Lyft®

Pulsed Eddy Current Array (PECA) Probe
Selection and Footprint (Lyft 2.0)

This reference document is designed to assist you determine whether the PECA probe is suited to your application with Lyft software version 2.0. Knowing the nominal thickness of the component to be inspected and the nominal insulation/coating thickness in place will help you do this. 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.

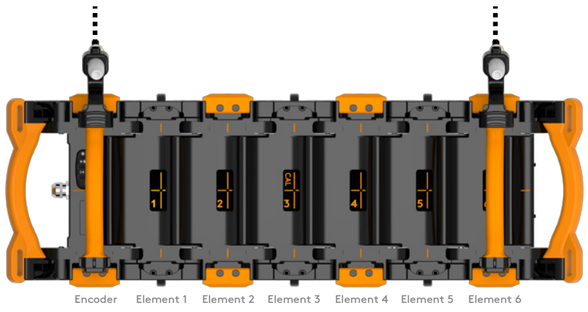
PECA Probe Application Range

Wall Thickness		Insulation / Coating Thickness (Liftoff)								
mm		0	25	38	51	64	76	89	102	127
	in	0.00	1.00	1.50	2.00	2.50	3.00	3.50	4.00	5.00
3	0.13	PECA-6CH-MED								
6	0.25									
10	0.38									
13	0.50									
16	0.63									
19	0.75									
25	1.00									
32	1.25									

Smallest configuration: 102 mm (4 in) OD pipe, schedule 40, with 25 mm (1 in) insulation; total OD 152 mm (6 in).

Coverage Across the Probe

Full coverage across the probe (with a minimum 50 % signal overlap) is guaranteed on pipes and plates for all the liftoff values in the probe selection table above. The probe's array is composed of six elements numbered 1–6. The center of each element is aligned with a wheel of the probe. You can calibrate the probe by placing element 3 on a nominal thickness.

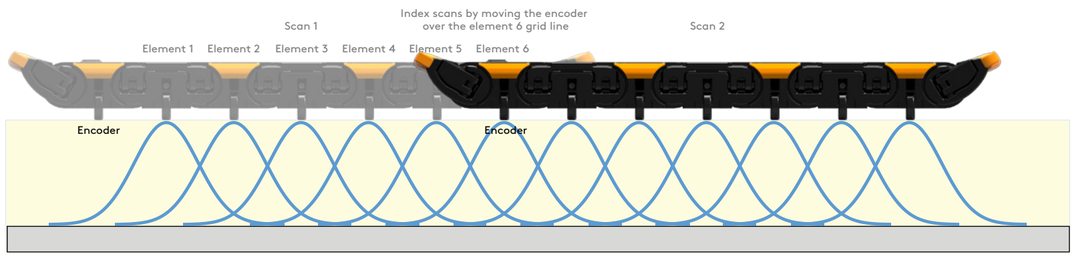


Grid-As-U-Go™

Use the Grid-As-U-Go accessory to trace grid lines while scanning a component and correctly index your scans.

Lateral / Circumferential Index

The probe's encoder is located under the control keypad, next to the cable exit. As a rule of thumb, the best way to index your scan is to place the encoder on the grid line previously scanned by element 6, as illustrated here.



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:

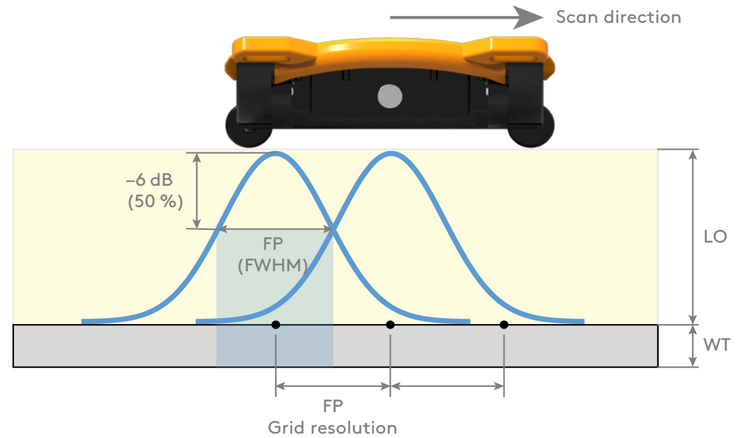
PECA-6CH-MED

FP_0 = 46 mm (1.80 in)

