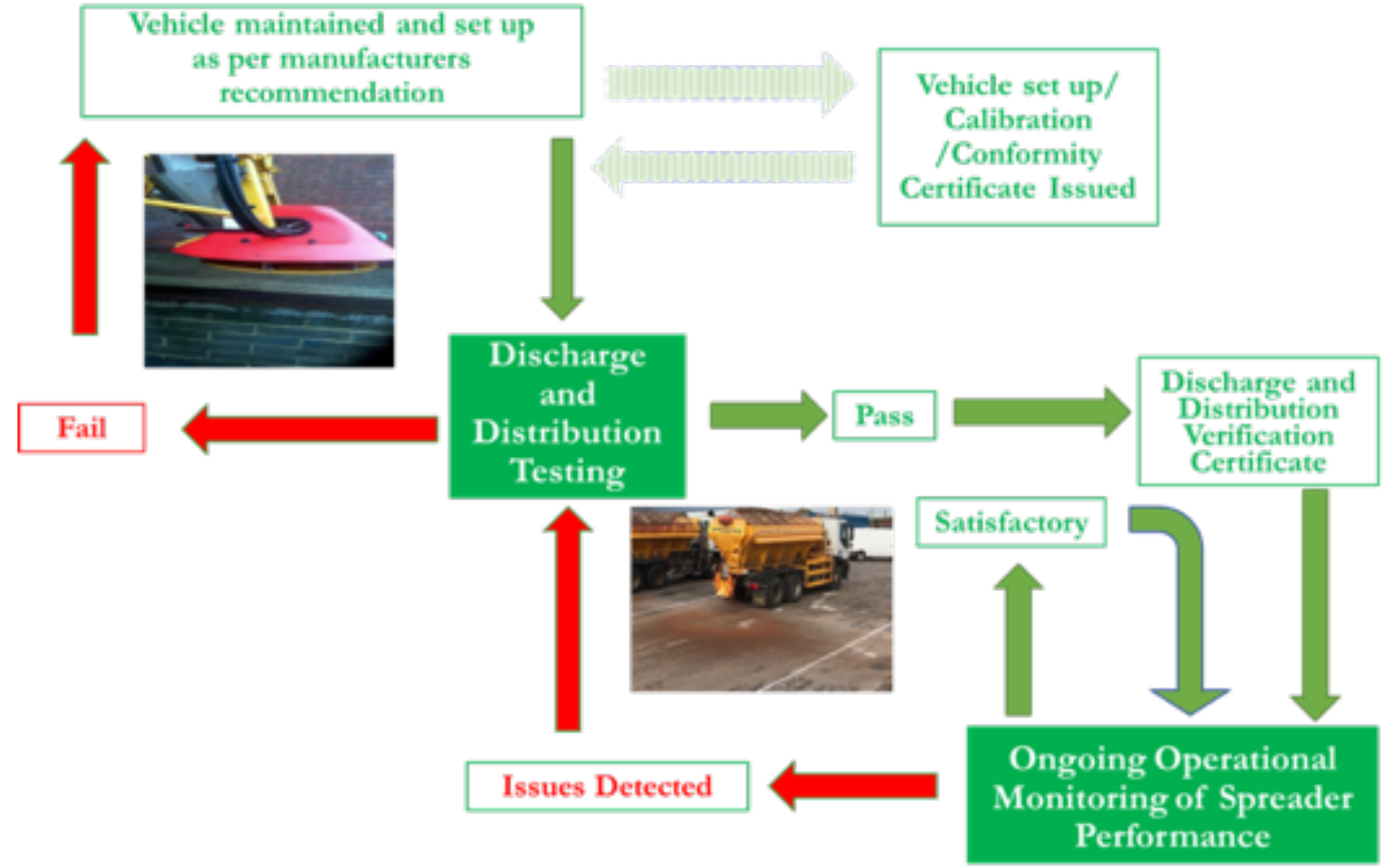
NWSRG

NATIONAL WINTER SERVICE RESEARCH GROUP

SECTION SIX

SPREADER MANAGEMENT



In association with IHE

INSTITUTE OF HIGHWAY ENGINEERS

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CONTENTS

KEY

Red text are warnings or especially important information

Green text are particular recommendations or key advantages to consider

CHECK LIST:

Is the spreader manufactured in accordance with current standards?

