This reference document is designed to assist your selection of the right PECA probe for your application with Lyft software version 2.2. Knowing the nominal thickness of the component being inspected and the nominal insulation/coating thickness in place will help you. The remaining information is intended to help you understand and determine the footprint of your probe, scan resolution, and circumferential grid spacing. This is especially useful in quantifying the performance of the Lyft solution under different conditions.

PECA Probe Application Range

![PECA Probe Application Range](image)

Note 1: PECA-HR-SM is a dedicated probe used for scab inspections.
Note 2: Estimated scab height should be considered as liftoff when validating the application range for the PECA-HR-SM probe.
Note 3: Smallest configuration for PECA-6CH-MED probe: 102 mm (4 in) OD pipe, schedule 40, with 25 mm (1 in) insulation; total OD 152 mm (6 in).

Calculating the PECA Probe Footprint

Use the following formula to determine your probe’s footprint (FP) and determine the axial grid resolution.

\[
FP \approx 0.65 \times LO + FP_0
\]

Where \(LO\) is the liftoff (insulation, jacket, coating thickness) and \(FP_0\) is the footprint at a liftoff of zero. For the probe, \(FP_0\) is:

- **PECA-HR-SM**: \(FP_0 = 22\) mm (0.87 in)
- **PECA-6CH-MED**: \(FP_0 = 46\) mm (1.80 in)

![Grid-As-U-Go™](image)

**Grid-As-U-Go™**

Use the Grid-As-U-Go accessory to trace grid lines while scanning a component. Ensure full coverage and completely eliminate the need for surface preparation before the inspection.

Minimum Detectable Defect Diameters at Specific Depths

**PECA-HR-SM**

![Minimum Detectable Defect Diameters](image)

Note 1: Requires a minimum resolution of half the footprint on the scan axis.
Note 2: Impossible to detect through-hole defects (100% wall loss).

![Minimum Detectable Defect Diameters](image)

Note 1: Tests were performed over 200 different configurations, using mixed liftoff values, types of weather jackets, flat and round-bottom holes.
Note 2: Requires the use of double-index resolution for liftoff values between 0 and 25 mm (1 in).
Note 3: Requires a minimum resolution of half the footprint on the scan axis.
Note 4: Impossible to detect through-hole defects (100% wall loss).

**PECA-6CH-MED**

![Minimum Detectable Defect Diameters](image)

Footprint

Use the footprint of the probe to determine the optimal grid resolution for proper detection. The FP is defined as the full width at half maximum (FWHM) of the response detected by the probe. This ensures a 50% signal overlap between each point on the grid map.
Selecting the Right PEC Probe

For proper detection, the footprint of selected probes is especially useful in quantifying the performance of the Lyft solution in a variety of conditions. This reference document is designed to assist you in selecting the right PEC probes for your application with Lyft software version 2.2. Knowing the nominal thickness of the component to be inspected and the nominal insulation/coating thickness in place, the selection tables below suggest the adequate probes. The remaining information is intended to help you understand and determine the footprint of selected probes. This is especially useful in quantitying the performance of the Lyf probe solution in a variety of conditions.

Calculating the PEC Probe Footprint

Use the following formula to determine your probe’s footprint (FP) and determine the axial grid resolution.

\[ FP = 0.65 \times LO + FP_0 \]

Where LO is the liftoff (insulation, jacket, coating thickness) and FP_0 is the footprint at a liftoff of zero.

Minimum Detectable Defect Diameters at Specific Depths

Minimum detectable defect diameters for selected probes are given in Table 2. These values are intended to assist you in determining the optimal grid resolution for proper detection. FP is defined as the full width at half maximum (FWHM) of the response detected by the probe. Doing so ensures a 50% signal overlap between each point on the grid map.

Footprint

The footprint (FP) of a probe is used to determine the optimal grid resolution for proper detection. FP is defined as the full width at half maximum (FWHM) of the response detected by the probe. Doing so ensures a 50% signal overlap between each point on the grid map.
Cast Iron
PEC Probe Selection and Footprint (Lyft 2.2)

This reference document is specific to Cast Iron inspections with PEC technology. It is designed to assist your selection of the right PEC probes for your application with Lyft software version 2.2. The selection tables below suggest the adequate probes based on the known nominal thickness of the component being inspected and the nominal insulation/coating thickness in place. The remaining information is intended to help you understand and determine the footprint of selected probes. This is especially useful in quantifying the performance of the Lyft solution in a variety of conditions.