Footprint		Insulation / Coating Thickness (Liftoff)								
	mm	0	25	38	51	64	76	89	102	127
	in	0.00	1.00	1.50	2.00	2.50	3.00	3.50	4.00	5.00
PECA-6CH-MED	mm	–	62	70	79	87	95	104	112	–
	in	–	2.45	2.78	3.10	3.43	3.75	4.08	4.40	–

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.



Circumferential Grid Spacing

On pipes and other curved surfaces, the effective space between each element becomes less depending on the curvature (as opposed to when it is resting on a flat surface), resulting in a better resolution.

Circumferential Grid Spacing		Total Pipe Outer Diameter, Including Insulation / Coating Thickness (Liftoff)					
	mm	152	203	254	305	406	Flat
	in	6	8	10	12	16	Flat
PECA-6CH-MED	mm	51	55	59	61	64	76
	in	2.00	2.20	2.30	2.40	2.50	3.00

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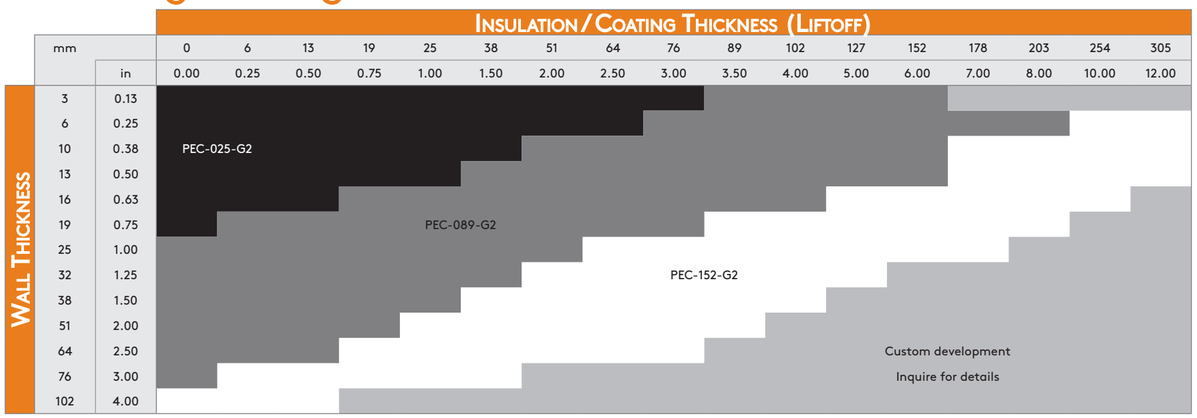
Second-Generation PEC Probes (G2)

Single-Element PEC Probe Selection and Footprint (Lyft 2.0)

