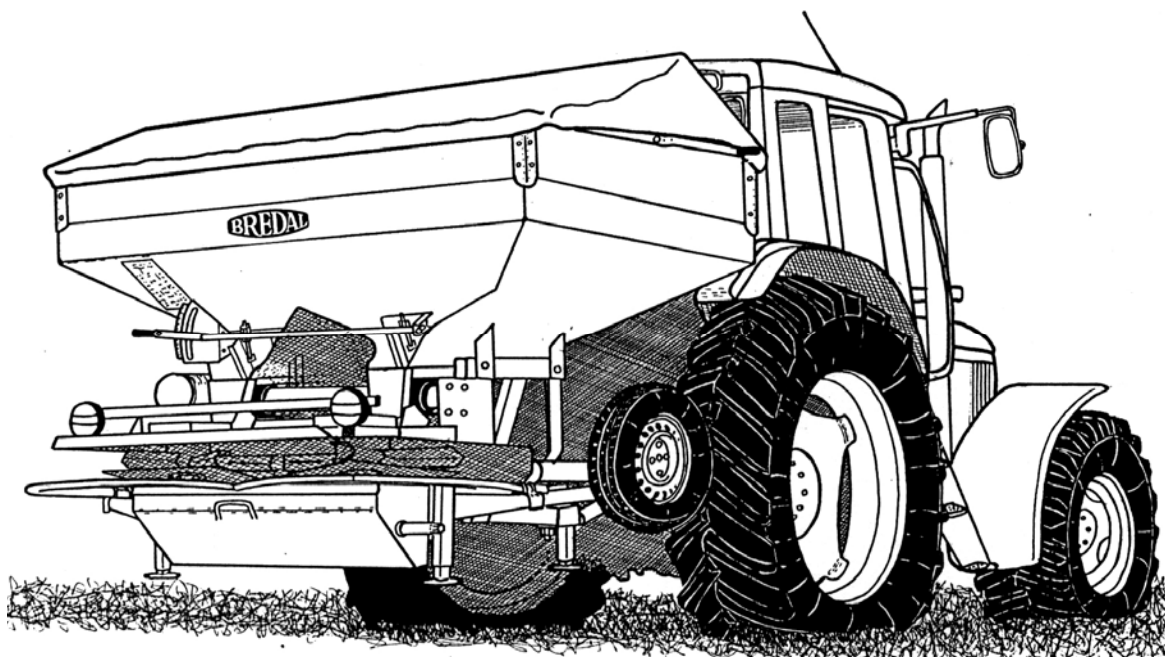


Bredal type B2 XL, B2ML & B4/B6/B8



Operation and service instructions

Maskinfabrikken Bredal A/S

(Vers. 1 November 01)

EU COMPLIANCE DECLARATION

(Directive 89/392/EEA, Annex II, supl. A)

Manufacturer: Maskinfabrikken BREDAL A/S
Overgårdsvej 19, DK-7120 Vejle Ø

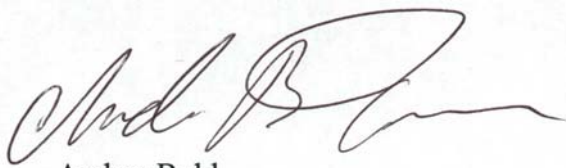
States that

BREDAL Type_____Serial number_____

Is manufactured in compliance with the machinery directive
(Directive 89/392/EEA) with the latest amendment, and with national provisions

Bredal DK-7120 Vejle Ø

19/12 – 1994



Anders Buhl

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1. Introduction.

BREDAL type B2 XL, B2 ML and B4/B6/B8 spreaders are solely constructed for spreading dry granular materials without content of dust onto agricultural fields.

It is the responsibility of the operator that the machine he is operating only spreads materials which does not harm his own or others health and property.

The machines must only be operated and maintained by persons which can be informed about and does understand the dangerous parts of the machine.

On the type plate is shown the machine type (B2 XL, B2 ML or B4/B6/B8), the serial number and the production year. Further is shown max. gross weight and net weight. The difference is the allowed payload. For the types B4/B6/B8 the gross weight is given for the tyre type, the machine is supplied with from the factory. If the tyres are changed or another types of wheels are mounted, it is the responsibility of the operator that these stands the gross weight of the machine.

This instruction handbook contains settings for your guidance regarding spreading of the common types of granular fertilisers found on the marked. Fertiliser quality is not a constant size. It changes from year to year and from one lot to the other. Due to this Maskinfabrikken BREDAL A/S does not take any responsibility for the quality of spreading. Neither regarding the fertiliser nor regarding spareparts and their mounting onto the machine.

It is only the responsibility of the operator, that the machine works in a way, that acceptable results are achieved. Maskinfabrikken BREDAL A/S is constantly testing the fertiliser types which is found on the marked. If any doubt of the spreadability of a certain fertiliser should occur, a simple way of doing a field test is described in part 12 in this handbook. You are also always welcome to call the importer of the BREDAL products in your country or to call the BREDAL factory direct, if you want.

Things for thoughts.

Your fertiliser spreader is every year managing several times its own value in the fertiliser which runs through it. The effect of a poor done job, due to the lack of maintenance and control, poor fertiliser quality or operation errors, can create yield losses which many times exceeds your investment in the machine. Give this a thought next time you are buying fertiliser, buying a new machine, doing a spread test or doing maintenance work.

The machine is manufactured by:

Maskinfabrikken BREDAL A/S

Overgårdsvej 19

DK-7120 Vejle Ø.

Denmark

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2. Traffic safety.

It is important that the traffic safety is OK. Check the following points:

1. The traffic lights are undamaged and fully operational and it is connected to the the plug of the tractor when ewer driving on public roads. Remember to clean it every time you have been spreading fertiliser.
2. Bolts by lower link arms, drawbar and wheels often are checked and retightened. This must be done before you take the machine in operation for the first time.
3. On type B4/B6/B8 regulary to controll tyre preashure and not to owerload tyres, rims, axles and chassis. Road travelling with high speed and big loads exposes your machine to the highest stresses.
4. On type B4/B6/B8 regulary to controll tyres, rims, axsles, drawbar and chassis. Look for cracks to prewent the danger of a break down.
5. Coupling the machine onto the tractor, see to that the used bolts are of sufficient size (dia.) and that they are proper locked.

3. Tecnical data.

Type	Volume	Net weight, kg	Loadig height, cm	Width/lenght, cm	Working width, m
B2 XL Std.	1400 ltr.	700	138	240/152 cm	12 – 28 m or 12 – 36 m
1. Extension	1900 ltr.	735	152		
2. Extension	2400 ltr.	770	165		
B2 ML Std.	1800 ltr.	715	135	280/152 cm	12 – 36 m
1. Extension	2200 ltr.	750	150		
2. Extension	3000 ltr.	790	165		

Type	Volume	Net weight, kg	Loading height, cm	Lenght, cm	Width w. tyres 1 / 2 / 3	Tyresize/ Trackwidth	Working width
B4	2850 ltr.	1800	200	500	1). 225	1). 16.9 x 30/180	12-28 m
w. extension	4000 ltr.		244		2). 260	2). 23.1 x 26/200	
B6	5000 ltr.	2100	220	550	2). 260	2). 23.1 x 26/200	or 12-36 m
w. extension	6800 ltr.		264				
B8	7000 ltr.	2600	220	550	3). 270	3). 650/65 x 30,5/210	
w. extension	9000 ltr.		264				

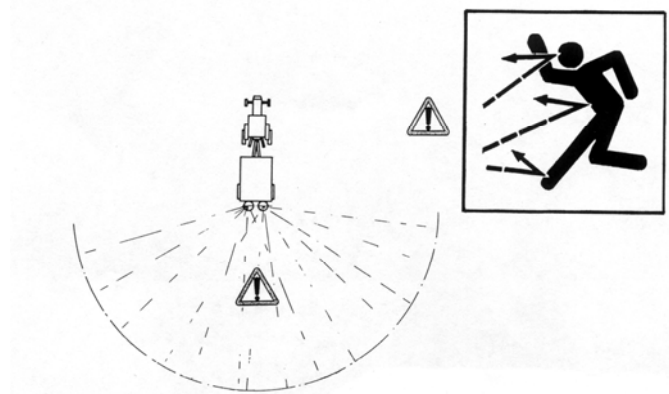
3.1. Tyre pressure

Tyre pressure in **B2 XL og B2 ML gagewheel**: 30 p.s.i./2,0 kg/cm²

Tyre pressure, type B4/B6/B8, by max. load:

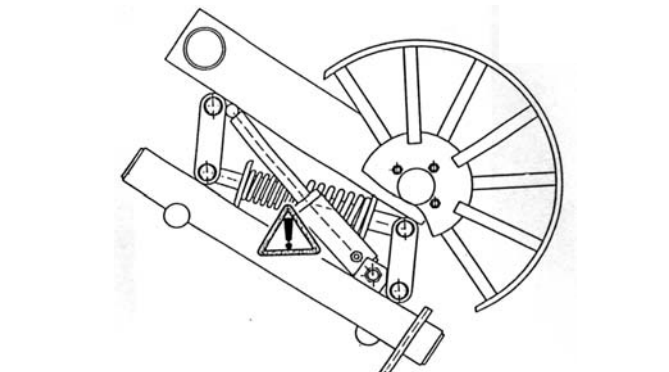
Tyre type	psi	Kg/cm ² (bar)
16.9 x 30, PR 8	30	2,0
650/65 x 30.5	25	1,7
23.1 x 26, PR 8	25	1,7
23.1 x 26, PR 12	32	2,2

4. Safety



Never stand close to the discs when they are rotating.

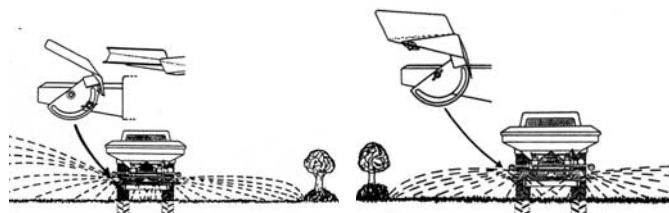
The tractor pto must be disengaged if persons or animals are within a radius of **30 meter** from the spreaddiscs of the machine, running with **1000 rpm** on the tractor pto and **20 meter** with **540 rpm** on the pto.



Always be out of the operating range of the gagewheel when it is activated.

Working on the gagewheel engage- and disengagement system, always be shure that the gagewheel is in its forward position and the hydr. hose and cylinder are without presshure.

Newer dismount the spring system. Always look for qualified help.



18-36 m

12-16 m

Newer mount the headland plate or ajust the downshute system when the discs are running.



Guards on and by the pto shafts must be undamaged and correctly mounted.

Newer stand on the guard over the discs or on the protection guard, while the discs are running.

Stay on the machine during work and by road transport are strictly forbidden.

Avoid loading hard heavy items, such as metal parts or stones in the hopper. They can cause damage to the machine and be dangerous for the surroundings.

- **Performing servicework** on type B2 XL and B2 ML, the tractor lower link arms must be lowered to lowest position or the machine must be supported.
- **During work** with type B2 XL and B2 ML, the top linkage must in the work position of the machine, be inbetween: parallel to the lower link arms and horisontal. If the angle of the top linkage is to steep, it heavily increases the risk of damaging the carrying frame of the machine.
- **Coupling type B2 XL and B2 ML onto the tractor:** Newer work inbetween tractor and spreader, while persons are staying in the cab of the tractor. Make shure that the tractor hand-brake is securely tightened and that it is in full funktion.

5. Drawbar and coupling points.

5.1. Type B4/B6 and B8

The spreaders are as standard delivered with a Ø50 mm drawbar. If wanted a Ø32 mm drawbar can be delivered. A 30 cm extension pc. can also be supplied.

The drawbar must be mounted in a position that the machine is horisontal or slightly inclined towards the tractor.

The drawbar can be mowed vertically up or down in its holes or it can be turned 180 degrees (fig. 1). This provides you with good possibilities for ajusting the inclination. Working with hitch and/or oversize or double weels on your tractor, it might be nesseary to mount extended drawbar or an extension pc.

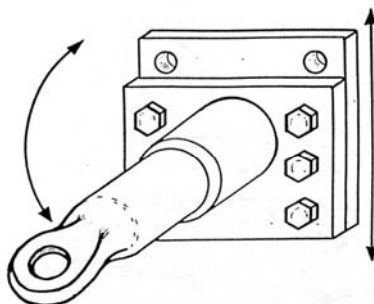


Fig.1. Bredal drawbar

5.2. Type B2 XL and B2 ML

B2 XL: The tree point linkage points meets the meashures in the ISO standard for kat. 2 tractors.

B2 ML: The tree point linkage points meets the meashures in the ISO standard for kat. 3 tractors.

Make shure that the lower link arms and the top linkage are as close to parallel with each other as possible. A steep angled top linkage may owerload the tractor and machine attatchment points.

The spreader has to be mounted **parallel** to the surface or **incline slightly towards the tractor**.

The spreader must not incline backwards, not ewen with fully loaded. It has to be placed straight behind the tractor, i.e. perpendicular to the driving direction with equal parts of the machine on left and right side of the center axis of the tractor.

5.3. Disc height working with type B2 XL og B2 ML

The distance from the ground to the discs must not be less than 75 cm. Optimum is aprox. 85 cm, but there is no upper limit for this distance.

Check chains must be tightened completely when the spreader is in working position. If this is not adjusted, the pressure between the landwheel and the tractorwheel will cause the spreader to move sideways, wich may affect accuracy in spreading.

The landwheel must always run on the center of the tractorwheel tuching both rows of ribs on the tractor tyre.

5.4. The pto shaft.

The pto shaft has to be of suitable length. Minimum overlap is 20 cm. (fig. 2).

On type B4/B6/B8 the pto shaft must not "bottom" when tractor and spreader turns sharply.

