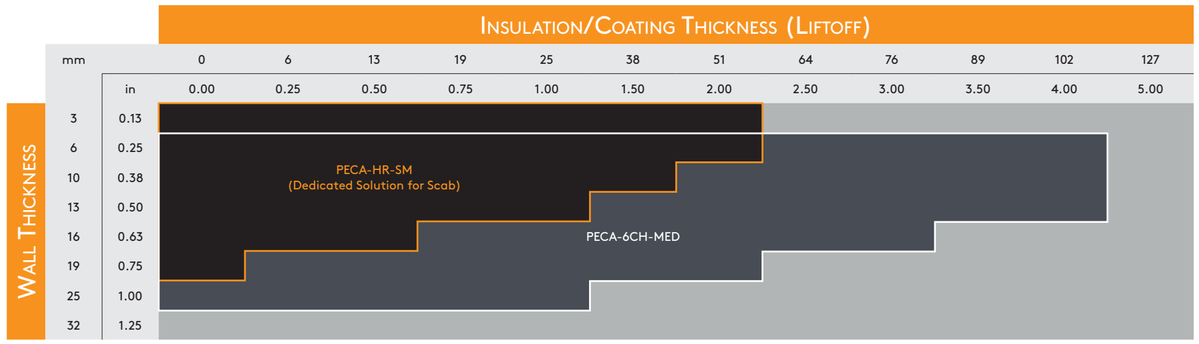
EDDYFI LYFT

Pulsed Eddy Current Array (PECA™) Probe
Selection and Footprint—Carbon Steel (Lyft 2.2)

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



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)

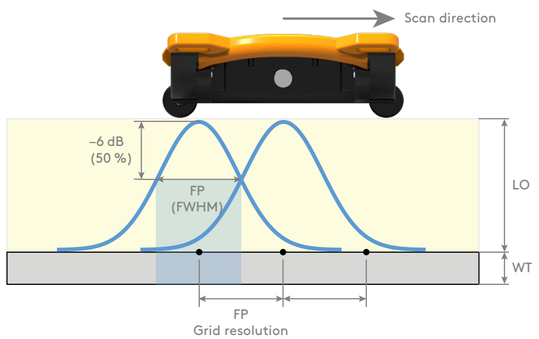
PECA-6CH-MED

FP_0 = 46 mm (1.80 in)

		Insulation/Coating Thickness (Liftoff)											
	mm	0	6	13	19	25	38	51	64	76	89	102	127
	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
PECA-HR-SM	mm	22	26	30	34	38	47	55	-	-	-	-	-
	in	0.87	1.03	1.20	1.36	1.52	1.85	2.17	-	-	-	-	-
PECA-6CH-MED	mm	46	50	54	58	62	71	79	88	95	104	112	-
	in	1.80	1.96	2.13	2.29	2.45	2.78	3.10	3.43	3.75	4.08	4.40	-

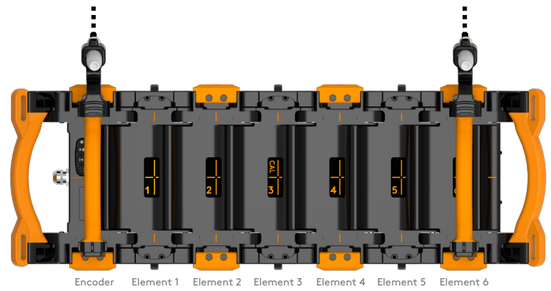
Footprint

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.



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

			Defect Depth											
			10%		20%		30%		40%		50%		60%	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
Liftoff	0	0.00	31	1.2	22	0.9	18	0.7	16	0.6	14	0.6	13	0.5
	6	0.24	36	1.4	25	1.0	21	0.8	18	0.7	16	0.6	15	0.6
	12	0.47	39	1.5	28	1.1	23	0.9	20	0.8	18	0.7	16	0.6
	18	0.71	43	1.7	30	1.2	25	1.0	21	0.8	19	0.8	17	0.7
	24	0.94	46	1.8	32	1.3	26	1.0	23	0.9	21	0.8	19	0.7

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).