Is the calibration up to date?

Has the distribution been assessed and recorded?

Is the performance being monitored?

SECTION SIX
Spreader Management

6.1 INTRODUCTION

Calibration and testing is important to demonstrate that the correct amount of de-icer is being discharged by a spreader and that the de-icer that is being discharged is being correctly positioned on the highway. For this reason, it is important that every vehicle is individually calibrated and tested. In addition, it is also important that once a vehicle is calibrated; there is a continuous form of monitoring throughout the season to determine if a recalibration is required. It is expected that any vehicles manufactured to current standards should be capable of being calibrated in accordance with this document.

The spread rate tables in Section 8 (Salting Spread Rates) are only designed to be used by spreaders that meet the requirements of this document. Where equipment is unable to meet the requirements of this document it is incumbent on the Authority to carry out its own risk assessment in evaluation of its equipment spreading capability and determine spread rates appropriate for the anticipated road conditions, the records of such should be retained as documentary evidence.

Note: - Calibration and testing as detailed in this document should not be confused with a conformity certificate or calibration certificate as issued by the original manufactures of winter service bodywork. A conformity certificate or calibration certificate issued by the body manufacturer does not always cover all the areas of testing detailed in this document. Each manufacturer issues a certificate relevant to their own procedure, so please check to the level of testing completed by your supplier issuing your annual conformity / calibration certificate. All manufacturers offer additional services to their standard certification process.

This document contains:

- Information on the standards that apply for salt spreaders
- Why, how and when spreaders are best calibrated in order to help deliver safe, effective and economical treatments
- Guidance on how to carry out calibration and testing effectively
- When re-calibration is needed.
- How to monitor and check the ongoing performance of a spreader.

6.2 SPREADER STANDARDS

Spreaders should be manufactured in accordance with BS 1622 and/or draft Euro Standard prEN 15597-2.

Any spreader compliant with the above should be capable of being successfully calibrated to ‘good’ or ‘fair’ following the guidance as outlined in this section. Where this cannot be achieved, the guidance in the spread rates section cannot be followed and the user should make their own risk assessment regarding usage of the spreader.

6.3 CALIBRATION, TESTING, REQUIREMENTS AND PROCESSES

Effective calibration and monitoring provides confidence that spreaders are performing correctly and allows lower spread rates to be used with a reduced risk of under-salting.

This section provides an overview of the calibration process and outlines some of the issues that may prevent achieving the best possible spreader performance.

Potential outcomes from poor levels of calibration can be increased risks of:-

- Under spreading
- Over spreading
- Poor spread pattern and coverage
- Wastage

Vehicle calibration should be carried out by a competent and adequately trained person, and all relevant Health and Safety requirements must be followed.

Dynamic Testing of each individual spreader in the fleet is required to meet with the NWSRG guidance, and should check:

1. That the total amount of de-icer being discharged is within acceptable tolerances
2. That the correct amount of de-icer is being distributed to the target area
3. That the distribution of the de-icer across the target area is within acceptable tolerances (see Table 6.7.1)

It is important that the calibration process is carried out using de-icer that is not significantly different (type or condition – ref Section 4 Salt Storage) to that used operationally. During calibration, the following need to be checked and recorded:

- De-icer type (e.g. rock salt, treated salt)
- Moisture content – within tolerance (see Section 4 Salt Storage)
- Grading – within tolerance (in accordance with BS3247:2011)
- Additives (e.g. anti-caking agent, ABP, etc.)

Vehicles should be correctly maintained in accordance with manufacturer's requirements.

Carrying out just a check of the spreader settings, such as the belt speed, gate height and spinner speed, is not considered to be sufficient. The amount of de-icer discharged should be measured, and de-icer distribution assessed.

The spread rate tables in Section 8 are only designed to be used by spreaders that meet the requirements of this Section, where the discharge is measured and the distribution assessed.