On type B2XL/B2ML the pto shaft must not "bottom" lifting the machine up in working position.

Remember: If the pto shaft is shortened the ends must be machined to avoid the two ends sticking together.

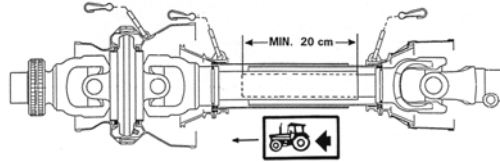


Fig. 2. Pto with wideangle for type B4/B6/B8

The spreader can be supplied with a gear increasing pto speed from 540 -> 1000 omdr. or decreasing if workingwidths from 12 -> 28 m (12-36 m) are desired and both 540 rpm and 1000 rpm are not available on the tractor.

5.5. Adjusting the landwheel.

Coupling the hydr. hose of the machine to the valve on the tractor, engaging and disengaging the feedmechanism is now done hydraulically. **Always remember to close the hydr. valve placed on the hose when driving on the road** (fig.3).

Landwheel driven feedmechanism in connection with feeding belts, has the advantage that the forward speed can be chosen at your wish, without affecting the set rate in litre/ha. Due to the fact that the landwheel is driving on the surface tractor/trailor-wheel, one meter driven forward in the field will be transferred to the surface of the landwheel, witch then also will turn one meter. Due to this you are free to change the size of the tractor/trailor-wheel, without affecting the accuracy of the rating system.

The landwheel can be adjusted forth/back and in/out. Make shure that the landwheel in disengaged position has a distance to the trailor-/tractor- tyre of no more than 3 – 5 cm (fig. 3):

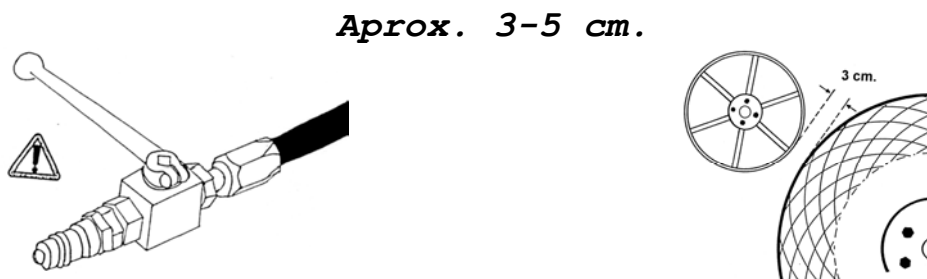


Fig. 3. Ball valve and landwheel

Re. type B2 XL and B2 ML: If your tractor is fitted with very wide tyres, your dealer can supply an extension pc. To make the landwheel go on the center of the tractor wheel. Accordingly with oversize (diameter) tyres, you can adjust the lower couplings, to make space between landwheel and tractorwheel in disengaged position.

The landwheel has to run as close as possible to the surface center of the trailorwheel on type B4/B6/B8. On type B2 XL and B2 ML the landwheel **must** run on both rows of thread on the surface center of the tractor tyre. If the landwheel jumps out and in, the machine will not rate accurately.

Remember always to close the hydr. valve (fig. 3) driving on the road. The valves on current tractors of today are never so tight that they can stand the preasure the springsystem of the landwheel are supplying. Forgetting to close the valve at the coupling, you risk to rate out fertiliser on the road, loosing expensive materials and making a negative impact on the environment.

6. Setting rate.

6.1. Principle of rating system.

Bredal B-type machines are build with a active rating system consisting of two narrow floorbelts and adjustable doors providing two very well defined openings where the material is forced out of the hopper. The flow is controlled by the landwheel. The faster you go the faster the floorbelts runs wich provides the correct ammount spread per hectare, no matter what forwardspeed you chose. The active rating system with it's very well defined openings always rates the material out in liter/ha and you only have to correcet to kg/ha by the specificf weight of the fertiliser to find the right setting.

6.2. Calibration kit..

To find the specificf weight of the fertiliser, you can use the calibration kit. Fill the bucket with the material you want to spread. Tap a few times gently to the ground and refill to stroke level. Hang the bucket on the w-shaped cutout at the short end of the balance arm. 1x are for direct reading from the scale and 2x are for very heavy materials exceed 1,3 kg/litre. Here you must multiply the reading with 2. When the arm is in balance, you can read the specificf weight as shown in fig. 4. Calculate the number of litre/ha to be spread according to the spread chart (page 9).

If the balance is not well adjusted or if you want to make a control you can do this by filling the bucket with water. When in balance, the reading point must show 1,0 kg/litre. If not, then the the reading point (the bolt) must be adjusted.

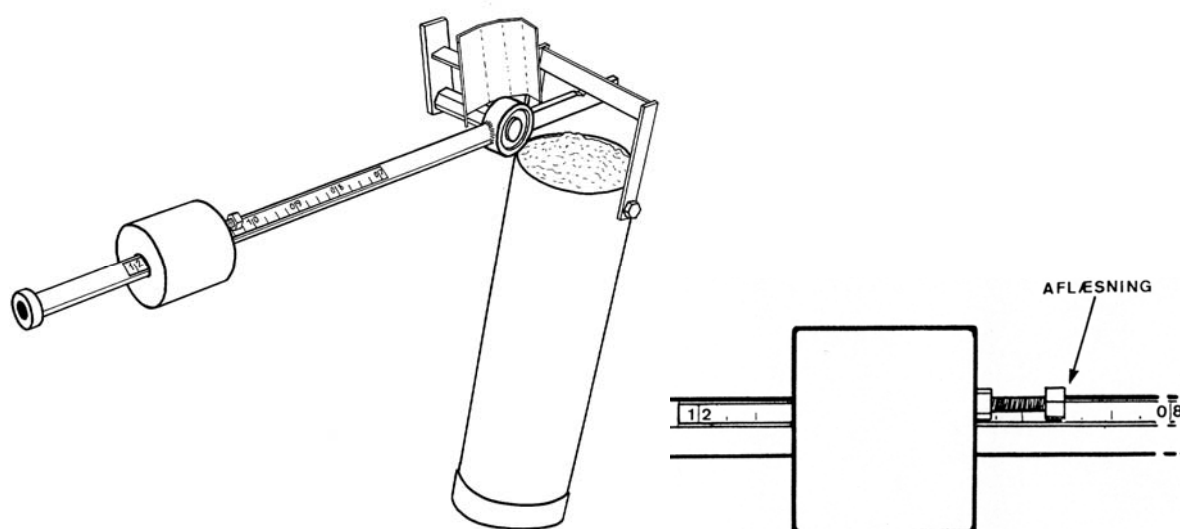


Fig. 4. Calibration kit.

6.3. How to use the spread chart.

To find the right setting for the chosen rate, divide the rate in kg/ha with the specific weight of the fertiliser (kg/litre). The result is the number of litre/ha which is to be spread. Find this number in the spread chart for the wanted spreadwidth and set the machine accordingly. The slide shown on page 10 can also be used.

Example

- 600 kg/ha
 - Specific weight: 1.10 kg
- $$\frac{600 \text{ kg/ha}}{1.10 \text{ kg/liter}} = 545 \text{ litre/ha (set at 545 in spread chart).}$$

12 m			
Scale	Axle 1	Axle 2	Axle 3
0	124	240	465
1	142	280	530
2	161	320	595
3	181	354	660
4	201	385	735
5	222	435	815
6	242	475	895
7	260	512	955
8	279	550	1020
9	298	585	1100
10	318	620	1170
11	336	662	1240
12	354	695	1300
13	370	730	1370
14	386	765	1440
15	401	792	1510
16	416	820	1580

15 m			
Scale	Axle 1	Axle 2	Axle 3
0	99	192	372
1	114	224	424
2	129	256	476
3	145	283	528
4	160	308	588
5	178	348	652
6	194	380	716
7	208	410	764
8	223	440	816
9	238	468	880
10	254	496	936
11	269	530	992
12	283	556	1040
13	296	584	1096
14	309	612	1152
15	321	634	1208
16	333	656	1264

16 m			
Scale	Axle 1	Axle 2	Axle 3
0	93	180	349
1	107	210	398
2	121	224	446
3	136	266	495
4	151	289	551
5	167	326	611
6	182	356	671
7	195	384	716
8	209	413	765
9	224	439	825
10	239	465	878
11	252	497	930
12	266	521	975
13	278	548	1028
14	290	574	1080
15	301	594	1133
16	312	615	1185

18 m			
Scale	Axle 1	Axle 2	Axle 3
0	83	160	310
1	95	187	353
2	107	213	396
3	121	238	440
4	134	256	490
5	148	290	543
6	161	316	596
7	173	341	636
8	186	368	679
9	198	390	733
10	212	413	779
11	224	441	826
12	236	463	866
13	246	486	912
14	257	509	959
15	267	527	1006
16	277	546	1052

20 m			
Scale	Axle 1	Axle 2	Axle 3
0	74	144	279
1	85	168	318
2	97	192	357
3	109	213	396
4	120	234	445
5	134	261	489
6	146	285	540
7	156	307	573
8	167	330	615
9	179	351	660
10	191	372	710
11	202	397	744
12	212	417	780
13	222	438	822
14	232	459	864
15	241	475	906
16	250	492	948

24 m			
Scale	Axle 1	Axle 2	Axle 3
0	62	120	233
1	71	140	265
2	80	160	298
3	90	177	330
4	100	192	368
5	111	218	408
6	121	238	448
7	130	256	478
8	140	275	510
9	149	293	550
10	159	310	585
11	168	331	620
12	177	348	650
13	185	365	685
14	193	383	720
15	200	396	755
16	208	410	790

28 m			
Scale	Axle 1	Axle 2	Axle 3
0	53	103	200
1	61	120	227
2	69	137	255
3	78	152	282
4	86	165	315
5	95	186	349
6	104	204	384
7	111	219	409
8	120	236	437
9	128	250	471
10	136	266	501
11	144	284	531
12	151	297	557
13	159	313	587
14	165	328	617
15	172	339	647
16	178	351	677

30 m			
Scale	Axle 1	Axle 2	Axle 3
0	50	96	186
1	57	112	212
2	64	128	238
3	72	142	264
4	80	154	294
5	89	172	326
6	97	190	358
7	104	205	382
8	112	220	408
9	119	234	440
10	127	248	468
11	134	265	496
12	142	278	520
13	148	292	548
14	154	306	576
15	160	317	604
16	166	328	632

32 m			
Scale	Axle 1	Axle 2	Axle 3
0	47	90	174
1	53	105	199
2	60	120	223
3	68	133	248
4	75	144	276
5	83	163	306
6	91	178	336
7	98	192	358
8	105	206	383
9	112	219	413
10	119	233	439
11	126	248	465
12	133	261	488
13	139	274	514
14	145	287	540
15	150	297	566
16	156	308	593

36 m			
Scale	Axle 1	Axle 2	Axle 3
0	41	80	155
1	47	93	176
2	54	107	198
3	60	118	220
4	67	128	245
5	74	145	271
6	81	158	298
7	87	170	318
8	93	183	340
9	99	195	366
10	106	206	390
11	112	220	413
12	118	231	433
13	123	243	456
14	129	255	480
15	134	264	503
16	139	273	526

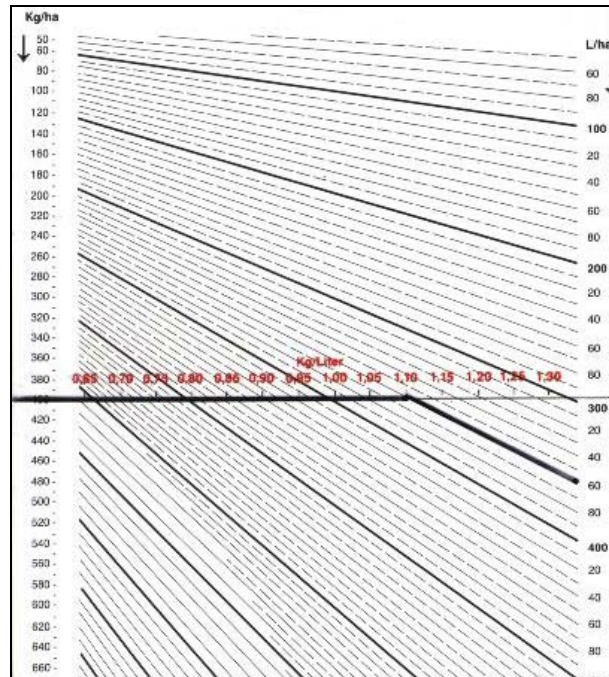
6.4. How to use the slide.

The spreader always rates out in ltr./ha unaffected of the physical properties of the fertiliser. Due to this it is only nesseary to know the density of the fertiliser to set the machine very accurately. BREDAL has for this purpose developed a tool (a slide) for quick and exact setting of the BRE-DAL B2XL,B2ML, B4, B6 and B6 spreader.

To use the slide you only have to know the wanted rate in **Kg/ha** and the density in **Kg/ltr**. Then make the setting according to the instructions found below.

Wanted rate
400 kg/ha

Density of fertiliser
found to be 1,1 kg/l



Volume to be spread: 360 Ltr./ha
Turn the slide

Now set the slide on 360 Ltr./ha.

By the workingwidth you are operating at: Read the recommended setting.



At the above example, the recomended setting at 12 m workingwidth is axle 2 and scale 3,0.

As a general rule, use as high floorbelt speed (highest numbered axle) as possible. Only if you are working width a very lumpy or sticky fertiliser i.e. you can use a low floorbelt speed and high dooropening.

6.5. Max. flow in kg/min.

The V-belt transmission must not be overloaded.

