PEH205 Series, +125°C

Overview

KEMET's PEH205 Series of capacitors has a polarized all-welded design, heavy duty screw terminals, extended cathode construction, and safety vent. The sealing system is designed for electrolyte leakage-free operation and a very low gas-diffusion rate of electrolyte. Mechanical contact between the winding and aluminium case allows excellent heat transfer from the winding hot-spot to the ambient, which means cooler operation and very high current ratings.

Please note the PEH205 is housed in a bare can and does not feature plastic insulation.

Applications

Typical applications for KEMET's PEH205 capacitor include high temperature, high ripple current applications such as welding equipment, industrial and automotive drives, and high end professional power supplies.

Benefits

- Long life, up to 8,000 hours at +125°C (V_R, I_R applied)
- High ripple current capability



Part Number System

PEH205	G	A	518	0	Q	U0
Series	Rated Voltage (VDC)	Size Code	Capacitance Code (µF)	Version	Capacitance Tolerance	Stud Option
Screw Terminal Aluminum Electrolytic	G = 16 H = 25 K = 40 L = 55 M = 63 P = 100	See Dimension Table	The last two digits represent significant figures. The first digit specifies the total number of digits.	0 = Standard	Q = −10 + 30%	U0 = Plain Can B0 = Threaded mounting stud

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Performance Characteristics

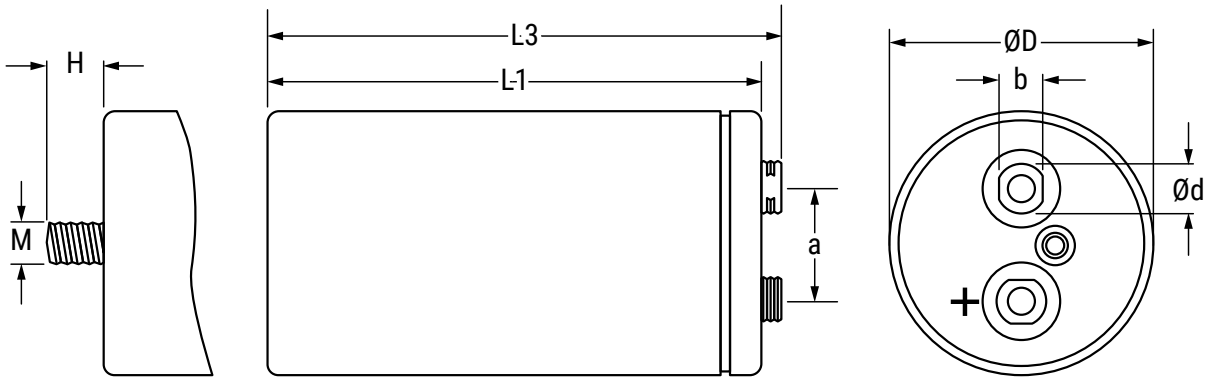
Item	Performance Characteristics		
Capacitance Range	1,500 – 390,000 µF		
Rated Voltage	16 – 100 VDC		
Operating Temperature	–55 to +125°C		
Capacitance Tolerance	–10/+30% at 100 Hz/+20°C		
Operational Lifetime	D (mm)	Rated Voltage and Ripple Current at +125°C (hours)	
	D ≤ 50	4,000	
	D > 50	8,000	
Shelf Life	2,000 hours at +85°C or 30,000 hours at +40°C 0 VDC		
Leakage Current	I = 0.002 CV + 4 or 3,000 (µA, whichever is smaller)		
	C = rated capacitance (µF), V = rated voltage (VDC). Voltage applied for 5 minutes at +20°C.		
Vibration Test Specifications		Procedure	Requirements
	D ≤ 50 mm	0.75 mm displacement amplitude or 10 g maximum acceleration. Vibration applied for three 2-hour sessions at 10 – 500 Hz (capacitor clamped by body).	No leakage of electrolyte or other visible damage. Deviations in capacitance from initial measurements must not exceed: Δ C/C < 5%
	D > 50 mm	0.75 mm displacement amplitude or 10 g maximum acceleration. Vibration applied for three 2-hour sessions at 10 – 55 Hz (capacitor clamped by body).	
Standards	IEC 60384–4 long life grade 55/125/56		

