

# CHARGE

February 2011

A Technical News Journal from Deki Electronics Ltd

## Editor's Desk

Dear Reader,

Deki's R&D is continuously working to make better products. In September 2010 Deki was awarded the 2nd prize for Excellence in R&D by ELCINA and EFY at their annual awards function for developing the PES (Polyester Extra Strength) capacitor .

Another new product that Deki has developed is the Long Life PEP capacitor used for switching in CFLs. While a normal filament capacitor lasts 4000 cycles Deki's long life capacitor has a life of 12000 cycles – thus enabling a three fold increase in the functional life of a CFL. This issue is devoted to this product.

We look forward to your comments and suggestions.

**A nil Bali**

## External Customer Satisfaction Survey

Deki conducts an external customer satisfaction survey every six months. The results of the last survey for the period July-December 2010 indicated another term of a consistently improving trend. In fact, we achieved the highest ever score of 84.02%. The main improvement was in the areas of Price, Delivery, Professionalism and “your Perception of Deki as a supplier of value”.

We were able to offer very competitive prices based on economies of scale. Our focus on reduction in process cycle time and daily monitoring of the production CLIP helped to improve our score in the area of delivery. The interaction that our marketing and R&D team have with our customers is reflected in the increased scores in Professionalism and “your Perception of Deki as a supplier of value”.

We would now like to maintain this level for the next six months by continuing the above activities.

Parameters	Jan-Jun 09	Jul-Dec 09	Jan-Jun 10	Jul-Dec 10
<b>Product Quality</b>	83.71	84.56	85.52	85.63
<b>Price</b>	73.86	74.09	74.69	76.63
<b>Delivery</b>	79.53	80.96	82.86	83.68
<b>Tech Support</b>	85.71	85.79	86.56	86.43
<b>Professionalism</b>	83.44	83.18	85.08	86.43
<b>Your Perception</b>	83.00	80.53	83.13	85.29
<b>Average</b>	81.54	81.52	82.97	84.02

## Employee Satisfaction Survey

Deki conducts an employee satisfaction survey every 6 months. In this survey all the direct employees are asked 15 questions pertaining to:

- 1) their work environment
- 2) salary
- 3) satisfaction level
- 4) growth opportunity
- 5) knowledge of targets ,standard specifications, operating procedures, etc.

They give marks to each of the questions and this is then consolidated and made into a report which compares the results of the most recent survey with the last 6 months. This consolidated report along with the action points for improvement are discussed with all the employees in an “Open House” by our MD, Mr Vinod Sharma.

In the August 2010 a survey was conducted and the total score showed a stable trend with the score at an impressive 86%.

The main areas of gain were:

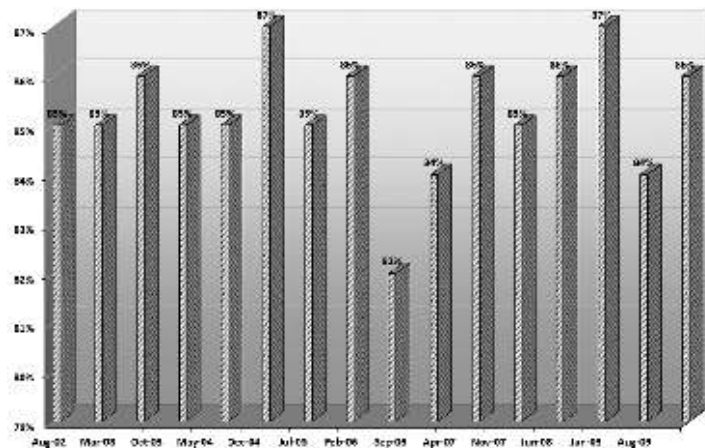
- 1) Availability of resources, and,
- 2) Facilities.

The main areas of concern were:

- 1) Work Environment, and,
- 2) Grievance Handling.

We are measuring the sound level, the lux level and the temperature and humidity of all work areas every month. All the areas except hot pressing are having a good working environment. By March 2011 we will improve the temperature in the hot pressing area.

For grievance handling we have a procedure in place. We will again remind all the employees of it.



For your **FREE** subscription, please contact **Deki Electronics Ltd**,  
B-20 Sector 58, NOIDA 201 301. Phone +91 120 2585457, 2585458  
Fax +91 120 2585289 E-mail [bali@dekielectronics.com](mailto:bali@dekielectronics.com)

[www.dekielectronics.com](http://www.dekielectronics.com)

## Long Life Filament Capacitor for CFL

Recent developments in CFL (Compact Fluorescent Lamp) Ballast require component rating of 110°C. The requirement is for ballasts smaller in size and higher in wattages which increases the temperature inside the capsule. Typically, the temperature inside the capsule reaches 100°C in some lamps.