PECA-6CH-MED

			Defect Depth											
			10%		20%		30%		40%		50%		60%	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
Liftoff	0	0.0	76	3.0	54	2.1	44	1.7	38	1.5	34	1.3	31	1.2
	12	0.5	92	3.6	65	2.6	53	2.1	46	1.8	41	1.6	38	1.5
	25	1.0	107	4.2	76	3.0	62	2.4	53	2.1	48	1.9	44	1.7
	38	1.5	120	4.7	85	3.3	69	2.7	60	2.4	54	2.1	49	1.9
	50	2.0	131	5.1	92	3.6	75	3.0	65	2.6	58	2.3	53	2.1
	64	2.5	142	5.6	101	4.0	82	3.2	71	2.8	64	2.5	58	2.3
	75	3.0	151	5.9	107	4.2	87	3.4	75	3.0	67	2.7	62	2.4
	90	3.5	162	6.4	114	4.5	93	3.7	81	3.2	72	2.8	66	2.6
	102	4.0	170	6.7	120	4.7	98	3.9	85	3.3	76	3.0	69	2.7

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).

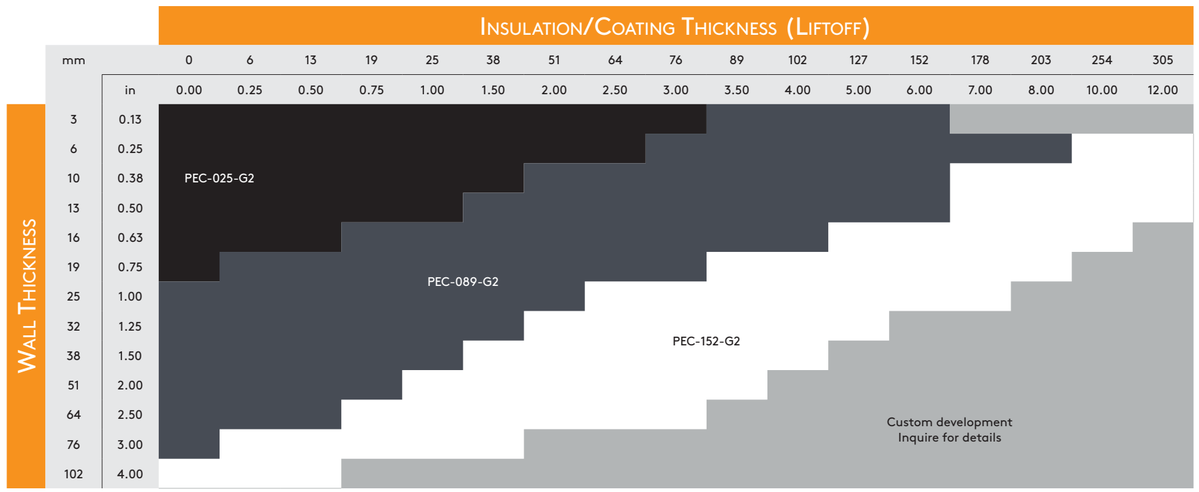
EDDYFI LYFT

Second-Generation PEC Probes (G2)

Single-Element PEC Probe Selection and Footprint—Carbon Steel (Lyft 2.2)

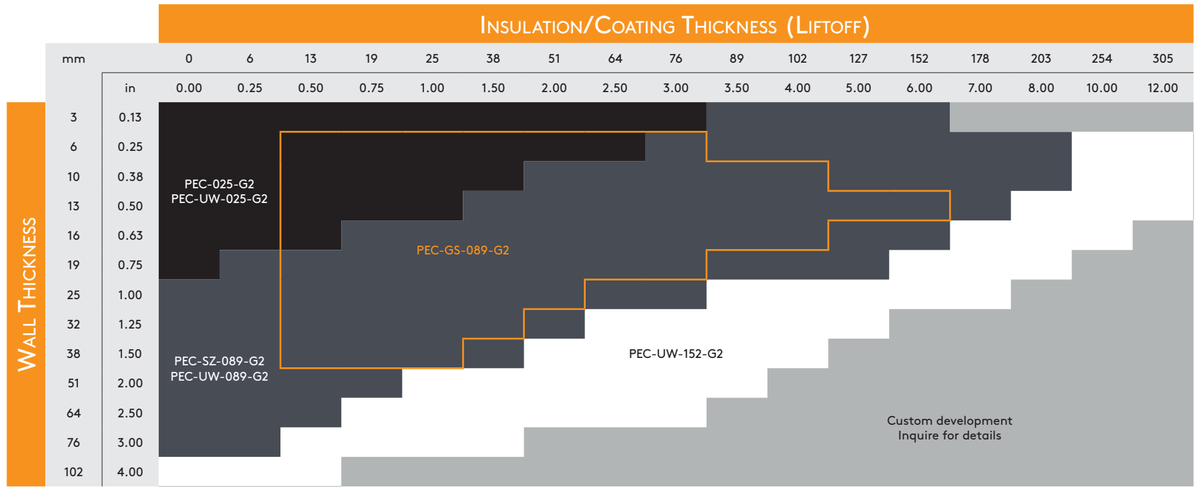
This reference document is designed to assist you in selecting the right PEC probes for your application with Lyft software version 2.2. Knowing the nominal thickness of the component to be inspected and the nominal insulation/coating thickness in place, the selection tables below suggest the adequate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

