

Guidelines Sheet

Winter Operations: Snow Plowing Guidelines for inset Lights

Introduction

Most ADB Safegate light fixtures are low protrusion height and the risk to damage the light is less than with fixtures that protrude higher above ground. Reinforced prisms are optional available for certain fixtures, further increasing the scratch resistance for enhanced lifetime. Nevertheless, airport winter operations play a crucial role in protecting in-pavement airfield ground lights from damage by snowplows.

Airport operators should follow the specifications:

- FAA AC 150/5200-30D - Airport Winter Safety and Operations
- FAA AC 150/5220-20A - Airport Snow and Ice Control Equipment
- FAA AC 150/5340-26C - Maintenance of Airport Visual Aid Facilities
- FAA EB85 - Ductile Snowplow Protection Ring And Installation Procedures
- ACRP Report 123 - A Guidebook for Airport Winter Operations

The following instructions provide a summary of these specifications and give additional guidelines, next to the airport specific and general rules, on damage prevention of airfield inset lights during winter operations.

Anti- and De-icing Chemicals

Chemicals may be required to remove compacted snow from in-pavement light fixtures. However, extensive chemical use may damage in-pavement light fixtures and underground electrical components resulting in additional electrical maintenance requirements and costs. De-icing liquids should be used moderately; excessive use will have a negative impact on the environment and will contaminate the light outlet.

ADB Safegate light fixtures are tested to work with common chemicals on the airfield such as:

- Potassium Acetate
- Potassium Formate
- Sodium Acetate
- Sodium Formate

The pH value of such chemical solutions should not exceed pH 11 to protect the light fixtures from corrosion and other damage.

Winter Operation Training

Most airports conduct dry-run winter operations training in advance of the winter season. Winter operation tests and simulations should be performed on designated and suitable sections of taxiways or runways equipped with the fittings to be tested. This will help to identify any potential problems and will avoid excessive damages on luminaries and maintenance vehicles during winter.

Snow and Ice Removal

To prevent damage of in-pavement lights during snow and ice removal a combination of different techniques should be used.

- In-pavement **lights should be turned on** at maximum intensity approx. 30-40 min. before the start of snow and ice removal. The purpose is to ensure melting of snow and ice formation at the light outlets before snow and ice removal.
- Anti-icing chemicals may be used to prevent ice bonding to the pavement surface. Once the ice has bonded to the pavement surface, approved de-icing chemicals may be used to melt through the ice pack and/or to break up or weaken the ice bond.
- For actual removal snowplows, rotary runway brooms and blowers should be used in combination. By principle:
 - **Snowplows** should be used with the plow blade set at a small distance from the pavement surface for removal of the majority of snow and ice.

Note: Refer to the [Cutting Edge Height](#) paragraph of the [Snowplows](#) section.

- **Rotary runway brooms** are more effective at removing snow from in-pavement lighting fixtures than plow blades and should be used for removal of the last layer.
- If snow removal is a frequent winter job, the use of **high-strength steel snowplow rings** is advised to better withstand the impact of snow plowing and to protect aluminum alloy in-pavement lights. Please refer to FAA Engineering Brief 85 for further information concerning design and installation of snowplow rings.

Important: The most effective counter-measures in case of damages to in-pavement lights are to slightly increase the plow blade/cutting edge height above ground and reduction of snowplow speed.

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Snowplows

Material and Structure of the Cutting Edge

To protect in-pavement lights from damage during the snow removal it is important that the snowplows are equipped with plastic cutting edges.

- The plastic cutting edge should be made of polyurethane, rubber or material of similar consistence and characteristics.
- The plastic cutting edge should consist of a minimum of plastic segments, accurately aligned and free of steps between them.



