D2 Tegninger og supplerende dokumenter
D2-ID76841a Induktive sløyfer

Inductive Loops

The Datarec products utilize inductive loops embedded in the road surface to register passing vehicles. This technology is well proven over many years and has many advantages compared to other technologies used for traffic detection. One of the main advantages is that the loops are embedded typically 5-10cm down from road surface. This makes the measuring system insensitive to weather conditions. It is also unaffected by normal road maintenance such as sweeping, snow-clearing, scattering of gravel and salting.

To get good recordings, you need good signals. It is important that the loops are established in correspondence with these guidelines. Inductance, conductance, geometry of the loops and the capability to resist noise are very important issues.

In order to ensure good conductance, we recommend using a cable with a large cross-section and preferably using as short a supply length from the loops to the Datarec as possible.

Cables with 2.5 mm^2 are recommended, but 1.5 mm^2 may be used if the supply length is short or the equipment is only needed for counting. Classification needs better signals than just counting. Please note that detectors for bicycle counting always use 2.5 mm^2 cables.

Always use twisted cable for the supply cable to avoid influence from noise. At least 10 turns per meter is necessary.

Important: In the loop the cable must not be twisted.

Other noise-issues:

Avoid power cables and reinforced concrete and be aware of the quality of the supply cable. The desired inductance is acquired by using a number of loops for the selected area. The geometry of the loops is length, width, area and shape of the loop.

A general rule is that the ratio for $A \times n^2$ = should be approximately 30 (A = area and n = number of turns in the loop).

Table 1 Loop length and turns for vehicles and bicycles

Loops	Size (cm)	Turns	$A \times n^2$	Comment
Norwegian loops for cars	185x185	3	30.8	
Bicycle loops (max)	120x330	3	35.6	
Bicycle loops (min)	120x150	4	28.8	

Two loops for each lane have to be established. The loops should be placed in the middle of the lane. If the vehicle’s normal position is to one side or another, the loops should be adjusted accordingly. Use rutness (rut depth) as indication.

Inductive loops for cars

Each loop shall be exactly 1,85 x 1,85 meter, with 1,00 meter between the loops. In the traffic flow direction it is particularly important that the distance from the start of the first loop to the start of the second loop is exact. This distance shall be 2,85 meter +/- 0,5cm.

The slots that are cut for the loops in the road surface may be from 5 - 10 cm depending on local conditions, and not more than 0,7 cm wide.

Use 3 turns of cable with 2.5 mm² isolated copper cable. Cable TP100 or Radox RX 125 are recommended.

In the loop trace itself, the cable must not be twisted, but remain in parallel.

The cable length between the loop and the meter box should be as short as possible to ensure good data quality; maximum cable length is 100m.

From the loop to the terminal inside the cabinet, the supply cable for each loop separately should be twisted by at least 10 turns per meter (refer **Figure 2**).

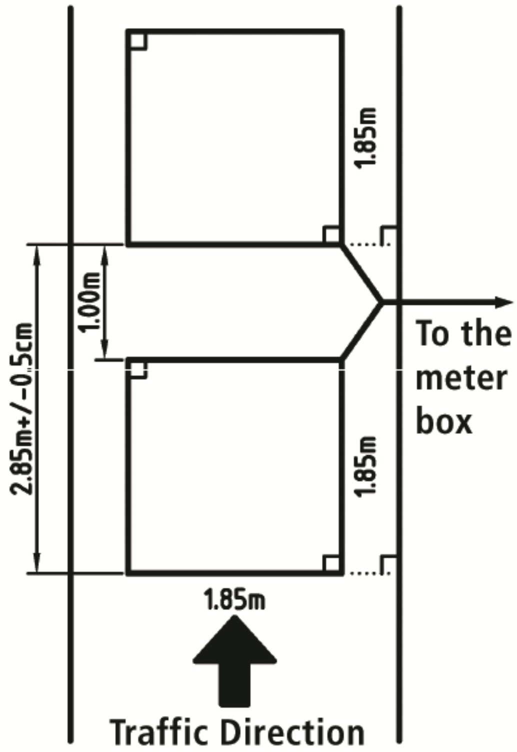

Figure 1 Standard Norwegian Loops

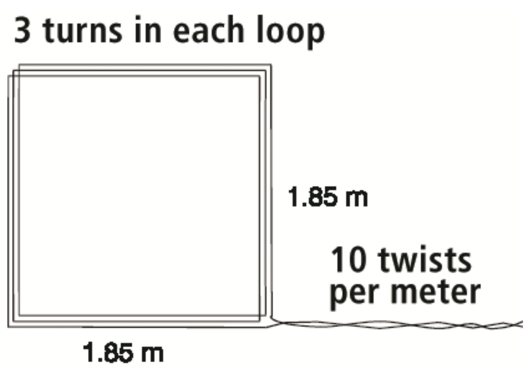

Figure 2 Winding of supply feed

All twisted cables from the loops to one Datarec device can be supplied to the cabinet within the same track. The loop supply cables must be twisted according to the illustration in **Figure 3**.