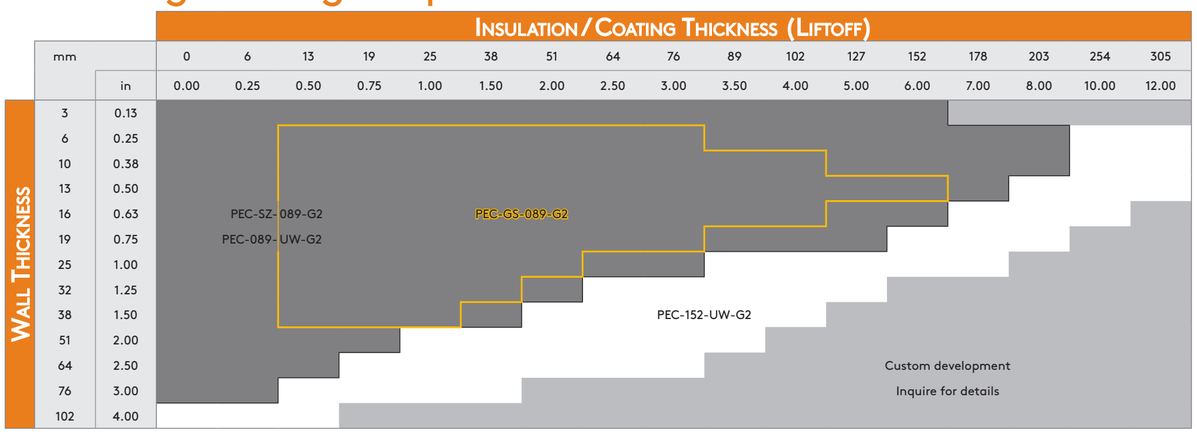
This reference document is designed to assist you in selecting the right PEC probes for your application with Lyft software version 2.0. Knowing the nominal thickness of the component to be inspected and the nominal insulation/coating thickness in place, the selection tables below suggest the adequate probes. The remaining information is intended to help you understand and determine the footprint of selected probes. This is especially useful in quantifying the performance of the Lyft solution in a variety of conditions.

Selecting the Right PEC Probe



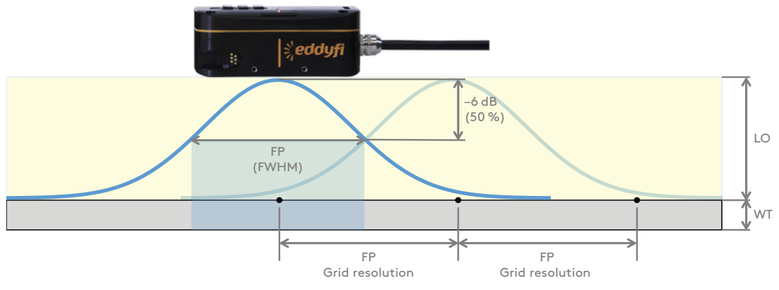
We recommend using the PEC-GS-089-G2 in applications on galvanized steel (GS) weather jackets. If you use other standard probes over GS weather jackets, add 40 mm (1.5 in) liftoff for every 0.5 mm (0.020 in) of GS.

Selecting the Right Specialized PEC Probes



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. So doing, ensuring a 50 % signal overlap between each point on the grid map.



Calculating the PEC Probe Footprint

Use the following formula to determine your probe's footprint.

$$FP \approx 0.65 \times LO + FP_0$$

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

For each probe, FP_0 is:

PEC-025-G2

FP_0 = 35 mm (1.38 in)

PEC-089-G2 / SZ / UW

FP_0 = 62 mm (2.44 in)

PEC-152-G2 / UW

FP_0 = 100 mm (3.94 in)

Footprint			Insulation / Coating Thickness (Liftoff)																
		mm	0	6	13	19	25	38	51	64	76	89	102	127	152	178	203	254	305
		in	0.00	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	5.00	6.00	7.00	8.00	10.00	12.00
	PEC-025-G2	mm	35	39	43	47	52	60	68	76	85	–	–	–	–	–	–	–	–
		in	1.38	1.54	1.70	1.87	2.03	2.36	2.68	3.00	3.35	–	–	–	–	–	–	–	–
	PEC-089-G2 PEC-SZ-089-G2 PEC-089-UW-G2	mm	62	66	70	74	79	87	95	103	112	120	128	145	161	178	194	–	–
		in	2.44	2.60	2.77	2.93	3.09	3.42	3.74	4.07	4.39	4.72	5.04	5.69	6.34	7.00	7.64	–	–
	PEC-GS-089-G2	mm	–	–	70	74	79	87	95	103	112	120	128	145	161	178	194	–	–
		in	–	–	2.77	2.93	3.09	3.42	3.74	4.07	4.39	4.72	5.04	5.69	6.34	7.00	7.64	–	–
	PEC-152-G2 PEC-152-UW-G2	mm	100	104	108	112	117	125	133	141	150	158	166	183	199	216	232	265	298
		in	3.94	4.10	4.26	4.41	4.59	4.91	5.24	5.56	5.89	6.21	6.54	7.19	7.84	8.49	9.14	10.43	11.73

We recommend using the PEC-GS-089-G2 in applications on galvanized steel (GS) weather jackets. If you use other standard probes over GS weather jackets, add 40 mm (1.5 in) liftoff for every 0.5 mm (0.020 in) of GS.