Fig. 1 - Snowplow blade with well aligned segments

- It is not recommended to have steps between the plastic segments.
- Vertical or horizontal steps between the plastic segments will increase the risk of luminaire damage. Hitting inset fixtures with steps between plastic segments should be avoided.
- Check regularly for wear and abrasion marks on plastic cutting edges.
- The plastic cutting edges should be replaced when worn down to the wear limit marking. Wear down to the metal portion of the plow should be avoided in any case.



Fig. 2 - Snowplow blade with wear and steps between segments

Cutting Edge Height

- In order to prevent damage to in-pavement lights and to protect vehicle operators from uneven pavement joints and edges, the plow blade / cutting edge should be set slightly above ground level.
- In a stationary position the clearance between the plastic cutting edge and the pavement should be 10 to 15 mm. Any remaining snow/ice should be removed with rotary brooms and/or de-icing or anti-freeze agent. No clearance between the plastic cutting edge and the pavement may damage in-pavement lights.



Fig. 3 - Snowplow blade without clearance

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- Use casters, shoes and/or support wheels on plow moldboards and on the front of rotary plows to stabilize the plow blade and to support maintaining a pre-defined clearance between the snowplow cutting edge and the pavement during operation.



Fig. 4 - Snowplow with support wheels



Fig. 5 - Snowplow without support wheels

- Do not use guidance and support wheels that are made of steel.
- Any protruding bolts and metal elements whose clearance to pavement is less than 20 mm during operation shall be avoided

Speed and angle of the plow

High snowplow speeds can damage the light outlets and prisms could eventually break. The allowable speed should be determined before start of operation, based on the configuration of the equipment.

- A speed of greater 40 km per hour is not advised.
- Whenever snowplows must traverse over in-pavement light fixtures, they should be traveling at less than 10 km per hour or should lift the blades clear of the fixture.
- Some plow blades are made of a series of movable segments. These segments are spring loaded and are able to move vertical to follow uneven pavement. Do not block blade segment mechanics which allow for such movement.

- Adjust and regularly control plow angles as per manufacturer recommendation.
- If frequent prism damages exist during the winter operations it may be necessary to reduce the snowplow's swivel angle versus the driving line of the vehicle.
- Different temperatures and snow quantities influence the parameters described. Applied settings need to follow supplier recommendations.

Rotary brooms

Rotary runway brooms can be used for both snow and ice removal:

- **Snow** - Rotary runway brooms are more effective at removing snow from in-pavement light fixtures than plow blades.
- **Ice** - The type of brooms used to remove a layer of ice is important since in some cases the broom may actually "polish" the ice, thus reducing traction.

Bristles for rotary brooms are available as steel or poly bristles.

- Steel bristles cut the ice surface while, poly bristles flip / wipe away snow. However, using steel bristles will faster scratch and wear out especially the glass prisms of in-pavement lights, negatively impacting the light photometry.
- When possible avoid using steel bristles, or run rotary brooms with a mix of steel and poly bristles (e.g. 1/3) to reduce the wear and damage to in-pavement lights.
- Check for adequate contact pressure; evaluate during pre-winter dry-run tests.
- Check for bristle wear according to manufacturers recommendation and replace the brooms when necessary. If worn down the bristles will be more stiff and will increase the wear on the light fixtures and especially the prisms significantly.
- When possible avoid using silica or glass sand. If necessary to use, remove it as soon as operational conditions allow. When removing sand use caution with rotating brushes (rotate at low speed).
- Use of reinforced prisms, which are about four times as hard as regular glass prisms, can significantly increase the prism maintenance interval, though scratches will still occur over time.

Steel brushes:

- The use of steel brushes is very effective for snow removal, it is however very important to pay special attention on how it is being used and replace the brushes when they are worn to make sure that the brushes are not too rigid and risk decreasing the service life of the prisms.

Tip: We recommend the use of "sapphire"TM prism which is about four times harder than a regular glass prism if steel brushes are used. The use of sapphire prisms will not make the prisms scratch proof as scratches can still occur over time but it will increase the service interval and service life of the prism.