Selecting the Right PEC Probe



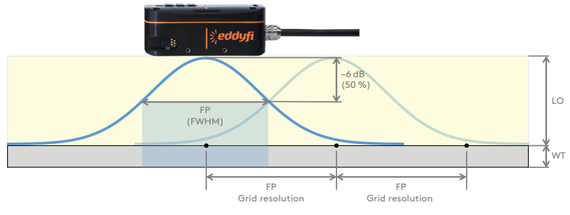
We recommend using the PEC-GS-089-G2 in applications on galvanized steel (GS) weather jackets. If you use other standard probes over GS weather jackets, add 40 mm (1.5 in) liftoff for every 0.5 mm (0.020 in) of GS.

Selecting the Right Specialized PEC Probe



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.



Calculating the PEC 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:

PEC-025-G2/UW

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 PEC-UW-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-89-G2 PEC-UW-089-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-UW-152-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	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.

Eddyfi Technologies

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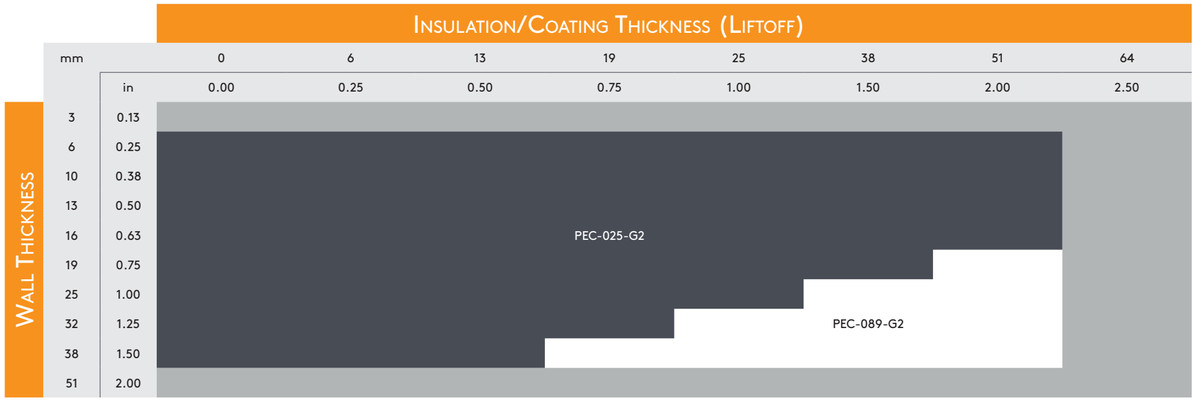
EDDYFI LYFT

Cast Iron
PEC Probe Selection and Footprint (Lyft 2.2)

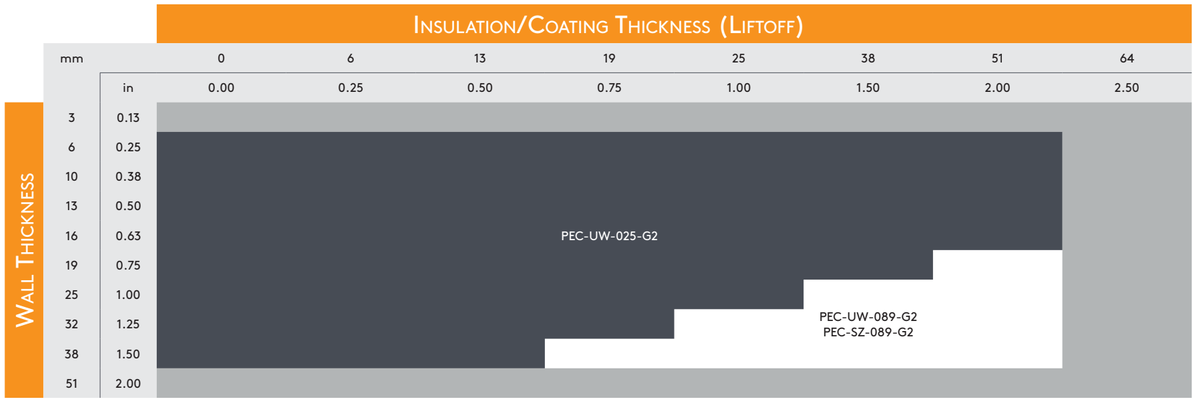
This reference document is specific to Cast Iron inspections with PEC technology. It is designed to assist your selection of the right PEC probes for your application with Lyft software version 2.2. The selection tables below suggest the adequate probes based on the known nominal thickness of the component 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.