Don't rate out more than: **250 kg/minute by 540 rpm** and
300 kg/minute by 1000 rpm

Calculate the flow according to the below equation:

$$\frac{\text{km/t} \cdot \text{arbejdsbredde} \cdot \text{kg/ha}}{600} = \text{kg/min}$$

The max forward speed allowed by 1000 rpm on the pto can be calculated:

$$\frac{180.000}{\text{arbejdsbredde} \cdot \text{kg/ha}} = \text{Km/h (max)}$$

7. Setting of spread pattern.

Often controll the vital parts of the spread system. If they are damaged or worn out it can have serious consequences for the accuracy of the spread pattern.

By spreading in humid weather conditions and/or with damp fertiliser, the downshutes leading the fertiliser from the floorbelts down onto the discs must often be cleaned. Layers of fertiliser sticking to these influates the spread pattern.

7.1. Spreadprinciple.

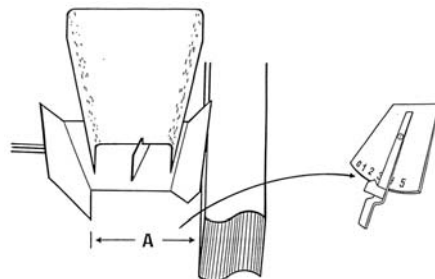
A BREDAL B-type spreader is mounted with dia. 82 cm wide discs, wich are geared 11% up according to the pto shaft This means that the fertilkser is thrown out with a speed of aprox. 140 km/h by 540 rpm and aprox. 250 km/h by 1000 rpm. To be able to stand the the preshure of these speeds, it is nesseyary that the fertiliser granules can stand a load of 0,5 -> 1 kg by 540 rpm, 2 kg's at 800 rpm and min 3-4 kg's at 1000 rpm.

The high speed means that the spread width always is the double of the working width by common nown fertiliser types (not prilled urea). This is called a double owerlabbed spreadpattern (fig. 5). The spread wift is covering an area of about 1000 – 1200 m² at 1000 rpm on the pto shaft. The consenstration of fertiliser dropping down per m² is then wery little.

A triangular shaped spreadpattern with a double owerlab (fig.6), provides always a big flexibility regarding unintentional variations in workingwiths, pto speeds i.e. Sitespecciffic spreading is always done with the highest possible accuracy with this type of spread pattern.

The high speed (up to 250 km/h) of the fertiliser, provides a low sencivity to wind. A strong wind has a speed of aprox. 40 km/h (aprox. 11 m/s).

The downshutes has a wery important funktion. To achieve a perfect spreading they have to have the correct basic setting. By the handle for the downshutes a scale is placed. When the distance A equals 145 mm, the handle must show 1 on type B2XL and B2ML, and on type B4, B6 and B8 A equals 195 mm, when the handle shows 1 as well. The distance can be ajusted on the links from the handle to the downshutes.



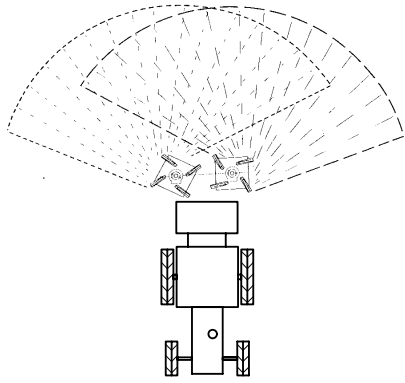


Fig. 5. The overlab of each disc.

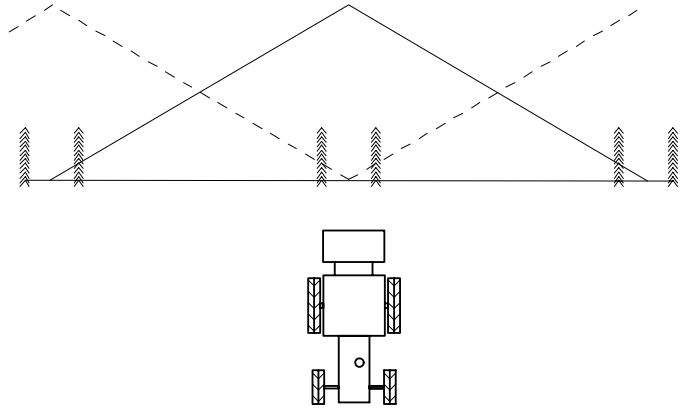
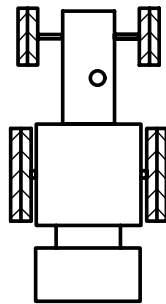


Fig. 6. Correct double overlabbed spread pattern.

7.2. 12-28 m workingwidth, settings.

The machine has to be supplied with 12-28 m square discs, each with 4 pc. vanes.



12 - 28 m

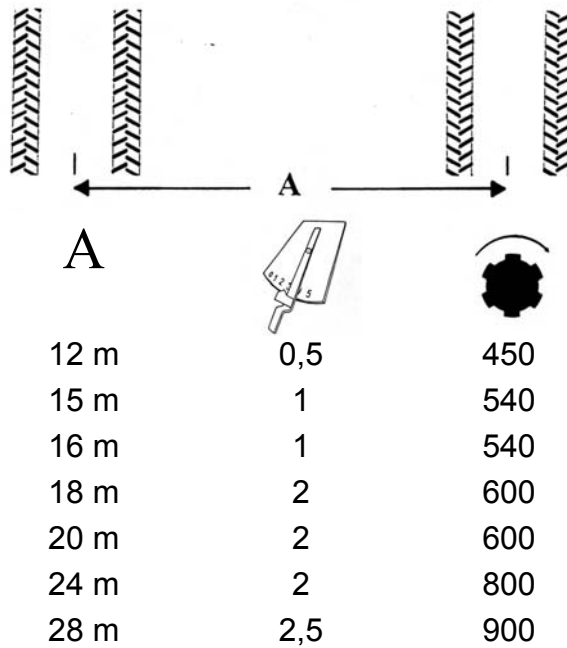


Fig. 7. In field spreading.

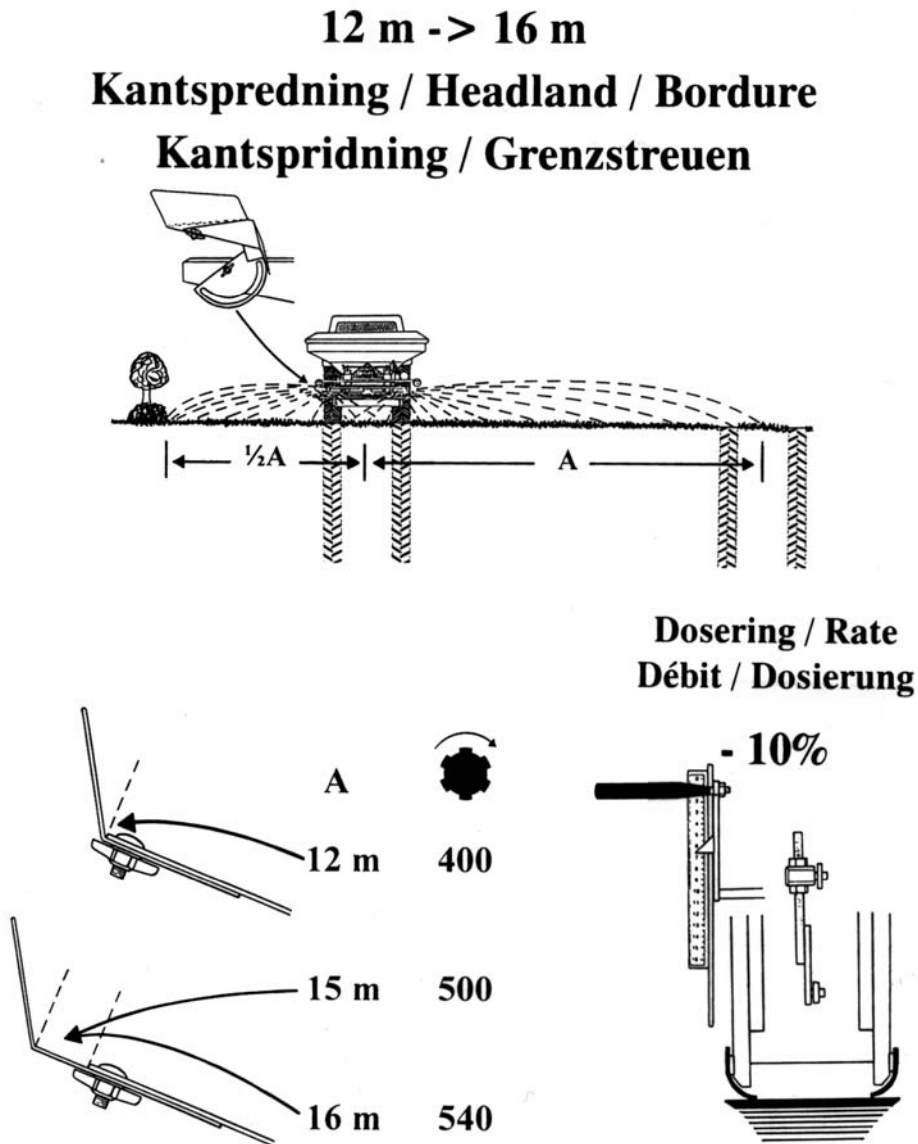
The above recommended settings are normative. They are valid for alle types of current fertilisers within certain limits of physical properties according to part 11.2 "The influence of fertiliser quality on spreadability". For other types of fertiliser look at part 15 "Special types of fertiliser".

BREDAL A/S are frequently making tests of the current fertiliser types. If the spreadability of a fertiliser type are questioned, you are welcome to take contact to the BREDAL importer in your country or direct to the manufacturer. An easy way of checking the quality of spreading is made by doing a spread test according to part 12 "Performing an in field spread test and adjusting the spread pattern".

7.2.1. Operating the 12-16 m headland system.

By 12, 15 og 16 m workingwidths, BREDAL offers a headland limiter plate. It is mounted in the headland part of the spreadpattern. By 12 m workingwidth the rpm must be reduced and the limiting plate positioned as close to the disc as possible. At 15 and 16 m workingwidth, the limiting plate must be placed as far a way from the disc as possible according to fig. 8.

Fig. 8. Headland spreading 12 -> 16 m



7.2.2. Working with 18-28 m headland system.

The 15 – 28 m headland system are designed to work with very reduced disc speeds. This means that you must be careful with wind influence when you are doing headlands. The use of the 15 – 28 m headland arrangement according to the instructions, minimizes the amount of fertiliser thrown over the headland border (fig. 9).

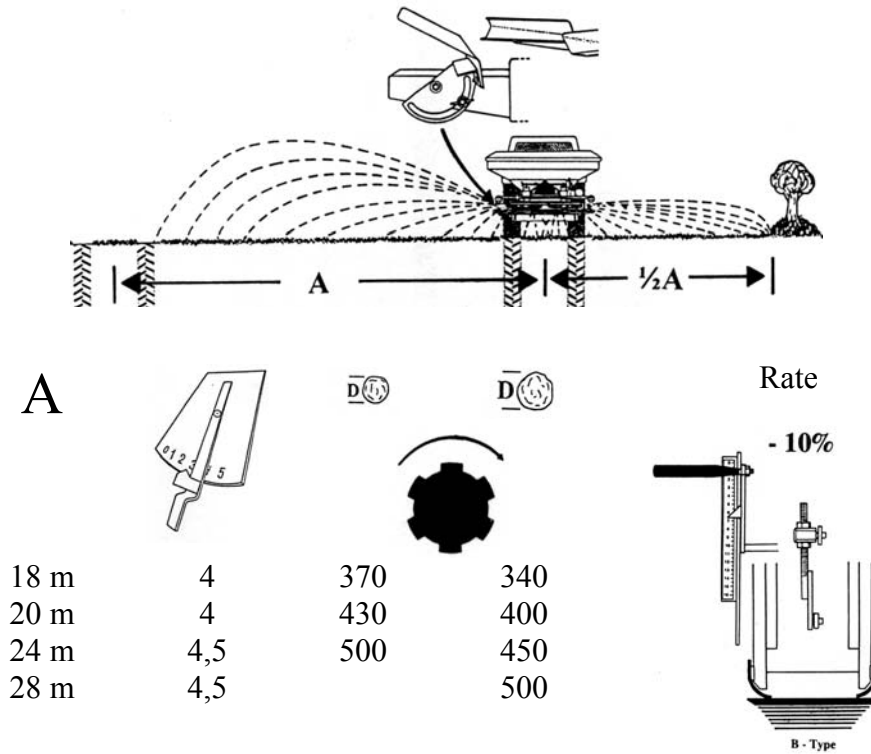


Fig. 9. Headland spreading 18->28 meter

PLS. NOTE: 15 -> 28 m headland arrangement and 12 -> 16 m limiting plate must not be used at the same time.

The above instructions are made with the purpose of achieving approx. 50% of the rating exactly at the headland border. This is valid for big grains D, often known as a **granulated** fertiliser type. They often has a medium grain size of approx. 3,1 mm or more. For smaller grains D, often known as a **prilled** fertiliser type. The rate is reduced as recommended by 10 %, to compensate for the higher concentration of fertiliser due to the lowered disc speed.

If you want 100 % rating at the headland border, the above pto speeds must be raised with 10%. The rate are then **not** to be reduced.