FIGURE 6.3.1 –CALIBRATION PROCESS STEPS

1. **Pre-calibration checks** - of the salt condition, the spreader type, condition and the spreading requirements. See 6.4
2. **Verification of spreader settings** (Conformity check and certification) to measure and confirm correct vehicle operation e.g. belt or auger speed, gate height, spinner speed. Often undertaken by manufacturers. See 6.5
3. **Discharge tests** - measuring the amount of salt discharged. This may be carried out with the spreader stationary, also, additionally at speed if required, which may be more accurate, and making any adjustments as necessary. See 6.6
4. **Visual check of the salt distribution** -. This may be carried out with the spreader stationary, also, additionally at speed if required, although it may be more difficult to assess while travelling, and making any adjustments as necessary. See 6.7
5. **Issuing a distribution record** - following successful completion of the discharge tests and distribution check. See 6.8

6.4 PRE CALIBRATION CHECKS

1. The de-icers, spread widths and spread rates for which calibration is required should be determined and recorded.
2. A representative sample of the spread widths and patterns used operationally on the network for each spreader should be used.
3. The calibration should be undertaken using the de-icer materials that will be used operationally and be assessed for being within the optimal range (see Section 4 Salt Storage) and these details recorded
4. The vehicle(s) should be checked for maintenance and correct operation and should be in a serviceable condition.
5. Records should be kept and available for future reference and use

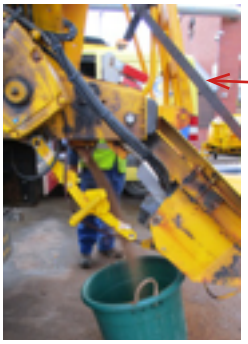
Ref 6.4.4 Damaged spinner hood

6.5 VERIFICATION OF SPREADER SETTINGS (May also be known as manufacturers conformity or calibration)

1. The process will be dependent on the make and model of vehicle being calibrated, and should include checking various settings such as the belt speed, gate height, spinner speeds are in accordance with manufactures recommendations.

6.6 DISCHARGE TEST - REQUIREMENTS AND PROCEDURE

1. The purpose of the discharge test is to establish that the correct amount of de-icer is delivered to the spinner or discharge mechanism
2. The discharge test should be carried out with the spreader running at spreading speeds, widths and patterns expected to be used operationally. These speeds can be simulated when the spreader allows this to be carried out as a static test
3. The vehicle should be refuelled to the same level before and after any spreading run, so the weight of fuel used does not affect the measurement
4. The hopper should be loaded to a level between 10% and fully loaded, and the load level should be consistent across vehicles and equipment being calibrated, and recorded
5. If carrying out a spreading run, the load should be weighed before spreading
6. The total target weight of de-icer to be discharged should be calculated from the spread rate setting, treated distance and spread width.
7. The discharge run or static discharge test is then carried out
8. For static testing, a minimum duration of 15 seconds will suffice, with the duration being precisely recorded.
9. Following the run or static test, the amount of salt (and brine, where applicable – see note below) discharged is determined by direct measurement by before/after run or test weight comparison



Spinner secured

Suitable calibrated weighing device

10. A minimum of two runs or tests should be utilised to determine the average weight discharged.
11. The discharged weight is then compared to the calculated target weight.
12. If the weight of material discharged is not within ±10% of the target, adjustments should be made in accordance with the spreader manufacturer's recommendations.
13. Where necessary adjustments of the vehicles and or spreader mechanism are required these should be done by trained operatives and / or in consultation with the manufacturers.
14. The process should then be repeated until two consecutive measurements are made within ±10% of the target.
15. For more modern vehicles, with closed loop control of the weight discharged, more stringent limits of ±6% should apply.
16. The above procedure should be carried out at two significantly different spread rates using a representative spread width(s) for the routes treated by that spreader

Note: When pre-wetted salting at target mix proportions of 70% dry salt and 30% brine, the measured proportions should be within the range 64:36 to 76:24. The amount of brine discharged during a static test can be determined by collecting this separately from the salt. Alternatively, the vehicle can be weighed with no salt loaded before and after the test (fuelled to the same level). The difference in weight will be the amount of brine discharged

6.7 VISUAL CHECK OF THE SALT DISTRIBUTION

The above described discharge test in Section 6.6 is insufficient on its own to establish that effective spreading is occurring across the target area of paved surface.