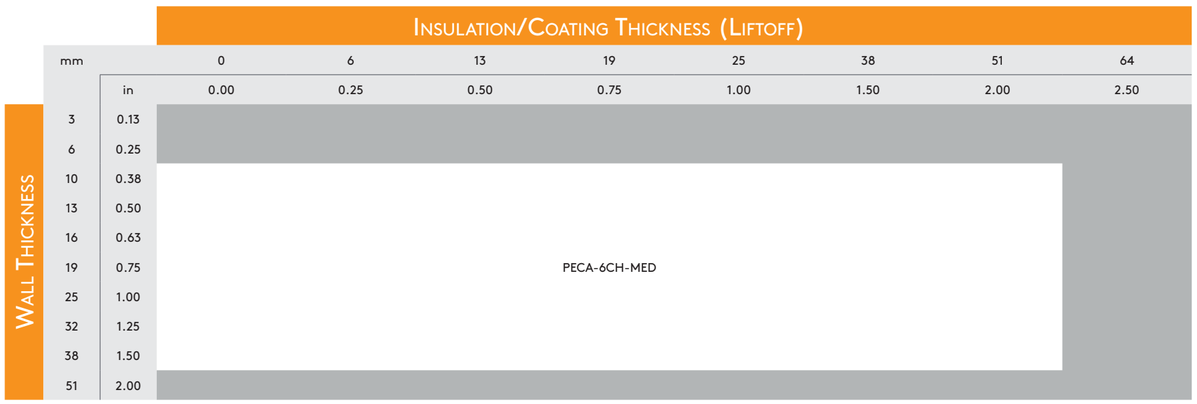
Selecting the Right PEC Single-Element Probe



Selecting the Right Specialized PEC Probe



PECA Probe Application Range



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

For each probe, FP_0 is:

PECA-6CH-MED

FP_0 = 46 mm (1.80 in)

PEC-025-G2/UW

FP_0 = 35 mm (1.38 in)

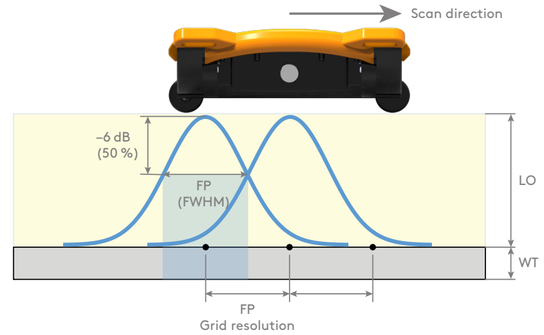
PEC-089-G2/SZ/UW

FP_0 = 62 mm (2.44 in)

Footprint		Insulation/Coating Thickness (Liftoff)						
	mm	0	6	13	19	25	38	51
	in	0.00	0.25	0.50	0.75	1.00	1.50	2.00
PEC-025-G2 PEC-UW-025-G2	mm	35	39	43	47	52	60	68
	in	1.38	1.54	1.70	1.87	2.03	2.36	2.68
PEC-089-G2 PEC-UW-089-G2	mm	62	66	70	74	79	87	95
	in	2.44	2.60	2.77	2.93	3.09	3.42	3.74
PECA-6CH-MED	mm	46	50	54	58	62	70	79
	in	1.8	1.96	2.13	2.28	2.45	2.78	3.10

Footprint

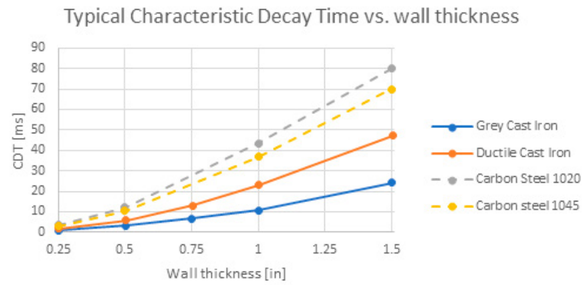
Use the footprint of the probe to determine the **optimal grid resolution** for proper detection. The FP is defined as the **full width at half maximum (FWHM)** of the response detected by the probe. This ensures a 50% signal overlap between each point on the grid map.



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.