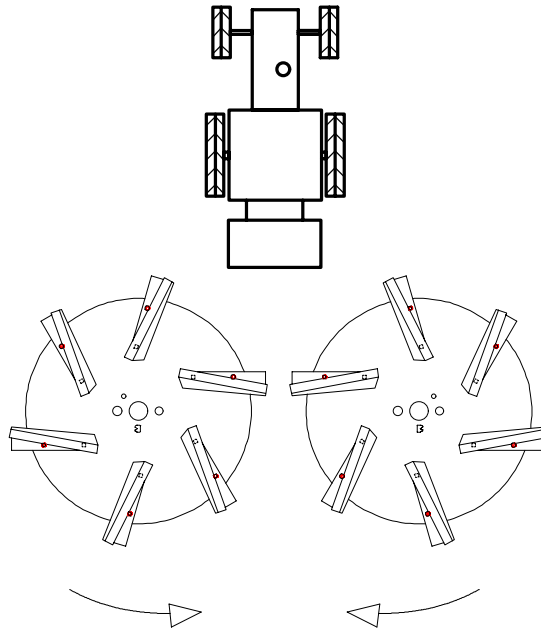
If you want a minimum of fertiliser to be thrown over the border line and it can be accepted that the crop will show a lack of nutrients in the area closest to the border, then you can reduce the recommended pto speed by 10%. The rate must then be reduced by 15% instead of the recommended 10%.

Fine adjusting the pto speed. It is very easy to judge the correct pto speed observing the spread pattern from the tractor cab. The fertiliser drops very sharply by the headland border. Use these observations to fine tune the pto speed.

Doing the first time spreading in the spring. Often it will be an advantage to drive the first round with the outer tractor front and rear wheels in the inner track of the headland tramlines. This provides a longer distance to the border line and a shorter throw to the next tramline. Use then the recommended pto speed for the workingwidth 4 m wider than the one you are actually working at. Don't reduce the rate in this situation.

7.3. 12-36 m Discs, settings.

The **12 - 36 m discs** are supplied with each 6 vanes and a B marked in the center of each disc.



To work with these discs the **fertiliser** must stand the **quality demands** which are given in part 11.2. Pls. note that you can not spread fertiliser with very low density such as urea on more than 24, and fertilisers with a very rough surface, such as pure potash, some types of sulphuric acid a.o., you are not able to spread on more than max. 28 m workingwidth. All other demands for the physical properties must be kept.

Recommended settings.



A		
Workingwidth	Scale	Rpm on pto
12 m	0	450
15 m	0	540
16 m	0	540
18 m	0	800
20 m	1	800
24 m	1	1000
28 m	1	1000
30 m	1,5	1000
32 m	1,5	1000
36 m	2	1000

Fig. 10. Spreading 12-36 m

Maskinfabrikken BREDAL A/S is continuously performing tests of the current fertilisers on the market. If you have any questions to the spreadability of a certain fertiliser type, then pls. Contact the importer of BREDAL machines in your country. An easy way of controlling the quality of the spreading, is done by making a spread test in the field as explained in part 12.

7.3.1. Headland spreading w. 18-36 m headland arrangement.

The headland arrangement for 15 -> 28 m workingwidths are also suitable for 15-36 m workingwidth. Working on 36 m, the below recommended settings are though only supplying 30 – 40 % rate at the border line. For this wide workingwidth it is not possible to achieve higher rates at the border line.

Recommended settings for headland spreading.

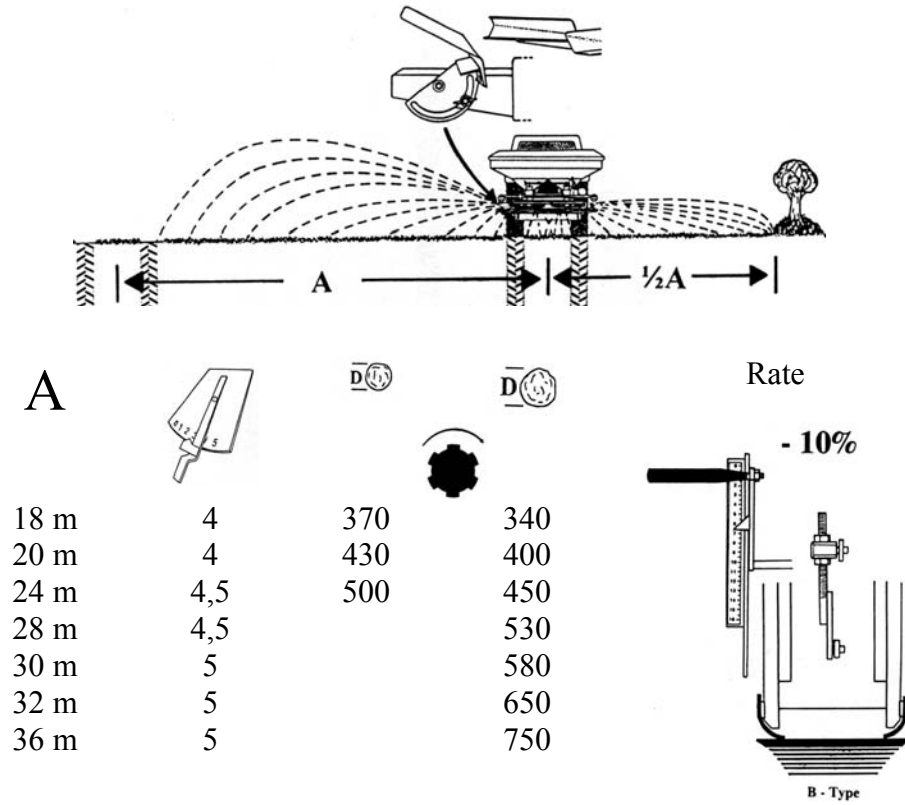


Fig. 11. Headland spreading 18-36 m.

7.4. Engaging and disengaging at headlands.

The fertiliser is thrown far back by the discs. Going down towards the headland make shure that you have crossed the headland tramline before you disengage the landwheel. Entering a tramline, make shure that you are one working with away from the headland tramline before you engage the landwheel.

Towards the headland:

5 to 10 m before you reach the headland tramline, slowly lower the engine rews to draw in the spread fan behind the spreader. When the discs have crossed the headland tramline you disengage landwheel.

Away from the headland:

Engage the landwheel when the discs are one workingwidth away from the headland tramline (fig. 12).

Working like this, you will have a nice work done at your headlands.

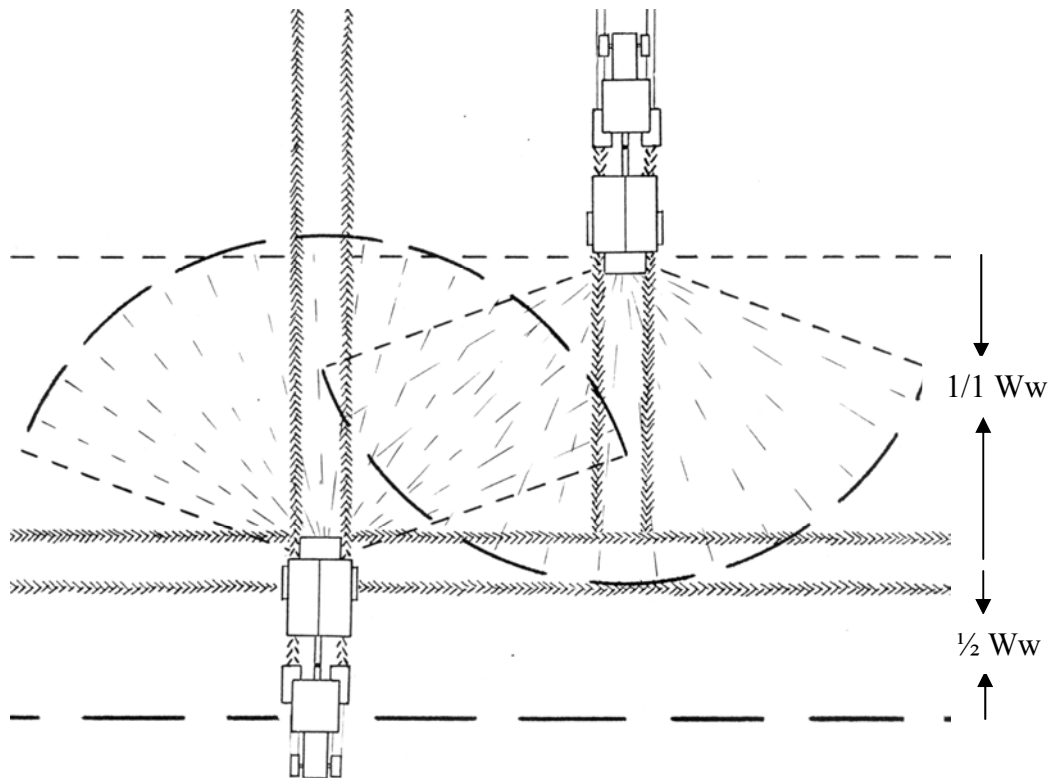


Fig. 12. Engaging and disengaging at headlands.

7.5. Late application.

Late application can be done in two ways:

- 1) A standard equipped BREDAL spreader operates with high speeds on the fertiliser grains when they are thrown. Due to this the grains fly far before they drop on the ground. Only a small drop height is needed to be able to achieve a nice spreading. A minimum drop height of 25 cm below the discs is needed.



Due to this it is possible to perform late application in crops up to knee height with type B4, B6 and B8 and up to approx. 70 – 80 cm with type B2XL/B2ML. Pls. Note that the fertiliser grains may damage the leaves, due to their high speed.

- 2) With the special BREDAL *late application equipment* (fig. 13), a BREDAL spreader will be able to spread in crops which reaches a height equal to the guard over the discs. This without damaging the crop, due to the high throw of the grains dropping down like rain. The headland device must be demounted and the late application equipment mounted in bolts for the headland device in both sides. The 12 -> 28 m (square) discs can be used on all working widths up to 36 m.



Fig. 13. Late application equipment mounted onto a BREDAL type B8.

7.5.1. Setting 12 – 36 m late application.

A		
12 – 24 m	0	540 -> 700
28 – 30 m	2 / 0	540 / 700
32 – 36 m	4	700

By 540 rpm the straightness of the grains must be min. 2 kg and by 700 rpm min. 3 kg.

If a spread test according to part 12 shows:

- A) That too much fertiliser is spread between the tramlines, the downshute scale is moved towards 0, 2 full numbers per test. If the scale already is placed at 0, increase the pto speed by +100 rpm.
- B) That too little fertiliser is spread between the tramlines, the downshute scale is moved towards 5, 2 full numbers per test. If the scale already is placed at 5, increase the pto speed by +100 rpm.

7.6. Driving to and from tramlines in angles.

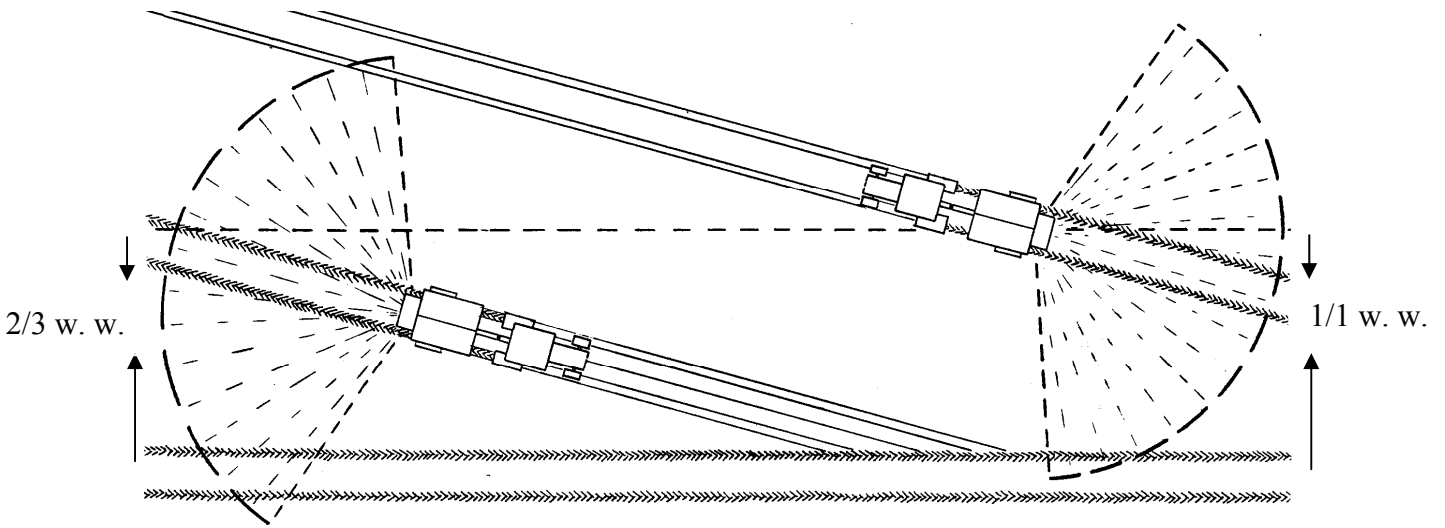


Fig. 14. Engaging and disengaging at 15°

Towards headland tramline:

Disengage the rating system in a distance of 2/3 workingwidth from the headland tramline. Slowly reduce the engine rews before you disengage.

Away from tramline:

Engage the rating system one workingwidth from the headland tramline.