A visual check of the salt distribution should also be undertaken to ensure that the de-icer is being spread to the target area at the expected rate(s). This check should be carried out by an experienced and competent person who is able to properly relate the visual check to actual performance.

Is the trajectory of the discharge from the spinner correct?

The distribution check should be carried out using de-icer that is not significantly different (type or condition) to that used operationally.

For some types of spreaders the check can be carried out with the spreader stationary and operated for a few seconds to simulate spreading at normal speed (see procedure for stationary distribution check below).

For vehicles that cannot be properly or accurately operated whilst stationary (as guided by the manufacturer), the salt distribution may be visually assessed from a vehicle following the spreader performing a trial spreading run. Whilst this will allow an assessment of the distribution at operational speeds, with the extra 'bouncing' of the salt particles after striking the pavement and the snaking caused by turbulence generated by the spreader, it is much more difficult to precisely assess the uniformity of the distribution and the wastage than from a static check.

An assessment of the uniformity of the salt distribution as Good/Fair/Failed should be made. This will depend on the de-icer type, Table 6.7.1 below provides details on the minimum amount of de-icer required to be spread in any lane for these assessment levels.

The distribution should be checked at realistic spread rate(s) and pattern(s) that may be used by that spreader.

Reference should be made to Section 8 - Spread Rates regarding acceptable wind conditions for this test.

Procedure for stationary distribution check

A valid distribution check can only be made when the total weight of de-icer being discharged is within 10% of the target weight as proved during the discharge test. (Section 6.6)

1.A suitable area should be marked out to replicate a typical 2 lane road layout (cones, white paint etc. may be used).

Edges of road

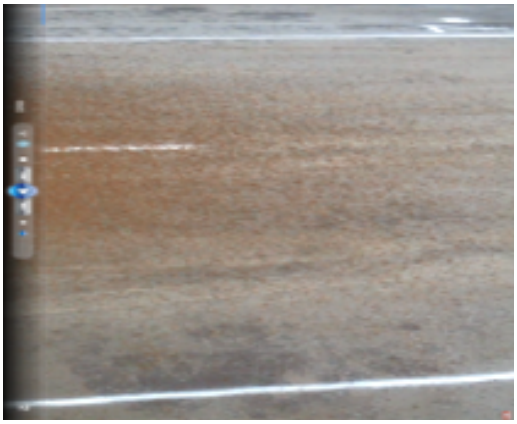
Centre line

2. If a static check is to be undertaken, the vehicle should be positioned appropriately and 15-20 second spread test should be undertaken to avoid too much de-icer accumulating.
3. For the purposes of this guidance the uniformity of distribution is expressed in terms of spreader capability. See Table 6.7.1.
4. This performance measure is then used as part of the decision making process when deciding the spread rates required during treatments – see Section 8 - spread rates and treatments for more details.
5. For each de-icer type, the uniformity of distribution is defined by the minimum amount of salt spread in each lane as shown in the following tables.

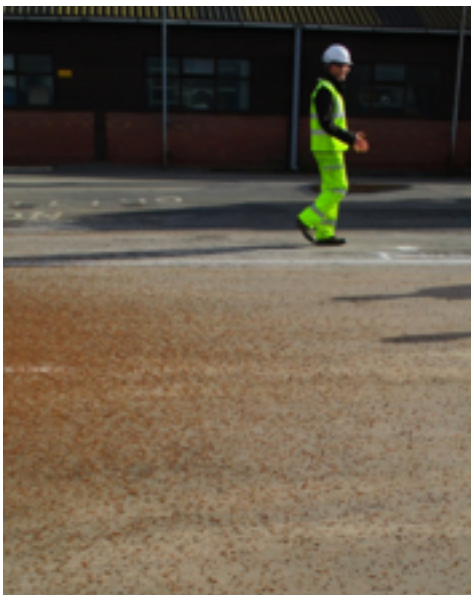
TABLE 6.7.1 – SPREADER PERFORMANCE BASED ON UNIFORMITY OF DE-ICER DISTRIBUTION FOR DRY, TREATED AND PRE-WETTED SALTING METHODS FOR ANY LANE