Note! Avoid junction of cable if possible. If junction between cables has to be done, this should be done in a separate box and with proper isolation.

An example of loop configuration is given in **Figure 4**.

After installation of the cables the slots should be filled with appropriate sealer according to local conditions. This may be sand or a glue or grout that is suited for the local asphalt layer. Avoid filler that could harm the cable insulation, be especially aware of the temperature.

Connection to the loop supply cable

Connect the cable from each loop to the loop supply cable, as shown in **Figure 3**. The cables are tagged with loop number on each connector. Connect to the loop supply cable in accordance with the connector tag. The Datarecs are delivered in different versions regarding available number of loop connections. Use the loop connecting cable that is suited for your device. For the devices that can handle up to 16 loops, two loop connecting cables for 8 loops should be used.

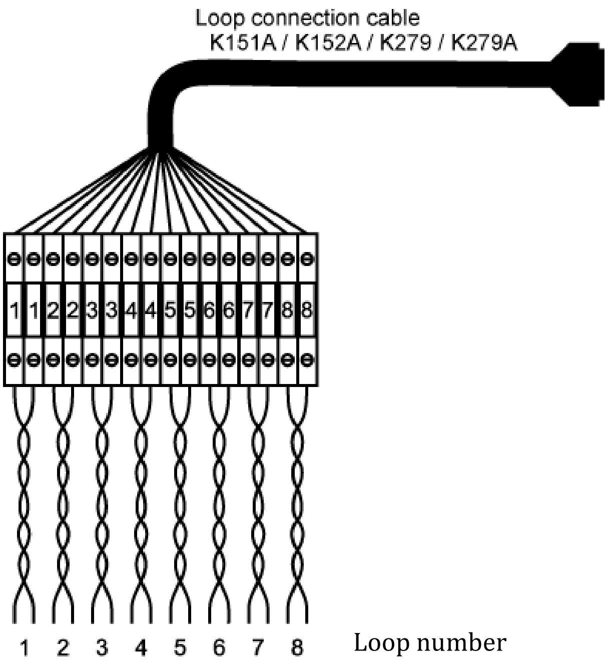

Figure 3 Loop cable connection in cabinet

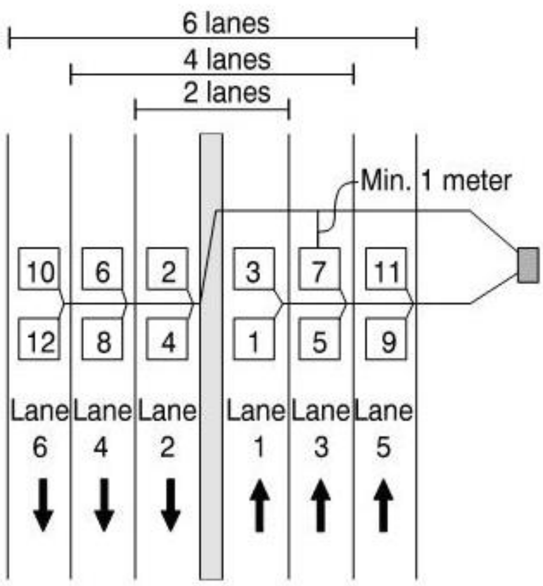

Figure 4 Example of typical loop configuration

Inductive loops for bicycle counting

For bicycle counting two loops are needed for detecting bicycle direction. The loops must be wide enough to cover the width of the lane. On pavements and bicycle lanes the loop must be very close to the edge in order to detect most of the passing bicycles.

Nevertheless, the width should be between 1.5 and 3.3 meters.

Consider carefully where to lay the loop regarding road curvatures, distance from crossroads, obstacles etc. that will have impact on the bicycle behavior causing deviations in the bicycle counting.

Bicycle counting can be performed in mixed traffic.

The loops must have the shape of a parallelogram, where the angle between the sides (in Figure 5 named a-b and c-d) is 45º to the direction of the traffic.

Detection is dependent on the sensitivity and the characteristics of the signals and it is very important that the length (a-d and b-c) of the loop is exactly 1.2 meters. This measure is based on the nominal distance between regular bicycle axles.

The distance between the loops should be exactly 1.0 meters.