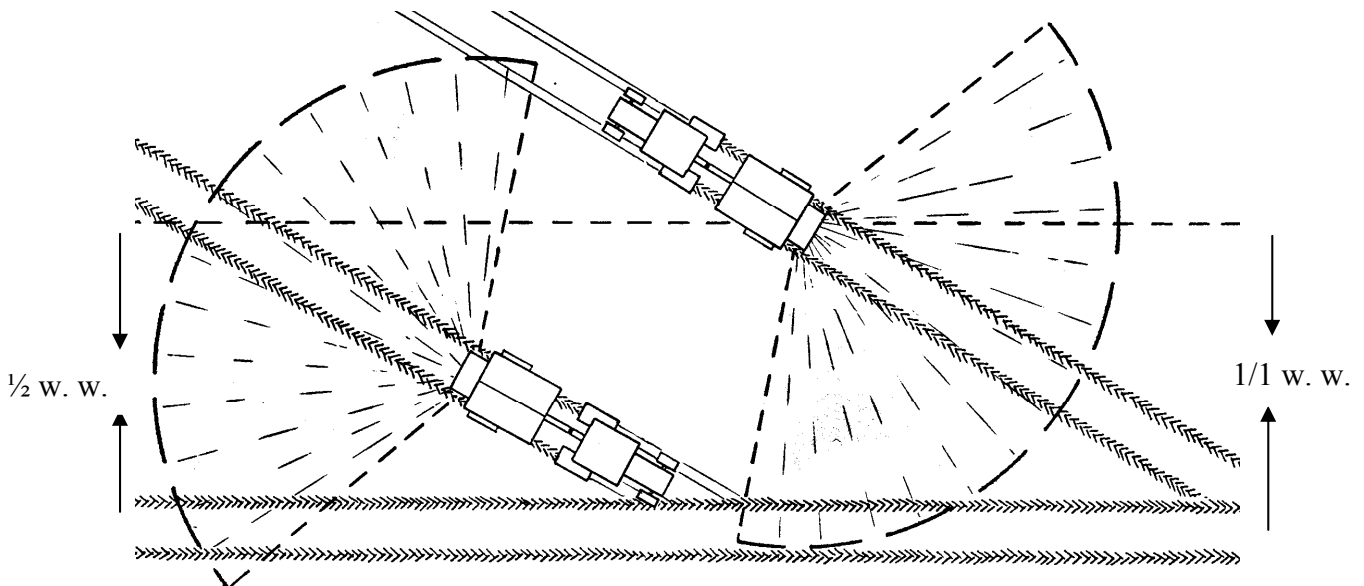


Fig. 15. Engaging and disengaging at 30°

Towards headland tramline:

Disengage in a distance of 1/2 workingwidth from headland tramline. Slowly lower engine rews before you disengage.

Away from tramline:

Engage the rating system one workingwidth from the headland tramline.

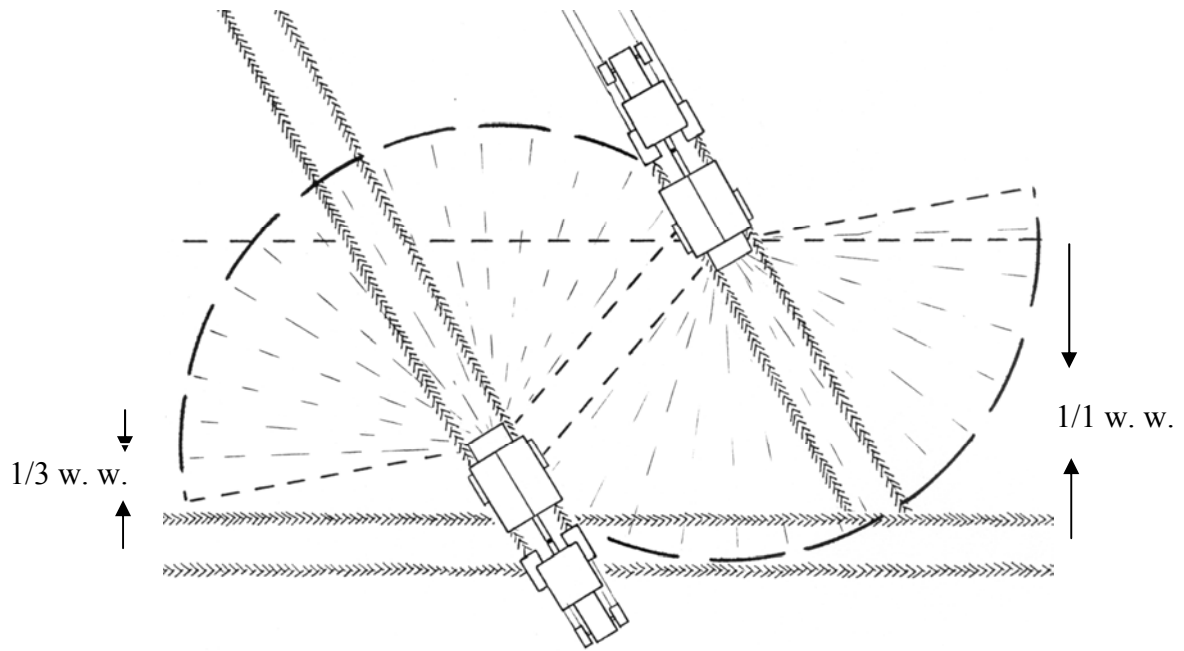


Fig. 16. Engaging and disengaging at 60°

Towards headland tramline:

Disengage in a distance of 1/3 workingwidth from the headland tramline. Slowley reduce engine rews before you disengage.

Away from tramline:

Engage the rating system one workingwidth from the headland tramline.

8. If you have troubles.

WARNING !!!

- The vanes must be correctly mounted on the spread discs.
- Incorrectly mounted vanes seriously affects spreading accuracy.

Correct mounting (see figures)

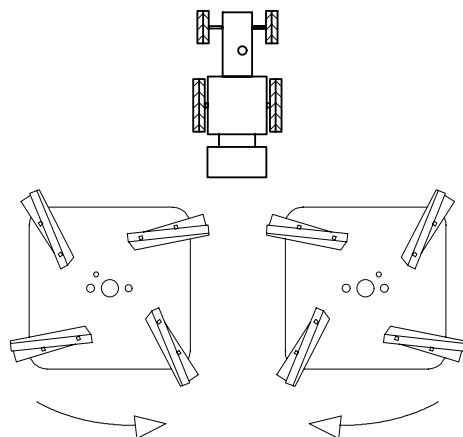


Fig. 17. Square discs, 12 – 28 m workingwidth

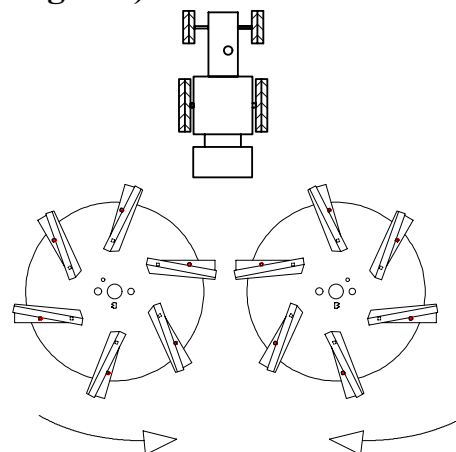


Fig. 18. Round discs 12 – 36 m workingwidth

- **Damaged and badly worn vanes must be changed.**
- **Vanes with holes worn, will throw the fertiliser out in a wrong direction.**

Responsibility!!!

The operator is responsible for checking and correct mounting of the vanes and discs.

If you need help for adjusting the spreadpattern, pls. look at part 12: “Performing spread test and adjusting of spread pattern.”

8.1. To much fertiliser spread to one side.

If the machine spreads to much fertiliser to one side, or if to much fertiliser is placed in the overlab in one side, **first make shure that the the vanes are correctly mounted on both discs**, according to fig. 17 and 18 and if you have the mounted spreader type B2XL it is horisontal mounted onto the tractor sideward, that the security chains for the lower link arms are tightened fully and that the machine is mounted straight in line with the tractor.

Next step is to controll that both rear doors and their edge tapes has the right meashures according to part 8.2 and that the fertiliser hits the center plastic pots in equal distance over the disc plate. BREDAL can provide a tool and an instruction in how to controll this meashurement.

If you still find that the machine spreads to much to one side, you can untighten the 4 bolts wich carries the transmission for the discs and move the transmission a few mm to the side where to les fertiliser is found. Alternatively you can move both downshutes a few mm towards the side where to much fertiliser is found. This is the easiest solution. (aprox. 0.5 - 1 mm movement of either downshutes or transmission for every 1 % in difference from one side to the other.

8.2. Inaccurate rating.

If the spreader does not rate out accurate, follow the priority described below:

1. Make shure that the specciffic weight of the fertiliser is correct. For this you can use the ballance for direct reading of the specciffic weight (look at part 6.2).
2. Make shure that the calculation from fra kg/ha to litre/ha is done correct (look at part 6.3).
3. For type B2 XL and B2 ML, make shure that the gage wheel is running smoothly onto the tractorwheel. If the gagewheel is jumping up and down, the spreader will not rate out corretly. A controll can be be made by driving a distance on the road with out fertiliser in the hopper or without the pto shaft mounted between gagewheel and 3-speed gear. The gage-wheel must then run 55,5 rotations per 100 meter driven forward. A mechanical counter for the gagewheel is usefull for this purpose.
4. Make a control of the rear door opening and the edge tape distance. (look at fig. 19):

B = 40 mm by scalesetting 8 (B2XL and B2ML and B4)

B = 42 mm by scalesetting 8 (B6 and B8)

C = 110 -> 115 mm between the edgetapes (B2XL and B2ML)

C = 120 -> 125 mm between the edgetapes (B4, B6 and B8)

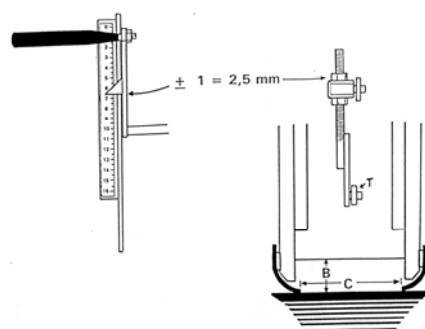


Fig. 19. Scale and rear door

Regarding the B meashure, it is an advantage to produce a piece of wood or steel with the above meashures. The height of the piece must be able to go underneath the rear doors without the doors being moved. The length must be able to go down between the edgetapes without the distance beeing to long.

The rear door guiders and their connections to the adjusting axle must be able to run freely, otherwise there will not be accordance between scalesetting and the rear door position. Be shure that the joint T is able to move freely. This is often joined due to rust i.e., because it moves wery little.

5. If the spreader continously rates out incorrect, having done the above described controlls, then find out how many steps on the scale the machine rates out incorrect. The ajustment nuts on the connetions to the rear doors is then used to correct the error. One step on the scale equals 2,5 mm opening difference on the rear doors. If you turn the nuts 1,5 turning on B2XL/B3XL and B2ML and 1,25 turn on B4/B6/B8 you will raise/lower the rear doors one step on the scale (fig. 19). (**Calculating % error can not be used**).
6. You can perform a turn test. Further information in part 14.
7. Spread pattern errors is corrected according to part 12.

9. Emptying the hopper.

The hopper is made with a door in the V shaped centerpart of the buttom. If you have loaded an incorrect type of fertiliser, wich you don't want to spread, most of it can run out on it's own. What is left you can turn out by the landwheel. This can be done either manuel, by oilmotor or trough at splined shaft, wich BREDAL can supply. This can be bolted onto the landwheel, to make another tractors pto turn the belts.

10. Maintenance.

Bolts by drawbar, discs, wheels etc. must frequently be checked and retightened if necessary. This is very important to do shortly after having put the machine into operation.

Make sure by frequent control that the spread system is clean and in good condition. Lack of cleaning and damaged/worn parts will cause spreading errors.

See to that edgetapes and front tightening are in their right positions according to section 10.2 and 8.2. The floorbelts at the rear door opening, has to be supported by the belt rollers (B4/B6/B8) or the support lists (B2XL/B3XL/B2ML). If you can press the floorbelts down at the rear door opening, the machine may rate out incorrectly.

V-belt. Frequently check that the V-belt is correctly tightened according to section 10.3.

Cleaning: Take care when you clean the machine with a high pressure cleaner. Never point at tightenings and bearings from close distance. Grease after cleaning. Intruding water is often the main reason for breakdown of bearings.

- Storing: Before you store the machine after the season, it must be cleaned very well, greased at all points and sprayed fully in oil. Hydr. oil is recommended, because this is designed to work together with rubber, it's cheap and it's with low viscosity, **but** remember to rub the oil of the rubber belts after spraying, because oil on rubber may damage the belts in the longer term. You can also cover the belts with an oilsucking material when spraying. Remember to turn the material out when the oil has ended running. The floorbelts must be rubbed of afterwards.
- The gage wheel must be in its forward position when stored. The hydr. cylinder is then in its shortest position and the piston will not damage the sealing when taken into operation for next season.
- Vanes. The vanes are made of stainless steel with a cover surface of carbide as wear layer. Even though provides them with a very long lifetime, they will be worn out at a certain time and must be changed. When the pure stainless steel is noticeable through the carbide the vanes has short time left and you must prepare changing them. No holes must be worn in the vanes due to a potential quality drop in spreadpattern.

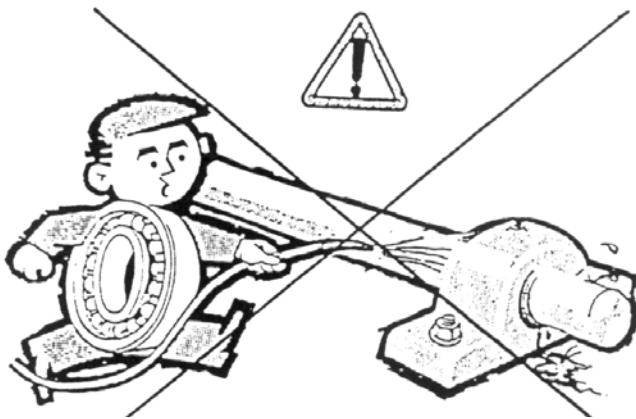


Fig. 20. Take care using a high pressure cleaner

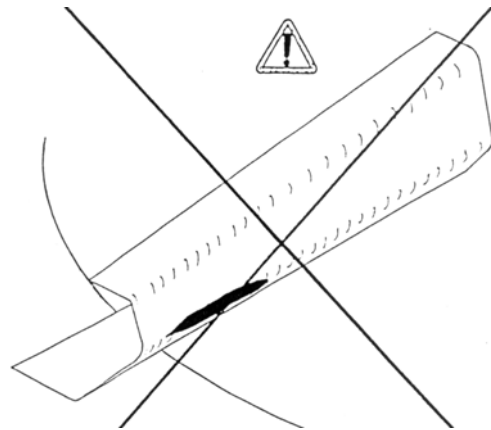


Fig. 21. No holes must be worn in the vanes

10.1. Greasing.

All rollerbearings used on BREDAL spreaders are sealed types. Often there is an additional sealing in front of the bearing. These bearings it is only nesseary to grease after washing of the machine (fig. 22).