TECHNOLOGY	APPROXIMATE AMOUNT OF DE-ICER IN EACH LANE AS % OF THE TARGET AMOUNT (TARGET IS THE AMOUNT IF LANE IS COVERED SEVENLY AT THE SET SPREAD RATE)	SPREADER PERFORMANCE
Dry	> 80	Good - Passed
	60 - 80	Fair - Passed
	Less than 60	Failed
Treated and Pre-wetted	> 90	Good – Passed
	70 - 90	Fair - Passed
	Less than 70	Failed

The following photographs are provided to assist in determining spreader performance using a simple visual assessment of the relative amounts spread in each lane. Examples of how the distribution might look on the ground are also given in the figures below.



The pictures above show **Good performance** – De-icer appears to be spreader uniformly and mostly within the set spread width.



The pictures above show **Fair performance** – Some variation in the amount of de-icer across the spread width is visible and small amount of de-icer outside of the lane width

Significant variation from offside (excess) to nearside (nil)

1m short on nearside - note salt relative to far cone

The pictures above show a **Failed performance** – Refer to table 6.7.1

6.8 VEHICLE CALIBRATION / CONFORMITY CERTIFICATE AND DISTRIBUTION RECORD

A Calibration / Conformity Certificate (example in Appendix 1), should be completed for each spreader that meets the requirements of Section 6.5.

Those meeting the requirements of the discharge test detailed in Section 6.6 and distribution check (Good or Fair) in Section 6.7 should be issued with a distribution record; this should include all items shown on the typical example in Appendix 2

A photograph taken of the spread distribution may be included with each record to provide a future reference.

Additional supporting records may be attached where appropriate. i.e. details of individual measurement records.

6.9 CALIBRATION PROCESS - PROGRAMME AND TIMING

This should be carried out:

- Utilising guidance from the manufacturer(s) before the start of each winter season
- As close as reasonably practicable to the start of the winter season
- Maximum 12 months from any previous pre-season calibration
- Following investigations carried out through spreader performance monitoring processes (see Section 6.10) including significant variance in de-icer quantity used for identical treatments
- Whenever the spreading mechanism or other mechanical part that may affect spreading is subject to mechanical damage or change
- Consider if concerns raised by driver
- Consider after reports of accidents post treatment

6.10 MONITORING SPREADER PERFORMANCE AFTER CALIBRATION

1. Proper monitoring, auditing and data recording will help identify potential issues with delivery of de-icers (this will also provide documented evidence to support treatment decisions and defend against liability)
2. Vehicle tracking and data monitoring systems, routine vehicle checks and reporting systems may well assist in this process.
3. The amount of de-icer being spread on each route should be routinely monitored throughout the operational winter season.
4. Target amounts should be determined for each route and spread rate used, and these used for comparison against actual amounts used during operations.
5. Reports of potential inconsistencies may also be received from drivers or other sources.
6. Authorities may wish to determine monitoring tolerances in connection with the above.
7. Where issues are found these may require immediate remedial actions to ensure an effective treatment has been delivered, for example retreatment of a route.
8. A procedure should be in place to investigate spreaders when their performance falls outside the acceptable range.
9. All checks, remedial actions and recalibration should be properly and fully documented.

Checks to carry out when monitoring or other reports indicate potential issues

1

- If issues are identified at any stage below, carry out remedial action and conitinue to monitor
- Consider if
  Recalibration is required?
  Further driver training is necessary?

2

- **Check the spread settings used**
- Correct spread rate and spread width(s)?
- Correct setting for the salt type being spread?