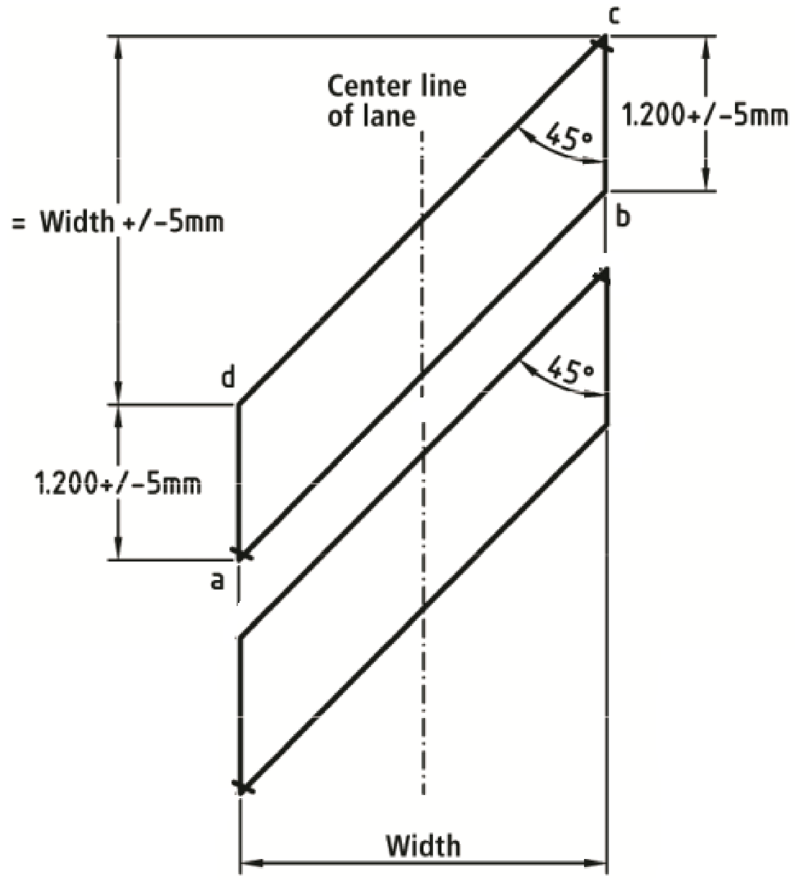

Figure 5 Bicycle loops

Correct geometry is crucial. Start with the side a-d and the prolonging of the side b-c in parallel with the lane in order to ensure that correct width can be measured precisely. The length of side a-b is calculated by the width x square root of 2 and marked. Mark the point c and the side c-d and check the distance between a- and c-d, which should be 849 mm.

Use 3 turns of cable (4 turns is recommended if the width is 2 meters or less) with 2.5 mm² isolated copper cable. The loop should be as shallow as possible, 2 cm is recommended.

Make a sloped end to avoid sharp edges on the loop, approximately 50 mm from the sharp corners in the loop. This is done to avoid damage to the isolation when temperature changes.

The track can be filled with sand. Use an appropriate filling that suits the local conditions.

In the loop trace itself the cable must not be twisted but remain in parallel.

Cable TP100 or Radox RX 125 is recommended.
From the end of the loop and to the terminal inside the cabinet, the supply cable for each loop separately should be twisted by at least 10 turns per meter (refer Figure 6). All twisted cables can be supplied to the cabinet within the same track. The cable length between the loop and the meter box should be as short as possible to ensure good data quality; maximum cable length is 100m

Note! Avoid junction of cable if possible. If junction between cables has to be done, this should be done in a separate box and with proper isolation.

For bicycle counting the supply cable has to be 2.5 mm² and as short as possible. This is because signals from bicycles are very small, hardly larger than white noise.

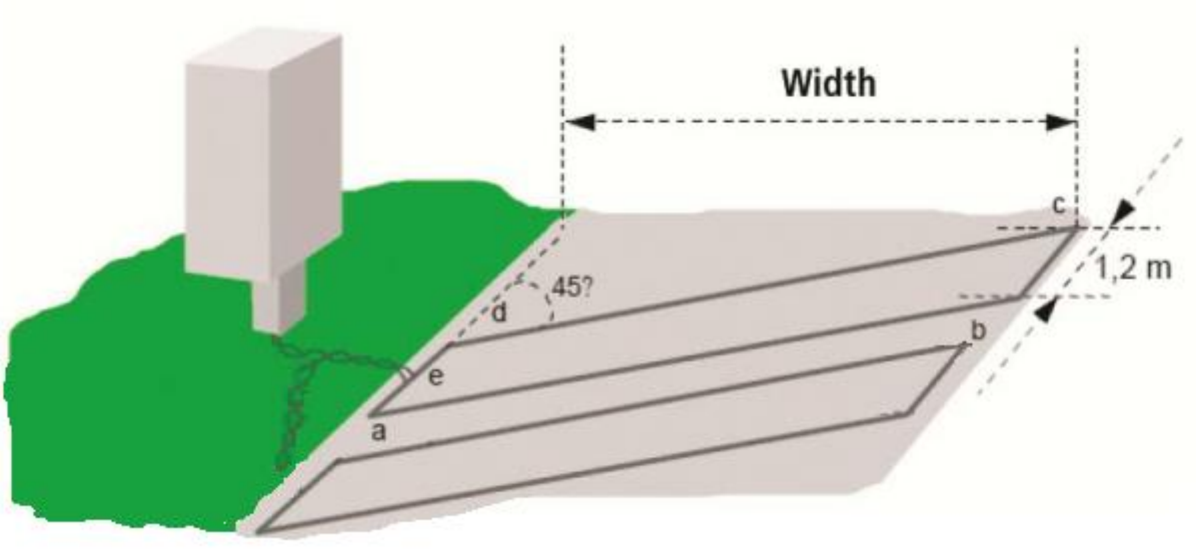

Figure 6 Design of loops in pavement and bicycle tracks.

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