Under the machine on the pto shaft with freewheeling two grease nipples are placed. These must often be greased to avoid troubles with the freewheeling. Only grease a little every time, otherwise the small clutches can be stuck and will not operate. The pto shafts must often be dismantled and the splines greased to avoid the axle to be stuck onto the shaft. Every now and then the telescopic ends of the pto shaft must be dismantled, cleaned and greased.

Connections between rear doors and ajusting axle must every now and then be oiled to prevent troubles with the accuracy in rating.

The oil in the chain gear is ordinary gearoil. Filling level is up to the filling hole. The chain gear is very slow running and it does not require special treatment or any regular change of oil as long there are oil in it.

Often oil all threads, bolts and connections used by the different ajustment and setting possibilities. Often there are used stainless material here, but these also likes oiling.

Greasing points

Poss	Designation	B2/B3XL and B2 ML, Number	Interval Hours
A	Wheelhubs on inside, B3XL	1+1	20
B	Pto. Shaft w. freewheeling	5	10
C	Entrance shaft	1	20
D	Flanged bearing by rearroller	1	20
E	Sealing by disc hubs	2	20
F	Ajusting axle for rear doors	2	60
G	Pto. shaft for floorbelt drive	4	20
H	Pivot, springguide and ram	3	20
J	Beltguiders	2+2	20
K	Flg. bearing by cardanshaft		20
L	Jack	1	20
M	Drawbar, B3XL	1	20

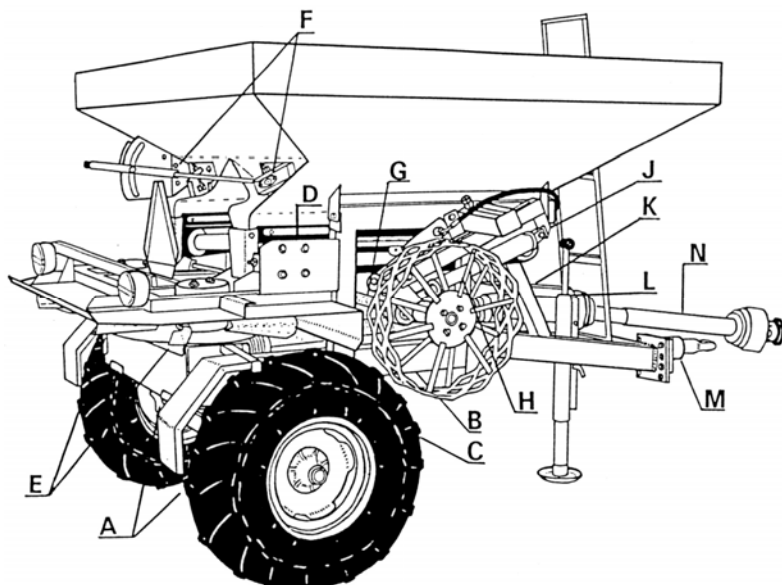
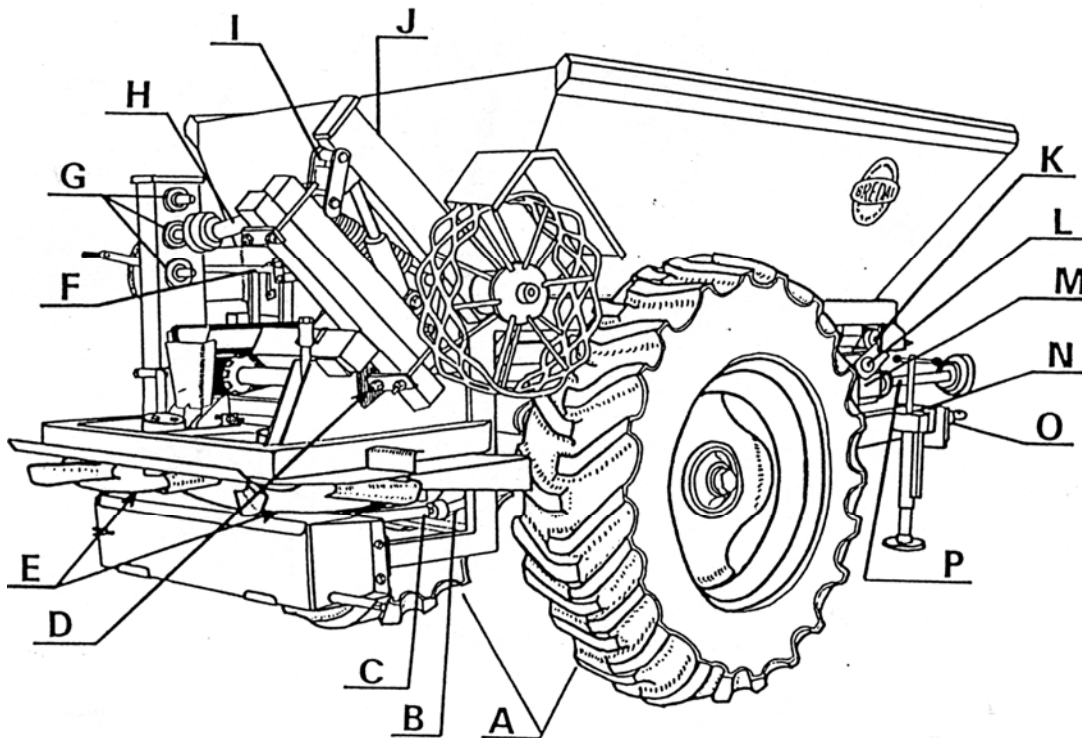


Fig. 22. Greasing points

Poss.	Designation	B4/B6/B8 Number	Interval Hours
A	Wheelhubs on the inside	1+1	20
B	Cardan joint with freewheeling	2	20
C	Entrance shaft	1	20
D	Flanged bearing by rear roller	1	20
E	Sealing by disc hubs	2	60
F	Adjusting axle for shutter	3	60
G	Sealing by splined shaft	3	20
H	Drive	4	20
I	Pivot, springguide and cylinder	8	20
J	Sealing by fluted shaft	1	20
K	Sealing by front roller	2+2	20
L	Beltguide	2+2	20
M	Flanged bearing by cardan shaft	1	20
N	Jack	1	20
O	Drawbar	1	20
P	Drive shaft	6	10



10.2. Adjusting and exchanging the belt

The belts are supplied with a belt guide consisting of 2 conic rollers right behind the front roller. This belt guide takes the most essential fluctuations of the belts on the front roller. The front rollers tension adjusters are supplied with a contra nut on the one side and a single nut on the other side (fig. 24.). If a belt runs awry at the side of the single nut, tighten it. Does the belt run awry on the other side, slacken the single nut.

- Do not turn more than $\frac{1}{4}$ per adjustment.
- The belts must be checked for tightness, regularly.
- It should be possible to raise the belt c. 2 - 3 cm right below the machine without using force.

If the belts need to be exchanged, dismantle the supporting rail of the belts, the front rollers, the 3-gear chain drive and the rear roller.

The edge rubber, which seals along the belt, **must always be placed under the sealing rubber** (fig. 23.), otherwise, fertilizer grain will crawl beneath the edge rubber and lift it up so that the system will become untight. Be especially aware of this fact if the dosingwheel has been switched on during reverse motion.

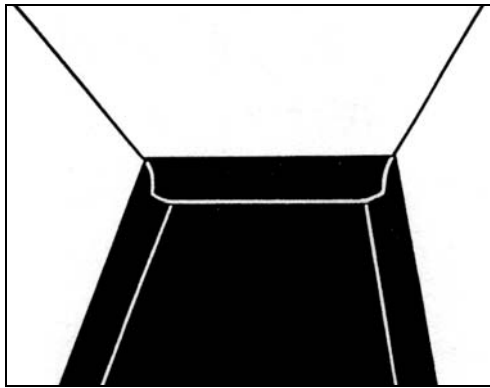


Fig. 23. Edge rubber

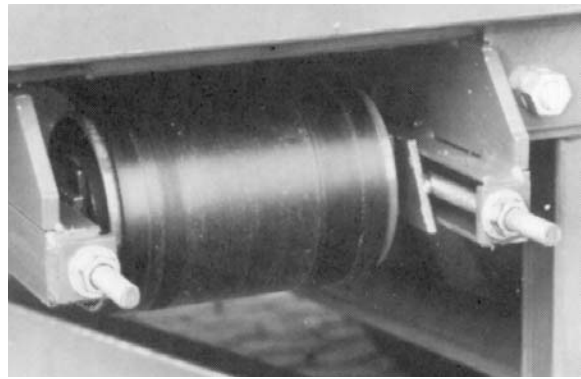


Fig. 24. Adjustment of belt

10.3. Check on V-belt

Check on the V-belts, regularly, especially right after an exchange. The tightness (fig. 25) is checked on by pushing down on the belt right between the two pullis below the discs. With a force of about 10 kg the belts may only yield up to 10 mm at the most.

An easier way to check on the tightness of the belts is to grab a wing of one disc with one hand and grab the other wing with the other hand and pulling in the same turning direction. Thus, the discs may not be pulled/moved in the same turning direction. Remember to tighten the nut on the tension adjuster (5) right after finishing the tightening.

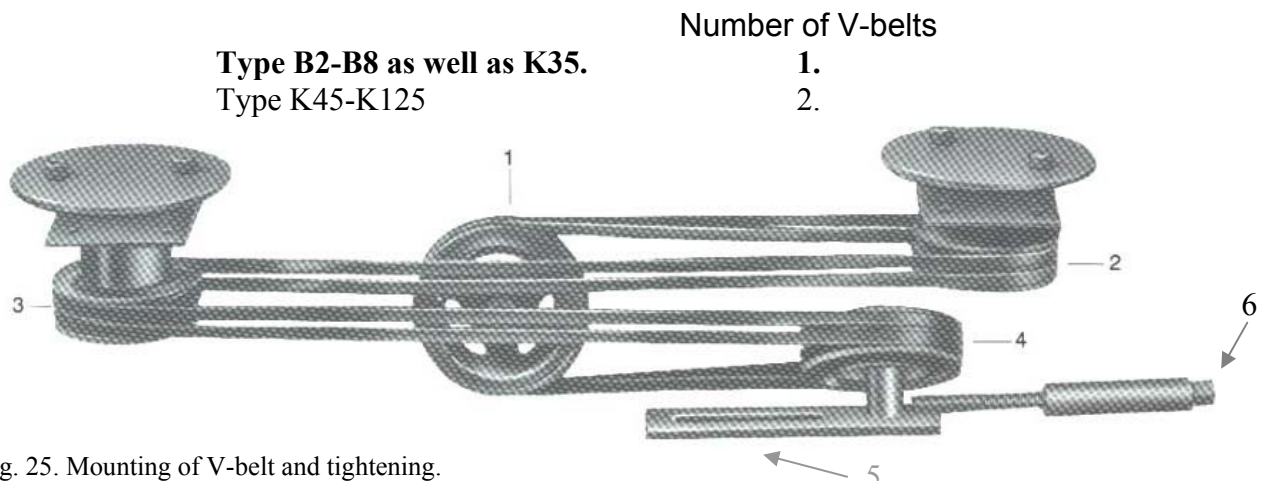


Fig. 25. Mounting of V-belt and tightening.

Mounting of new V-belts

Dismount the belt tightener (pulley 4 with fittings) before mounting the belt.
On spreaders with two belts, mount them at the same time.

1. Mount the belt on pulley 1. The back pointing to the right.
2. The top part of the belt on pulley 1 is passed behind pulley 2.
3. The belt is twisted a half turn. – It is passed from pulley 2 to the back of pulley 3.
4. Pulley 4 (the belt tightener) is passed through the loose end of the belt between pulley 1 and pulley 3. Then, pulley 4 with fittings is mounted and the belt is tightened.

11. Fertilizer Quality

The quality of the fertilizer is of great importance for the job, which the spreader shall execute.

11.1. Measuring the fertilizer quality

When a normative fertilizer quality has to be measured, for example at purchase, the most important values to know, in order to get an impression of the ability of spreading, are:

- A) Grain strength** is measured by placing a fertilizer grain on an ordinary kitchen scale and pushing down the grain with increasing weight, for example with the back of a pencil, while the pointer follows. The weight, which is shown when the grain is smashed, is an indicator for the grain strength of the fertilizer. Make sure to try several grains (both big and small) and then calculate the average grain strength (fig.26).

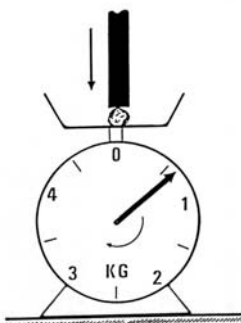


Fig. 26. Kitchen scale for measuring the grain strength.

- B) Grain size** can be measured with the help of BREDAL's riddle box. Fill up the space above the riddle with the largest meshes. Put the lid on and shake until no more changes of distribution occur. Turn the box with the lid pointing upwards. Measure with a tape measure or a ruler. Measure the number of mm in each compartment. Find out the % distribution for each compartment (fig.27).

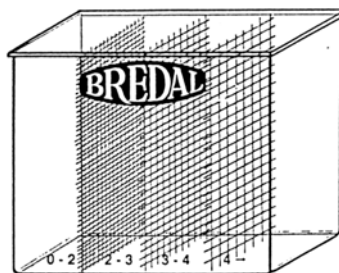


Fig. 27. Riddle box for grain size.