EDDYFI LYFT

First-Generation PEC Probes (G1)

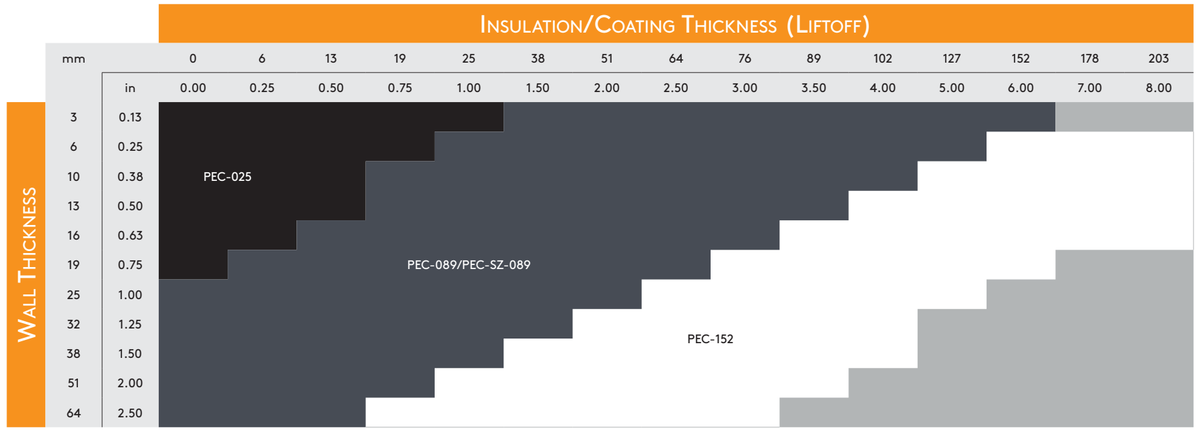
Single-Element PEC Probe Selection and Footprint—Carbon Steel (Lyft 2.2)

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 suggest the adequate probes based on the known nominal thickness of the component being inspected and the nominal insulation/coating thickness in place.

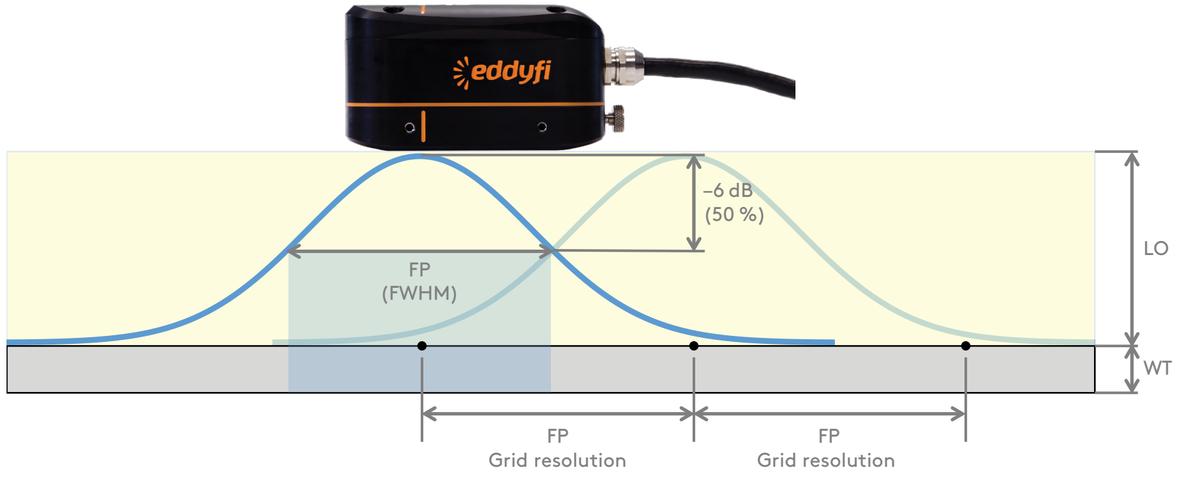
The remaining information helps you understand and determine the footprint of the selected probe, the averaging area, and the edge effect. This is especially useful in quantifying the performance of the Lyft solution in a variety of conditions.

Selecting the Right PEC Probe

Refer to the chart when choosing a probe.



Footprint



Calculating the PEC Probe Footprint

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

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

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)

		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
Footprint	PEC-025 mm	35	39	43	47	52	–	–	–	–	–	–	–	–	–	–
	PEC-025 in	1.38	1.54	1.70	1.87	2.03	–	–	–	–	–	–	–	–	–	–
	PEC-089 PEC-SZ-89 mm	62	66	70	74	79	87	95	103	112	120	128	145	161	–	–
	PEC-089 PEC-SZ-89 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	–	–
	PEC-152 mm	100	104	108	112	117	125	133	141	150	158	166	183	199	216	232
	PEC-152 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

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.