Test Method & Performance

Endurance Life Test	
Conditions	Performance
Temperature	+125°C
Test Duration	2,000 hours
Ripple Current	Maximum ripple current specified in table
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor
Performance	**The following specifications will be satisfied when the capacitor is tested at +20°C:**
Capacitance Change	Within 15% of the initial value
Equivalent Series Resistance	Does not exceed 200% of the initial value
Leakage Current	Does not exceed leakage current limit

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Dimensions – Millimeters



Reference Size (mm)	Size Code	Dimensions in mm					Approximate Weight Grams
		D	L1	L3	a	Mounting Stud (M x H)	
		±0.4	±1.0	±1.0	±0.5	Nominal	
35 x 51	A	35.0	51.5	58.0	13.0	M8 x 12	70.0
35 x 75	C	35.0	73.5	80.0	13.0	M8 x 12	105.0
35 x 95	D	35.0	94.5	101.0	13.0	M8 x 12	130.0
50 x 75	H	50.0	74.5	81.0	22.0	M12 x 16	180.0
65 x 105	O	65.0	106.0	111.3	28.5	M12 x 16	415.0
75 x 105	T	75.0	106.0	111.3	32.0	M12 x 16	585.0
75 x 145	V	75.0	146.0	151.3	32.0	M12 x 16	800.0

Termination Table

Reference Diameter	Thread	Termination Style	Dimensions in mm	
			d	b
35	M5	Round	8	
50	M5	Oval	15	13
65	M5	Oval	15	13
75	M5	Oval	15	13
Note: M6 and other termination options available on request				

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Shelf Life

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will very slowly increase. KEMET products are particularly stable and allow a shelf life in excess of three years at 40°C. See sectional specification under each product series for specific data.

Re-age (Reforming) Procedure

Apply the rated voltage to the capacitor at room temperature for a period of one hour, or until the leakage current has fallen to a steady value below the specified limit. During re-aging a maximum charging current of twice the specified leakage current or 5 mA (whichever is greater) is suggested.

Reliability

The reliability of a component can be defined as the probability that it will perform satisfactorily under a given set of conditions for a given length of time.

In practice, it is impossible to predict with absolute certainty how any individual component will perform; thus, we must utilize probability theory. It is also necessary to clearly define the level of stress involved (e.g. operating voltage, ripple current, temperature and time). Finally, the meaning of satisfactory performance must be defined by specifying a set of conditions which determine the end of life of the component.

Reliability as a function of time, R(t), is normally expressed as: $R(t)=e^{-\lambda t}$
where R(t) is the probability that the component will perform satisfactorily for time t, and λ is the failure rate.

Failure Rate

The failure rate is the number of components failing per unit time. The failure rate of most electronic components follows the characteristic pattern:

- Early failures are removed during the manufacturing process.
- The operational life is characterized by a constant failure rate.
- The wear out period is characterized by a rapidly increasing failure rate.

The failures in time (FIT) are given with a 60% confidence level for the various type codes. By convention, FIT is expressed as 1×10^{-9} failures per hour. Failure rate is also expressed as a percentage of failures per 1,000 hours.
e.g., 100 FIT = 1×10^{-7} failures per hour = 0.01%/1,000 hours

End of Life Definition
Catastrophic Failure: short circuit, open circuit or safety vent operation
Parametric Failure:

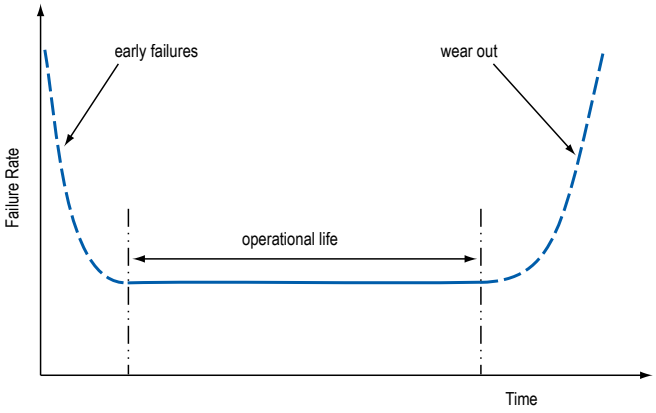
- Change in capacitance > ±10%
- Leakage current > specified limit
- ESR > 2 x initial ESR value

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MTBF

The mean time between failures (MTBF) is simply the inverse of the failure rate.