Minimum Detectable Defect Diameters at Specific Depths

Footprint	Defect Depth													
	10 %		20 %		30 %		40 %		50 %		60 %	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
	40	1.6	49	1.9	35	1.4	28	1.1	24	1.0	22	0.9	20	0.8
	50	2.0	61	2.4	43	1.7	35	1.4	31	1.2	27	1.1	25	1.0
	60	2.4	73	2.9	52	2.0	42	1.7	37	1.4	33	1.3	30	1.2
	70	2.8	86	3.4	61	2.4	49	1.9	43	1.7	38	1.5	35	1.4
	80	3.1	98	3.9	69	2.7	57	2.2	49	1.9	44	1.7	40	1.6
	90	3.5	110	4.3	78	3.1	64	2.5	55	2.2	49	1.9	45	1.8
	100	3.9	122	4.8	87	3.4	71	2.8	61	2.4	55	2.2	50	2.0
	110	4.3	135	5.3	95	3.8	78	3.1	67	2.7	60	2.4	55	2.2
	120	4.7	147	5.8	104	4.1	85	3.3	73	2.9	66	2.6	60	2.4
	130	5.1	159	6.3	113	4.4	92	3.6	80	3.1	71	2.8	65	2.6
	140	5.5	171	6.8	121	4.8	99	3.9	86	3.4	77	3.0	70	2.8
	150	5.9	184	7.2	130	5.1	106	4.2	92	3.6	82	3.2	75	3.0
	160	6.3	196	7.7	139	5.5	113	4.5	98	3.9	88	3.5	80	3.2
	170	6.7	208	8.2	147	5.8	120	4.7	104	4.1	93	3.7	85	3.4
	180	7.1	220	8.7	156	6.1	127	5.0	110	4.3	99	3.9	90	3.5
	190	7.5	233	9.2	165	6.5	134	5.3	116	4.6	104	4.1	95	3.7
	200	7.9	245	9.6	173	6.8	141	5.6	122	4.8	110	4.3	100	3.9

Note 1: Impossible to detect through-hole defects (100 % wall loss)

Note 2: Requires a minimum resolution of half the footprint of the selected probe.

Note 3: Above defect sizes were determined using flat-bottom holes.

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First-Generation PEC Probes (G1)

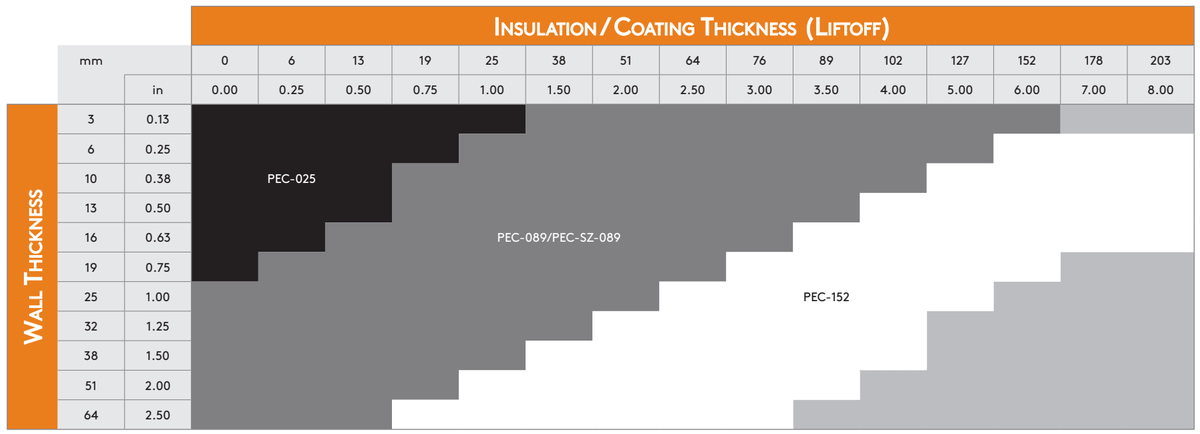
Single-Element PEC Probe Selection & Footprint (Lyft 2.0)