Selecting the Right PEC Single-Element Probe

Calculating the PEC Probe Footprint

Footprint sizes for cast iron are the same as the ones for carbon steel. Use the following formula to determine your probe’s footprint (FP).

\[
FP \approx 0.65 \times LO + FP_0
\]

Where LO is the lift-off (insulation, jacket, coating thickness) and FP_0 is the footprint at a lift-off of zero.

For each probe, FP_0 is:

- PEC-025-G2/UW: FP_0 = 35 mm (1.38 in)
- PEC-089-G2/SZ/UW: FP_0 = 62 mm (2.44 in)

Characteristic Decay Time (CDT)

Both grey and ductile irons are supported when selecting cast iron type during setup with the Lyft software. These materials are typically more resistive than carbon steel, leading to a much faster PEC response and lower Characteristic Decay Time (CDT). Typical CDT of grey and ductile cast irons are compared to carbon steel in the graph here:

You may need to adjust the CDT manually before starting the SmartPULSE or PEC Autoset procedures if the cast iron deviates significantly from typical behavior.
First-Generation PEC Probes (G1)
Single-Element PEC Probe Selection and Footprint—Carbon Steel (Lyft 2.2)

This reference document is designed to assist your selection of the PEC probe that is best suited for your application with Lyft software version 2.2. The selection table below suggests the adequate probes based on the known nominal thickness of the component being inspected and the nominal insulation/coating thickness in place.

The remaining information helps you understand and determine the footprint of the selected probe, the averaging area, and the edge effect. This is especially useful in quantifying the performance of the Lyft solution in a variety of conditions.

**Selecting the Right PEC Probe**

Refer to the chart when choosing a probe.

| **Insulation/Coating Thickness (Liftoff)** | 0 | 6 | 13 | 19 | 25 | 38 | 51 | 64 | 76 | 89 | 102 | 127 | 152 | 178 | 203 |
|------------------------------------------|---|---|----|----|----|----|----|----|----|----|------|------|------|------|------|------|
| 0.00                                     | - | - | -  | -  | -  | -  | -  | -  | -  | -  | -    | -    | -    | -    | -    | -    |
| 0.25                                     | - | - | -  | -  | -  | -  | -  | -  | -  | -  | -    | -    | -    | -    | -    | -    |
| 0.50                                     | - | - | -  | -  | -  | -  | -  | -  | -  | -  | -    | -    | -    | -    | -    | -    |
| 0.75                                     | - | - | -  | -  | -  | -  | -  | -  | -  | -  | -    | -    | -    | -    | -    | -    |
| 1.00                                     | - | - | -  | -  | -  | -  | -  | -  | -  | -  | -    | -    | -    | -    | -    | -    |
| 1.50                                     | - | - | -  | -  | -  | -  | -  | -  | -  | -  | -    | -    | -    | -    | -    | -    |
| 2.00                                     | - | - | -  | -  | -  | -  | -  | -  | -  | -  | -    | -    | -    | -    | -    | -    |
| 2.50                                     | - | - | -  | -  | -  | -  | -  | -  | -  | -  | -    | -    | -    | -    | -    | -    |

**Footprint**

*FP (FWHM)*

**Calculating the PEC Probe Footprint**

Use the following formula to determine your probe’s footprint (FP).

\[
FP = 0.65 \times LO + FP_0
\]

Where *LO* is the liftoff (insulation, jacket, coating thickness) and *FP* is the footprint at a liftoff of zero.

For each probe, *FP* is:

- **PEC-025**: FP$_0$ = 35 mm (1.38 in)
- **PEC-089/PEC-SZ-089**: FP$_0$ = 62 mm (2.44 in)
- **PEC-152**: FP$_0$ = 100 mm (3.94 in)

**Averaging Area**

This is the surface viewed by the probe on the component. The wall thickness determined by Lyft is the average wall thickness within the averaging area. As a result, corrosion flaws smaller than the averaging area are underestimated. The averaging area diameter is 1.8 times the probe footprint (*AvgA* = 1.8 × FP).

**Edge Effect**

The edge effect impacts PEC measurements when a probe nears geometry variations such as nozzles, flanges, or the end of a structure. Measurements begin to vary from a distance of one FP from the center of a probe’s coils.