- C) Litre weight** can be measured with a litre measure or a 10-litre bucket. The greater the amount, the more precise the measure. BREDAL offers a Roman balance weight to mount on to the spreader (fig.28). This weight indicates the litre weight directly. (instructions under point 6)

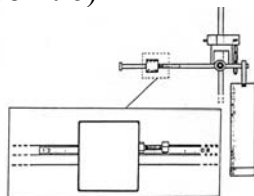


Fig. 28. Roman balance weight for litre weight.

- D) The shape of the Grain** can be judged visually. The smoother and rounder the grain is, the better it flies in the air and the better it slides out of the hopper. A very edged grain (broken stones) or a grain with many bunions on the surface has bad flying properties and has difficulties to reach large working widths.
- E) A large dust content** is obvious if a large amount of grain is gathered below the smallest riddle, but the dust content can often be judged visually.

11.2. Fertilizer quality's influence of spreading properties

1. **A low grain strength** means that the fertilizer has the tendency to get crushed during transportation and spreading. Often, there is a connection between a low grain strength and the dust content, as the fertilizer gets crushed during transportation and putting in stock at low strength values.

The grain strength is most often OK when the fertilizer lot leaves the factory. The fertilizer will lose its original grain strength if it is exposed to high humidity or direct water inlet during transportation or storage.

It will not be regained even though the fertilizer lot is dried. Therefore, the fertilizer must be covered with plastic during storage. Some fertilizer types always have a low grain strength, e.g. prillet urea and some types of ammonium nitrate (N34). There are great fluctuations on the grain strength from different manufactures of urea and ammonium nitrate (N34). These fluctuations are within the area of sensitiveness towards the crushing on spreading discs.

Normal granulated fertilizer has a grain strength of 3 -> 8 kg. *Ammonium nitrate (N34)* has a grain strength of 0.5 -> 3 kg. *Urea* has a grain strength of 0.5 -> 2 kg, single granulated types of urea reach up to about 3 kg. **(To be able to withstand the stress on a BREDAL spreader, which runs with 540 rpm on pto, the minimum requirement is set on 0.5 -> 1 kg. At 800 rpm on pto, the minimum requirement is set on about 2 kg and at 1000 rpm on pto, the minimum requirement is 3 -> 4 kg).**

2. **Grain size** is of importance for how far the fertilizer can be thrown. Big fertilizer grains are thrown further than small ones, therefore it is necessary to have a minimum requirement on grain sizes in order to spread on large working widths. BREDAL set its lowest limit for the middle-grain size at c. 2.8 mm (20 - 28 m) up to 3.1 mm (30 til 36 m). In the riddle box offered by BREDAL, there has to be more than c. 40% - 45% of the fertilizer above the 3 mm riddle (20-28 m) and c. 55 % above the 3 mm riddle (30-36 m).

Normal prilled and granulated fertilizer has the middle-grain size of about 2.9 -> 3.3 mm. Ammonium nitrate (N34) has a middle-grain size of about 2.0 -> 2.8 mm.

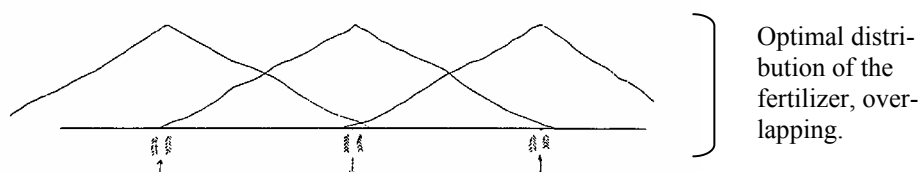
Prilled urea has a middle-grain size of 1.5 - 2.5 mm, single granulated urea manufactures reach up to 3 -> 3.5 mm. *12 m working width* does not make special demands on the grain size, however, the dust rate in the fertilizer should not be high, and the fertilizer should not look like salt or sugar.

3. **Heavy fertilizer grain** is thrown farther than light grain. Therefore, a minimum requirement for the specific weight of the fertilizer at large working width is necessary. BREDAL sets the limit for spreading on large working widths at 0.9 -> 1.0 kg pr. litre. Normal granulated and prilled fertilizer incl. Ammonium nitrate (N34) has a litre weight of 0.9 -> 1.2 kg pr. litre. Urea has a litre weight of 0.7 -> 0.75 kg pr. litre. Big grains and an even surface may compensate for a lacking litre weight (see under spreading of urea, section 15.3).
4. A **skærvet fertilizer** has bad aerodynamic properties and does not fly very far. Large working widths require a fertilizer with good flying properties. These properties are difficult to measure in practice, but a visual judgement is easy and sufficient, as an even surface as well as a round grain provides for good flying property.
5. **Dust content** increases with the number of treatment (reloading, transport etc.), which the fertilizer is exposed to. Furthermore, moist fertilizer, which has been dried again, will lose its grain strength and the dust content will increase greatly with the number of treatment. If dusty fertilizer is stored with a stationary stacker, the dust will be gathered in a cone right below the stacker. This causes big changes in quality of the lot as the storage is emptied. A stacker, which is used for putting in fertilizer for storage, has to be moved regularly.

12. Performing a spread test and adjusting the spread pattern

If there is a suspicion that the machine does not spread correctly or the purchased fertilizer type has other properties than usually, it is **sensible to make a spreading test**. During the execution it is important to consider the following points:

- A. The test must take place under dry conditions (field/machine)
- B. The test must take place in a field with a good crop, - c. 10 cm strong covering so that jumpers are avoided.
- C. Make sure to execute the test on a flat part of the field and to place the trays in the most horizontal position as possible.
- D. The test **must** be executed with the same forward speed, which normally is used for spreading (optimum is 10 - 12 km/h, if the field allows it).
- E. Make sure to run about 100 -> 200 kg fertilizer through the spreader before the test is executed. There will always be coatings left from old fertilizer, verdigris and rust on the discs and wings of the spreader, which need to be worn off before the spreader can show a constant spreading picture.
- F. The simplest way for the execution of the test is by placing the trays in $\frac{1}{2}$ working width to both sides of the middle of 3 tracks. Ride forwards on the first track, back on the second and forwards again on the third. In order to get the right amount into the trays needed for an estimation, it is necessary to spread about 400 kg/ha or pass the trays several times (fig 29).
- G. Make sure not to uncouple the dosing on the testing area, as the fertilizer is thrown far to the rear.



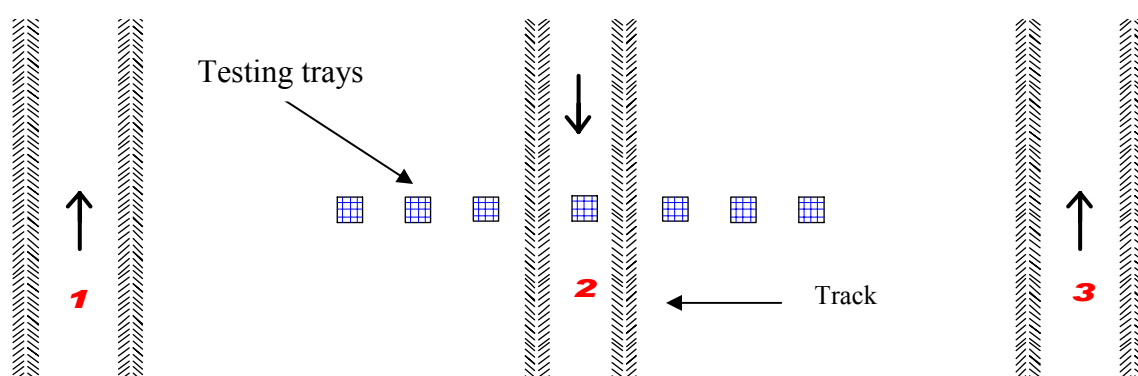


Fig. 29. Placing of testing trays.

BREDAL recommends using 7 trays for the testing.

Correction of the spreading:

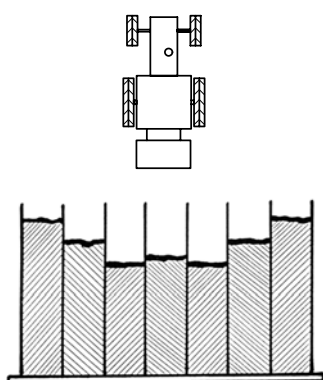


Fig. 30. Measuring glass: Too much fertilizer between the tracks.

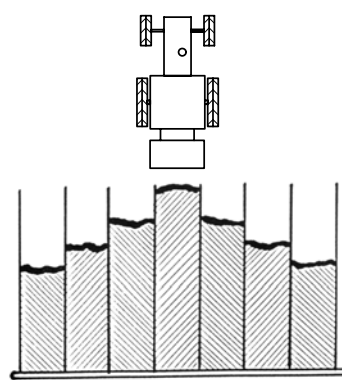


Fig. 31. Measuring glass: Too much fertilizer behind the spreader.

Too much fertilizer between the tracks? (fig. 30)

- A. **12-16 m:** Raise the number of revolutions to 540 rpm at 12 m and rise with 100 rpm pr. test at 15-16 m. Until the spreading is perfect.
- B. **18-36 m:** The drain scale (fig. 32) is moved towards 0. If the first test is unacceptable, always move 2 full scale marks. If the 2. test shows that two scale marks were too much, the difference between the two tests will indicate how far the scale has to be set back.



Fig. 32. Drain scale

Too much fertilizer behind the spreader? (fig. 31)

- A. **12-16 m:** Lower the number of revolutions with 50 rpm pr. test until the test is OK.
- B. **18-36 m:** If the fertilizer observes the requirements on grain strength and grain size (section 11.2), move the scale one full scale mark towards 5.
If the grain strength and/or the grain size do not observe the requirements (stated under 11.2), the combination of revolutions on pto and the drain scale-setting can be changed, as shown below:

Lower the revolutions with c. 20%. The spreader will then take care of the fertilizer (lower grain strength requirement) and drop the fertilizer earlier, thus leaving more fertilizer between the tracks. Move the drain scale one mark at a time towards 5 if it still is not enough. Be aware of the fact that this way of spreading is much more sensitive concerning fluctuations of the fertilizer quality, fluctuations of the distance between the tracks and variations of the number of revolutions than the recommended standard, as the overlapping is reduced because a box shaped spreading curve without great overlapping is achieved.

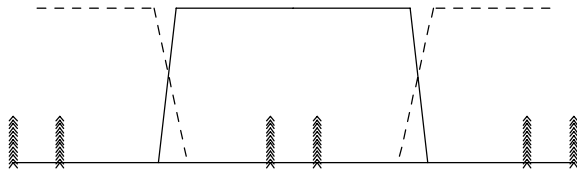


Fig. 33. Spreading with little overlapping

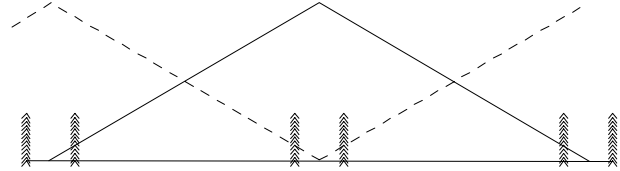


Fig. 34. Spreading with great overlapping

12.1. Execution of spreading test with border device.

Place the trays as shown in fig. 35. Adjust the machine as mentioned under section 7. Does the machine drop too much fertilizer over the boundary line; lower the number of revolutions with 30 rpm pr. test, until the spreading is acceptable. In the event of the opposite, too little fertilizer at the boundary line, the number of revolutions is raised with 30 rpm.

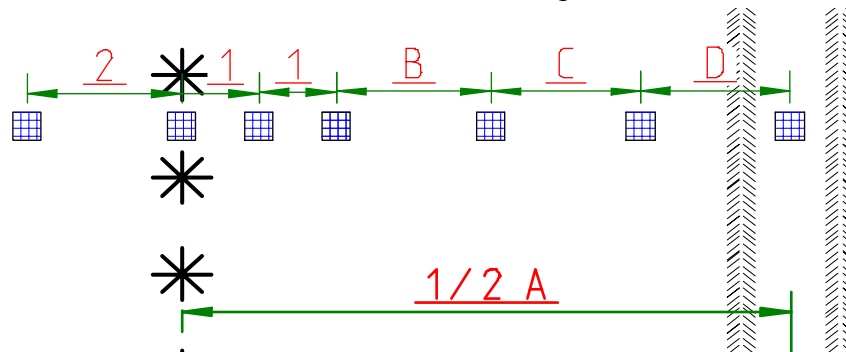


Fig. 35. Setting out of test trays at headlands spreading

The shown numbers are metres. The distance B,C and D are distributed over the remaining distance.

13. Spreading wedge-shaped fields, rest widths and hilly country

The spreader is very easy to operate on uneven areas, as it operates with great overlapping.

As the machine operates with discs, which rotate towards each other, an essential advantage is achieved, as it is possible to close one shutter. Each spreading disc spreads the fertilizer on c. 90% of the total spreading width (When the working width is 12 m the spreading width is 24 m and each disc spreads over 22 m).

By closing one shutter the dosing amount will be halved.

How to work on different uneven parts of the field is best shown on practical examples:

When driving on a *on a rest width in the field* (less than one working width) between two tracks, the dosing in both tracks is reduced closest to the rest width, compare below:

Find out the percentage of the missing working width. Subtract the dosing in the two tracks pointing towards the rest width one half of the above percentage.