This reference document is designed to assist you in selecting the PEC probe that is best suited to your application with Lyft software version 2.0. Knowing the nominal thickness of the component to be inspected and the nominal insulation/coating thickness in place, the selection table below suggests the adequate probe.

The remaining information helps 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.

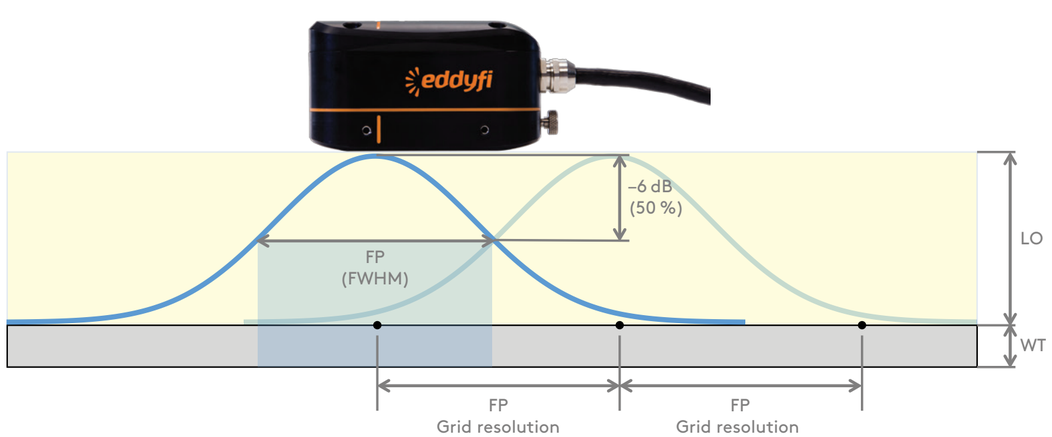
Selecting the Right PEC Probe

Reference the chart to choose a probe.



Footprint

The footprint (FP) of a probe is used to determine the **best grid resolution** for proper detection. FP is defined as the **full width at half maximum (FWHM)** of the response detected by the probe. So doing, ensuring a 50 % signal overlap between each point on the grid map.



Calculating the PEC Probe Footprint

Use the following formula to determine your probe's footprint.

$$FP \approx 0.65 \times LO + FP_0$$

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

For each probe, FP_0 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)

Footprint		Insulation / Coating Thickness (Liftoff)															
	mm	0	6	13	19	25	38	51	64	76	89	102	127	152	178	203
	in	0.00	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	5.00	6.00	7.00	8.00
PEC-025	mm	35	39	43	47	52	–	–	–	–	–	–	–	–	–	–
	in	1.38	1.54	1.70	1.87	2.03	–	–	–	–	–	–	–	–	–	–
PEC-089 PEC-SZ-089	mm	62	66	70	74	79	87	95	103	112	120	128	145	161	–	–
	in	2.44	2.61	2.77	2.93	3.09	3.42	3.74	4.07	4.39	4.72	5.04	5.69	6.34	–	–
PEC-152	mm	100	104	108	112	117	125	133	141	150	158	166	183	199	216	232
	in	3.94	4.10	4.26	4.43	4.59	4.91	5.24	5.56	5.89	6.21	6.54	7.19	7.84	8.49	9.14

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 ($AvgA_\Phi = 1.8 \times FP$).

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.