3

- **Issues during the spread run**
- Spreading was over correct length and width?
- Spreader was operated in burst/ blast mode?
- Salt was spun off before returning to depot
- Is the spread pattern correct?
- Tunnelling was reported during spread run?

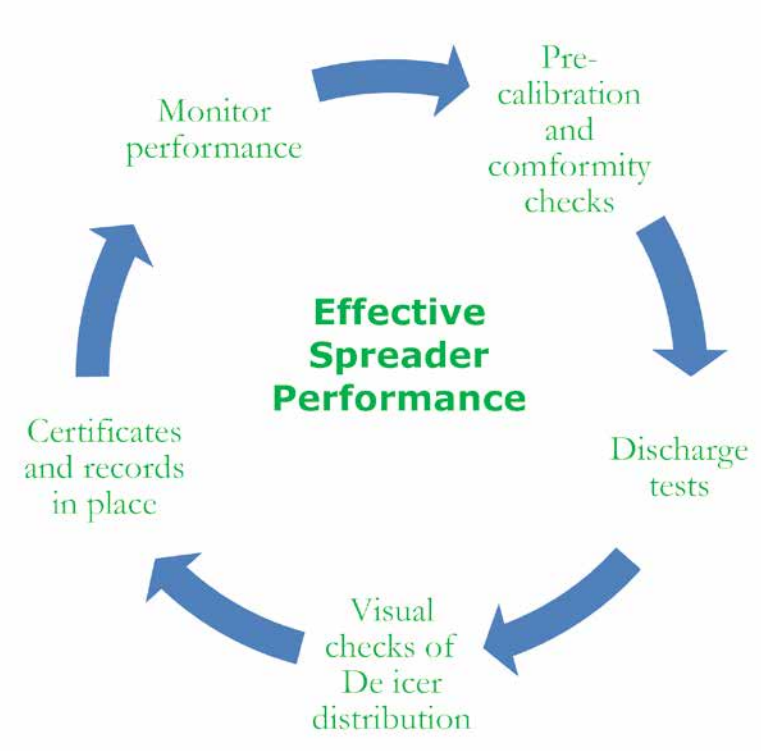
4

- **Check spreader operation**
- Visible damage to the hopper or spreading mechanism?
- Driver advises vehicle is operating incorrectly?
- Visible contamination of the hopper or spreading mechansim?
- Is correct amount of material being discharged?
- Is the spread pattern correct?

Is the current certificate less than 12 months old

6.11 SUMMARY

Following the guidance of this Section will help authorities deliver an effective service



Appendix 1

Certificate of Calibration / Conformity
Road Speed Related Spreader

Authority/Customer	
Vehicle Registration	
Vehicle Type/ Model	
Spreader ID and make	
Test Site & Location	
Material Specification Note Condition and moisture content	Certificate attached or reference
Attachments if required	
Date of Calibration	
Certificate Valid Until	
Issued By	

Appendix 2

Discharge & Distribution* / Monitoring* Record
Road Speed Related Spreader

Authority/Customer			
Vehicle Registration			
Vehicle Type			
Spreader ID			
Test Site & Location			
Environment & weather condition			
Material Specification, Condition and moisture content less than 1 month old	Certificate attached or reference		
Discharge Check			
Spreader settings used for test	Spread rate – spread width - speed		
Amount of Material in Hopper - %full			
Calibration Equipment Type			
Equipment Serial No			
Measurement readings			
Comments/ attachments ref			
Overall Assessment	**Pass/Fail**		
Spread Pattern Check	**Static / Moving vehicle**		
Amount of Material in Hopper - %full			
Centre – Assessment of lane distribution	**Lane 1**	**Lane 2**	
Centre - Result	**Good**	**Fair**	**Failed**
Asymmetric Right - Assessment of lane distribution (about 90% of gritting is this)	**Lane 1**	**Lane 2**	
Asymmetric Right - Result	**Good**	**Fair**	**Failed**
Attachments			
Date of Verification			
Name	**Signed**		
Comments			

NATIONAL WINTER SERVICES RESEARCH GROUP
Website www.nwsrg.org
Email nwsrg@trl.co.uk