MTBF= 1/λ



Environmental Compliance

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation world wide and makes any necessary changes in its products, whenever needed.

Some customer segments such as medical, military and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Because of customer requirements, there may appear additional markings such as LF = Lead Free or LFW = Lead Free Wires on the label.

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Table 1 – Ratings & Part Number Reference

VDC	Rated Capacitance	Size Code	Case Size	Ripple Current			ESR Maximum	Impedance Maximum	Part Number
	100 Hz 20°C (µF)		D x L (mm)	100 Hz 125°C (A)	100 Hz 85°C (A)	100 Hz 40°C (A)	100 Hz 20°C (mΩ)	10 kHz 20°C (mΩ)	
16	18000	A	35 x 51	6.2	17.2	24.2	23	16	PEH205GA5180Q(1)
16	33000	C	35 x 75	8.1	22.5	31.6	15	11	PEH205GC5330Q(1)
16	39000	D	35 x 95	8.5	23.6	33.1	13	9	PEH205GD5390Q(1)
16	68000	H	50 x 75	13.7	37.8	53.1	10	8	PEH205GH5680Q(1)
16	180000	O	65 x 105	17.4	48.1	67.5	6	7	PEH205GO6180Q(1)
16	270000	T	75 x 105	22.9	63.3	80.0	6	8	PEH205GT6270Q(1)
16	390000	V	75 x 145	24.8	68.8	80.0	6	8	PEH205GV6390Q(1)
25	10000	A	35 x 51	5.3	14.7	20.7	27	17	PEH205HA5100Q(1)
25	18000	C	35 x 75	7.0	19.4	27.2	17	11	PEH205HC5180Q(1)
25	22000	D	35 x 95	7.5	20.6	29.0	15	10	PEH205HD5220Q(1)
25	39000	H	50 x 75	12.0	33.4	46.8	11	8	PEH205HH5390Q(1)
25	120000	O	65 x 105	19.8	54.8	76.9	7	7	PEH205HO6120Q(1)
25	180000	T	75 x 105	20.8	57.7	80.0	7	8	PEH205HT6180Q(1)
25	270000	V	75 x 145	23.5	65.1	80.0	6	8	PEH205HV6270Q(1)
40	4700	A	35 x 51	4.8	13.2	18.5	32	17	PEH205KA4470Q(1)
40	10000	C	35 x 75	6.8	18.9	26.6	18	10	PEH205KC5100Q(1)
40	15000	D	35 x 95	8.1	22.4	31.5	15	9	PEH205KD5150Q(1)
40	22000	H	50 x 75	11.7	32.4	45.5	11	8	PEH205KH5220Q(1)
40	47000	O	65 x 105	18.1	50.1	70.4	7	7	PEH205KO5470Q(1)
40	68000	T	75 x 105	19.9	55.2	77.6	7	8	PEH205KT5680Q(1)
40	100000	V	75 x 145	22.2	61.5	80.0	6	8	PEH205KV6100Q(1)
55	3300	A	35 x 51	4.4	12.2	17.2	40	23	PEH205LA4330Q(1)
55	5600	C	35 x 75	5.8	16.1	22.7	25	15	PEH205LC4560Q(1)
55	8200	D	35 x 95	7.0	19.3	27.1	19	12	PEH205LD4820Q(1)
55	12000	H	50 x 75	10.3	28.4	39.9	17	9	PEH205LH5120Q(1)
55	33000	O	65 x 105	17.3	48.0	67.4	8	8	PEH205LO5330Q(1)
55	47000	T	75 x 105	19.0	52.7	74.0	8	8	PEH205LT5470Q(1)
55	68000	V	75 x 145	21.7	60.0	80.0	7	8	PEH205LV5680Q(1)
63	2200	A	35 x 51	4.1	11.4	16.1	43	24	PEH205MA4220Q(1)
63	4700	C	35 x 75	6.1	17.0	23.8	24	14	PEH205MC4470Q(1)
63	6800	D	35 x 95	7.2	19.9	28.0	19	11	PEH205MD4680Q(1)
63	10000	H	50 x 75	10.1	27.9	39.2	14	9	PEH205MH5100Q(1)
63	22000	O	65 x 105	16.3	45.2	63.4	9	8	PEH205MO5220Q(1)
63	33000	T	75 x 105	18.0	49.7	69.9	9	9	PEH205MT5330Q(1)
63	47000	V	75 x 145	20.7	57.3	80.0	7	8	PEH205MV5470Q(1)
100	1500	A	35 x 51	3.0	8.4	11.7	83	53	PEH205PA4150Q(1)
100	2200	C	35 x 75	3.7	10.3	14.4	56	36	PEH205PC4220Q(1)
100	3300	D	35 x 95	4.7	13.0	18.3	37	26	PEH205PD4330Q(1)
100	4700	H	50 x 75	6.9	19.0	26.7	29	19	PEH205PH4470Q(1)
100	15000	O	65 x 105	13.4	37.0	51.9	13	10	PEH205PO5150Q(1)
100	22000	T	75 x 105	15.2	42.0	59.0	11	10	PEH205PT5220Q(1)
100	33000	V	75 x 145	18.5	51.2	71.8	9	9	PEH205PV5330Q(1)
VDC	Rated Capacitance	Size Code	Case Size	Ripple Current			ESR	Impedance	Part Number