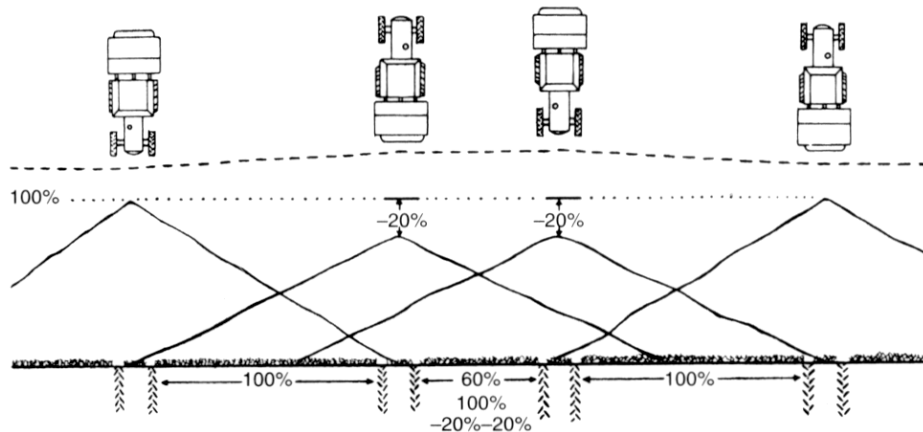


Fig. 36. Spreading on rest widths

Example:

If the rest of a working width of 12 m is 60 %, the missing working width will consequently be 40%. Half of that is 20%, which is subtracted from the dosing when the two tracks that point towards the rest width has to be spread.

Spread the headland as usually, if the **rest width** is **between the 1. and 2. track** in the field. Subsequently, find out the percentage of the working width that is missing between the 1. and 2. track. Lower the dosing with the percentage while the 2. track is spread. The drain setting has to be set on 1 for 15, 16 and 18 m working width in the 2. track and on 2 for 20, 24 and 28 m working width. The border device (15 – 28 m) has to be put up in the field and the number of revolutions has to be c. 30 % below the recommended rate for the spreading in the field for the set working width.

Example:

24 m working width with a distance of only 12 m between the 1. and 2. track, meaning that 50% of the working width is missing right there.

Spread the headland spreading as usual according to the direction for the 1. track. Lower the dosing with 50% in the 2. track. Set the drain on scale mark 2 and lower the revolutions 30% from 1000 rpm to 700 rpm. Put up the border device (15-28 m or 15-36 m) and drive with it pointing in to the field. The 3. track is spread the usual way (see fig. 37).

As to drive towards and away from the **forlandet**, respectively, in acute angles, we refer to the instructions under section 7.6 "Wedges in the **forager**."

The spreader and the ability of great overlapping make it also possible to start in an unusual way. Please contact the factory for more detailed instruction.

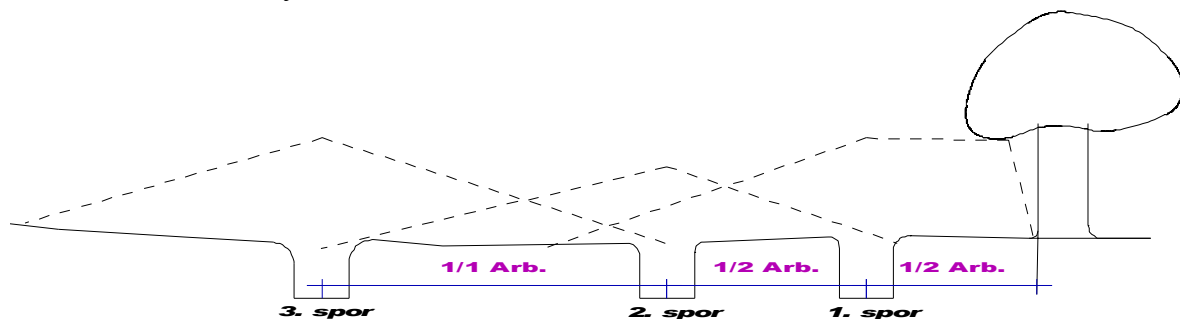


Fig. 37

13.1. 14.3. Spreading on hilly country

If the country is very hilly it is necessary to set the spreader on the highest possible belt speed and the lowest possible shutter opening. This applies especially to smooth-running, fine-grained fertilizer.

14. Performing a turn test for controlling the rate

1. Adjust the machine to the desired seed amount.
2. Dismount the spreading discs.
3. Turn the dosing wheel until there is an equal amount of material all the way from the shutter to the drain.
4. Place a tray or a bucket under each drain. (It is necessary to place a piece of cardboard or the like under each drain in order to lead the fertilizer into the bucket).
5. **Turn the dosing wheel 11.5 times** with a high number of revolutions, compare below
6. Weigh the collected amount.
7. Multiply the weight with the factor that fits the chosen working width, shown below. The result is the number of **kg/ha**, which is dosed.

Working width metre	Factor
------------------------	--------

6	80
8	60
9	53.3
10	48
12	40
15	32
16	30
18	26.7
20	24
21	22.9
24	20
28	17.1
30	16
32	15
36	13.3

When you do the test you can try to turn the dosing wheel with the same speed it would use in the field, minimum 60 rpm, 10 km/h yield 92 rpm on the dosing wheel.

15. Special fertilizer types

The market offers special fertilizer types for special purposes. Some look like fine salt or sugar with a litre weight of 1 kg/litre or above that. These types can often be spread on 6 m working width at 540 rpm on the pto shaft with drain setting (1).

The factory has over the years collected experience-material concerning many other fertilizer types. Please ask if spreading of unusual fertilizer gets relevant.

Please remember that each time an amount is saved in a fertilizer purchase, corresponding to the value of one barrel grain, the effect of bad spreading and poor utilization can amount to a value of several barrels.

15.1. Recommendations concerning the spreading of N34 ammonium nitrate

The machine factory BREDAL A/S has carried out spreading tests with this fertilizer type. The market offers many different qualities. As problems with the spreading quality often occur on large working widths, we have concentrated on testing ammonium nitrate with medium to good spreading properties.

Ammonium nitrate should not be comparable with ordinary quality fertilizer as it often differs in grain strength and grain size. A grain strength of 1- 2 kg is not unusual, whereas an ordinary quality fertilizer has a strength of 4 - 6 kg and sometimes even more. The grain size will often be smaller compared to an ordinary quality fertilizer. A medium grain size of c. 2.2 mm is not unusual, whereas ordinary quality fertilizer has a medium grain size of c. 3 mm or more.

These factors have decisive influence on the spreadability of the fertilizer. The machine factory BREDAL A/S has carried out spreading tests in spreading centres with an ammonium nitrate with the above-mentioned properties.

The recommendations mentioned below are intended as a guide (fig. 38). As mentioned above, the fertilizer quality is a fluctuating dimension. Therefore, the Machine factory BREDAL does not take any responsibility for the spreading, which will be carried out. For that same reason, we vigorously recommend to carry out a spreading test in the field before carrying out the final work.



A		
12	540	0
15 -> 16	800	0
18	800	1
20	900	1
24 **	900	2

Fig. 38. Review of the recommended settings at the spreading of N34 ammonium nitrate.

** On 24 m we recommend to spread only with an ammonium nitrate of high quality. As N34 most often is very smooth-running, it is recommended to lower the dosing with c. 10 % compared with the directions of the dosing table.

15.2. Pure potash and sulphate of ammonia

As these fertilizer types run more slowly on the wings of the spreading discs, it would be advantageous to adjust the drain scale one or two marks higher than the recommended setting: Potash 2 marks and Sulphate of ammonia 1 mark. The correction of the spreading via a spreading test must pass off according to the given directions under section 12.

It is important to choose the highest belt speed and the lowest shutter opening, as these fertilizers run so slowly that it may cause problems as to fill the shutters. The dosing is increased with c. 10% compared with the guidelines for the dosing setting.

15.3. Urea

This fertilizer is available in two versions. A prilled and a granulated version. These two versions differ very much from each other. Urea is often rather inferior when talking spreadability, because it has 3 essential properties against itself.

- 1) Urea is most often very fine-grained (prilled commodity).
- 2) Urea grains have low grain strength.
- 3) Urea has a low litre weight.

Spreading on 9 - 12 m (12 - 16 m with a good prilled commodity):

Set the drain on scale mark 0. The number of revolutions of the pto can be increased to 650 - 700 rpm, if the grain strength is minimum 1 - 1,5 kg. If the grain strength is any lower, only 540 rpm should be used.

Spreading on larger working widths with a good prilled commodity:

The 3 above-mentioned properties result in a short throw. Therefore, the way of spreading the urea on large working widths has to be changed: *from* the save and flexible triangular-shaped spreading curve with double overlapping (fig. 34) *to* a square-shaped spreading curve with limited overlapping (fig. 33).

It is possible to achieve an acceptable spreading with standard wings and discs on medium working width (drain scale setting 5, the number of revolutions must fit the working width and the type of urea) .

Fine-grained prilled urea requires a higher number of revolutions than coarse-grained. It is not possible to achieve an 18 m working width and more with all types of urea.

If you want to be sure that the urea can spread on 18 m, the medium grain size must be at least 2 mm. If the urea shall be spread on 24 m, the medium grain size must at least be 2.5 mm.

The grain strength for the spreading of 18, 20 and 24 m must be about 2 kg

Because of the very special spreading picture (square-shape), it is important to be sure about the uniformity of the urea-lot all the way.

As the above-mentioned directions only are normative, it is strongly recommended to carry out a spreading test with the purchased urea. The number of revolutions, which ensure an even spreading, must be kept constantly, as it corresponds to the exact working width and type of urea, which is used.

Spreading of granulated urea

Granulated urea is rougher on the surface than prilled urea. It has usually a medium grain size of 3.0 – 3.5 mm and grain strength of 2 - 3 kg.

The standard setting of the spreader can be used for up to 24 m working width, but no higher pto revolutions than 800 rpm at 2 kg grain strength and 900 rpm at 3 kg grain strength.

The spreader can be raised as high as possible (disc height of about 110 cm), in order to compensate for the lacking revolutions on the largest working widths.

Late application equipment can be used advantageously (section 11). The following settings are recommended: 18 and 20 m, drain 1, 700 rpm on pto. 24 m, drain 3, 700 rpm on pto and 28 m, drain 5, 700 rpm on pto. With the mounted late application equipment the grain strength may be 3 kg.

Make sure to carry out a spreading test before spreading urea.

Other conditions concerning urea

At the purchase of urea the following conditions, beyond the greater risk at spreading, must be considered:

1. 100% utilization of the nitrogen of the urea can only be achieved if it is running down.
2. The urea must be transformed by two different bacterial strains in the earth before the plants can utilize the nitrogen of the urea. In the stage where the one bacterial type releases the nitrogen of the urea to the other bacterial receiver, the nitrogen of the urea is gaseous and can easily evaporate.
3. The temperature must be over 5 degrees Celsius before the transformation can succeed. If the temperature of the earth exceeds 8 degrees Celsius, the transformation will happen so quickly that there is a high risk of evaporation.
4. To decrease the risk of evaporation it should rain immediately after the urea is spread.

16. Optional equipment

16.1. Mechanical area counter

Always zero the counter before starting the spreading.

The protection cover should only be removed for reading and resetting to zero point (fig. 38). Remember to grease the counter from the outside with oil quite often, as it is exposed to fertilizer dust, which is very aggressive.

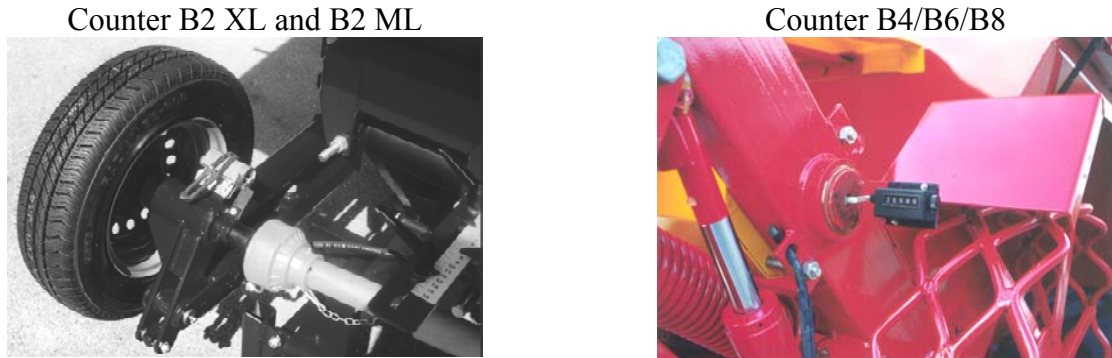


Fig. 38. Mechanical area counter

The area, which is run over, can be calculated by dividing the key figures of the different working widths by the read figure. The result will be the area run over in ha.

Working width	Key figures
12 m	460
15 m	368
16 m	345
18 m	306
20 m	276
24 m	230
28 m	197
30 m	184
32 m	173
36 m	153

16.2. Spreading of helicide, rape and mustard

When spreading helicide, rape or mustard the helicide equipment is placed under the shutters. Then, the shutters are regulated, in order to keep the helicide equipment down on the belts



Fig. 39. Helicide equipment

Spreading of helicide

A suitable amount of helicide is achieved at 1000 revolutions, shaft 1 and 24 m working width.

Spreading of rape and mustard

A suitable amount is achieved at

- 4 kg/ha in shaft 1.
- 8 kg/ha in shaft 2.
- 15 kg/ha in shaft 3.

A turning test can be made in order to check the seed amount, compare section 14.

Max. working width is 16 - 18 m, optimum is 10 – 12 m at 800 revolutions on pto



Fig. 40. Centre drain adjustment

If you wish for an even spreading of rape and mustard, you need to further adjust the discs. Please contact the factory for directions.

The following does only apply to the spreading of rape and mustard:

- Move the drain down to scale mark 0
- Rape runs very fast down the wings, as it is very smooth, therefore the drains must be set as described. Even with this setting the machine will deliver larger amounts in between the tracks than behind the machine.

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