(1) Mounting Code: U0 = bare can, B0 = threaded mounting stud

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Mechanical Data

Polarity and Reversed Voltage
Aluminium Electrolytic capacitors manufactured for use in DC applications contain an anode foil and a cathode foil. As such, they are polarized devices and must be connected with the +ve to the anode foil and the -ve to the cathode foil. If this were to be reversed then the electrolytic process that took place in forming the oxide layer on the anode would be recreated in trying to form an oxide layer on the cathode. In forming the cathode foil in this way, heat would be generated and gas given off within the capacitor, usually leading to catastrophic failure.

The cathode foil already possesses a thin stabilized oxide layer. This thin oxide layer is equivalent to a forming voltage of approximately 2 V. As a result, the capacitor can withstand a voltage reversal of up to 2 V for short periods. Above this voltage, the formation process will commence. Aluminium Electrolytic capacitors can also be manufactured for use in intermittent AC applications by using two anode foils in place of one anode and one cathode.

Mounting Position
The capacitor can be mounted upright or inclined to a horizontal position.

Insulating Resistance
Please note the PEH205 is housed in a bare can and does not feature plastic insulation.

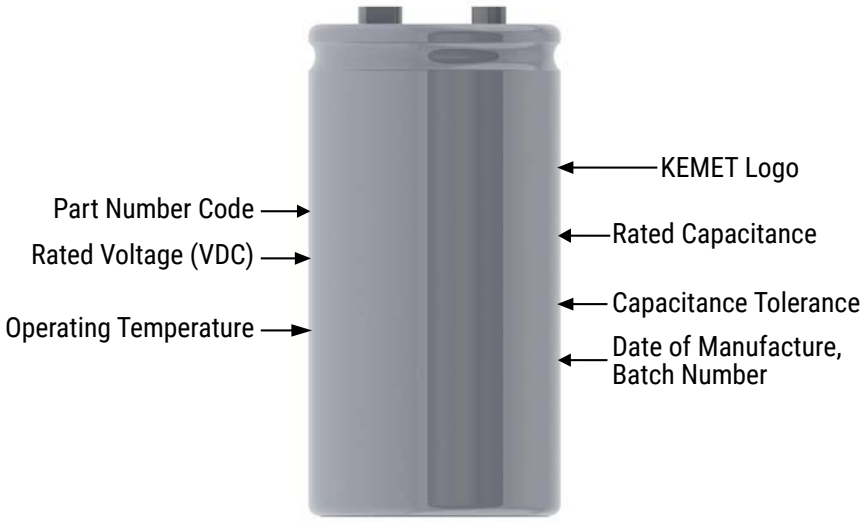
Clamp Fixing
Clips must be ordered separately.

Stud Fixing
Nylon cap nut must be ordered separately.
Maximum tightening torque:
M8 = 3 Nm
M12 = 8 Nm
Maximum chassis thickness = 5 mm

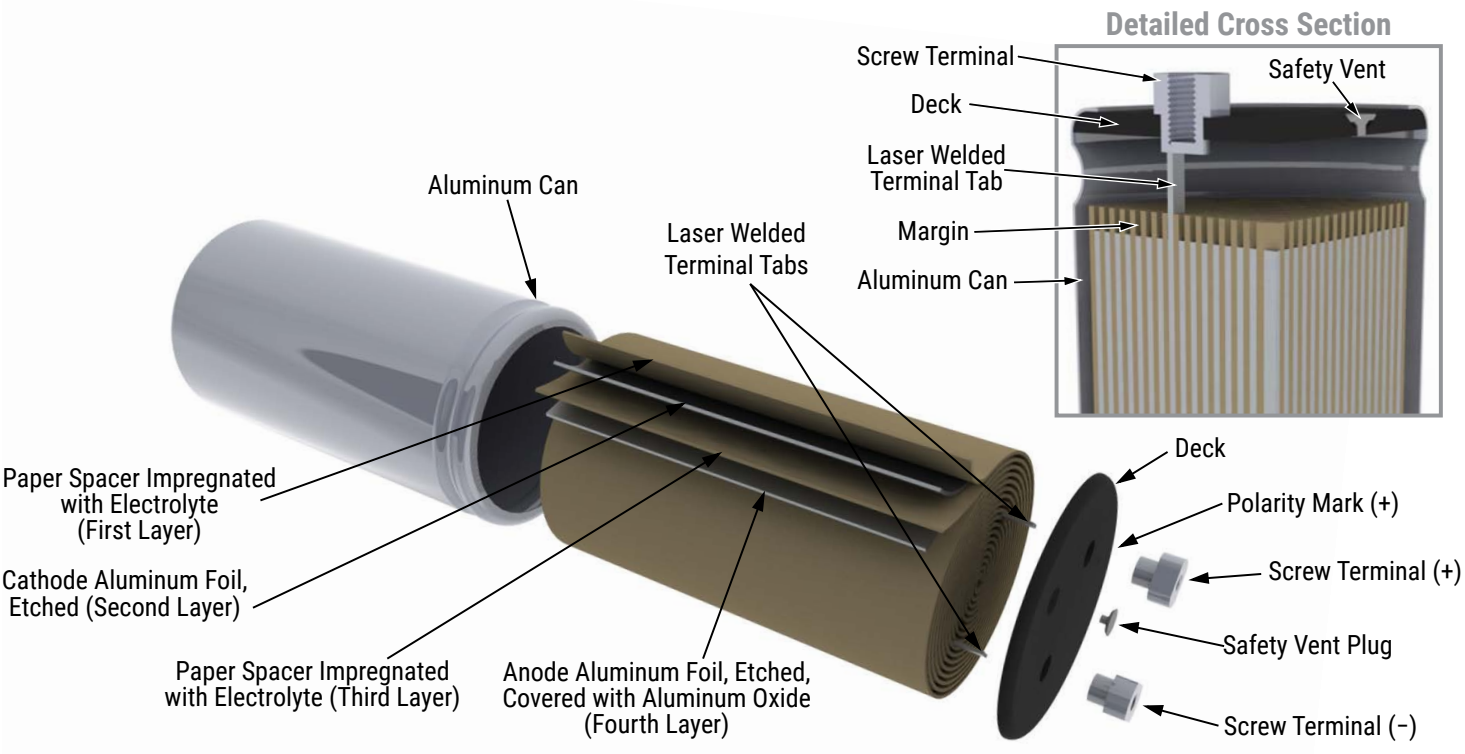
Screw Terminals
M5 x 10 according to DIN 41.248. Maximum tightening torque = 2.5 Nm. Must be ordered separately.
Recommended maximum connector thickness with delivered screw 4 mm. M6 thread upon request (65 and 75 mm diameter).

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Marking



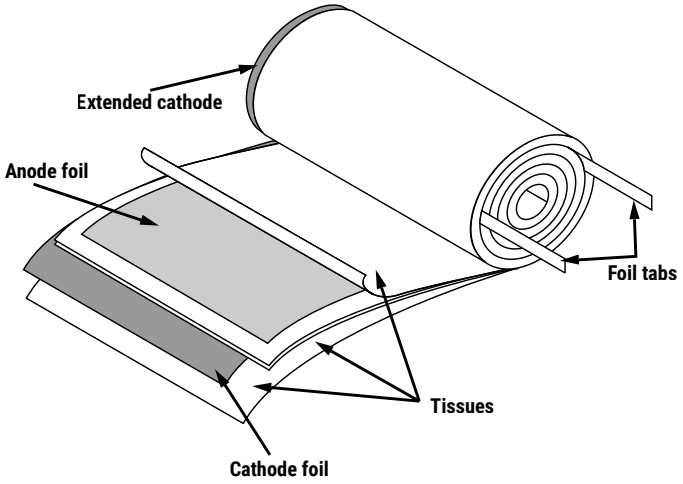
Construction



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Construction Data

The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then "formed" to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.



The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

Each capacitor is aged and tested before being sleeved and packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete.

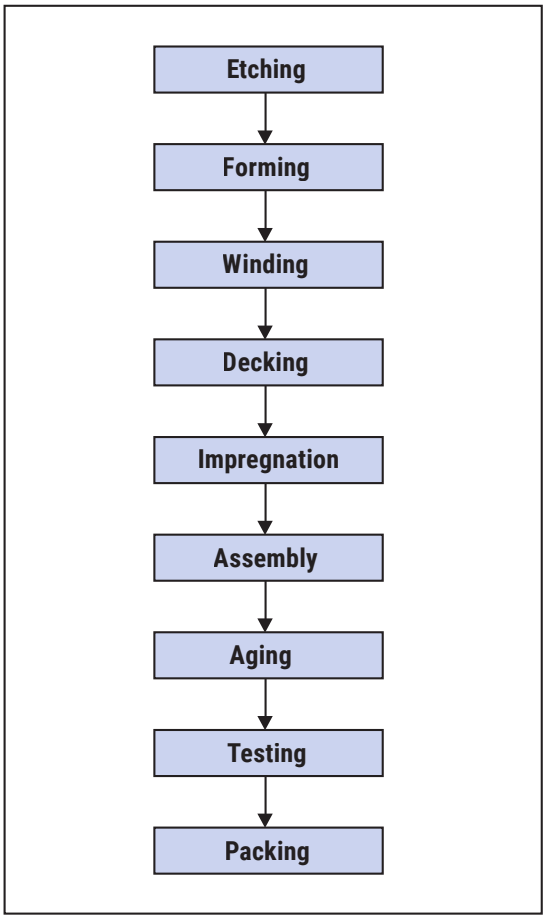
Damage to the oxide layer can occur due to variety of reasons:
- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding

A sample from each batch is taken by the quality department after completion of the production process. This sample size is controlled by the use of recognized sampling tables defined in BS 6001.

The following tests are applied and may be varied at the request of the customer. In this case the batch, or special procedure, will determine the course of action.

Electrical:
- Leakage current
- Capacitance
- ESR
- Impedance
- Tan Delta

Mechanical/Visual:
- Overall dimensions
- Torque test of mounting stud
- Print detail
- Box labels
- Packaging, including packed quantity



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Although all product–related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicted or that other measures may not be required.

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