Generally, a CFL circuit consists of two types of capacitors:

- 1) Plastic Film Capacitors.
- 2) Electrolytic Capacitors

Plastic film capacitors are used for the following applications:

- 1) Coupling
- 2) Snubber Application
- 3) Striking capacitor.

For general purpose applications like blocking and coupling applications, plain polyester and metalised polyester film capacitors are used.

For applications like snubber and striking, plain polypropylene film capacitors are used because of higher voltage and high frequency requirement.

The only problem with plain PP capacitor is temperature withstanding capability at 110°C. PP film starts shrinking leading to poor bonding strength between film and epoxy resin and subsequent cracking of epoxy.

In order to meet high temperature requirements of 110°C and at the same time to provide better power handling capability and better capacitance stability PEP capacitors were developed by Deki.

PEP capacitor is a combination of both plain polyester film and plain polypropylene which is nothing but mixed dielectric capacitor.

We can optimise the performance of the capacitor by the right mix of PET and PP films.

## Specifications

**Application:** Oscillator, timing and LC/RC filter circuits, snubber circuits, high frequency coupling of fast digital and analog ICs. Mainly used in CFLs and where stable temperature characteristics are required.

**Construction:** Film/foil inductive type construction with aluminum foil as electrode and PET + PP film as mixed dielectric coated with flame retardant epoxy resin.

**Climatic Category:** 40/100/56

**Maximum Operating Temperature:** 110°C

**Capacitance Value, Rated Voltage (DC):** Refer dimension chart

**Capacitance Tolerance:** ±1%, ±2%, ±2.5%, ±5%, ±10%

**Voltage Proof:** Between terminals - 2 times of rated voltage.

**Tan δ:** 0.3% (maximum) at 1.0 kHz. 0.6% at 100 kHz.

**Insulation Resistance:**

Minimum Insulation Resistance $R_{IS}$	$V_R$	$C_R \leq 0.33\mu F$	$C_R > 0.33\mu F$
(or) time constant $T=C_R \times R_{IS}$	≥100V DC	100 GVV	100 GVV
at 25°C, relative humidity ≤70%	≥100V DC	100 GVV	100 GVV

**Life Test Condition:** (Loading at elevated temperature)

Loaded at 1.5 times of rated voltage at 85°C or 1.5 times of category voltage at 100°C for 1000 hours. Category voltage is 80% of rated voltage.

**After the test:**

ΔC/C: ±5% ±5 pfd of initial value.

Change in Tan δ = 1.4 times the value measured before the test.

Insulation resistance: =50% of the value mentioned in IR chart.

## Comparative Data of PET/PP/PEP capacitors

This table contains the actual readings of 0.0027/1250VDC/10% tolerance capacitors for the following parameters.

1) Capacitance value at Different Temp and Diff Frequency.

2) Loss Factor (Tan δ) at Different Temp and Diff Frequency

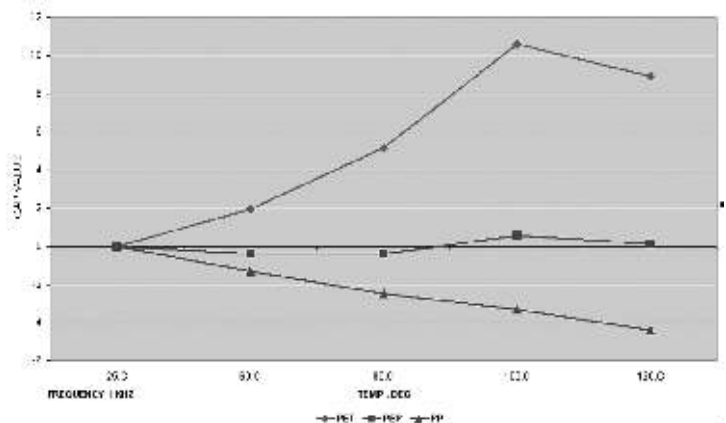
For all three types of capacitors:

PET TEMP	1kHz		20kHz		40kHz		50kHz		66.66kHz	
	CAP	TD	CAP	TD	CAP	TD	CAP	TD	CAP	TD
25°C	269.3	0.31	265.8	1.04	264.5	1.24	264.1	1.31	263.4	1.36
60°C	274.6	0.19	272.0	0.61	271.3	0.79	271.1	0.85	270.7	0.91
80°C	283.2	0.81	279.2	0.77	278.4	0.84	278.2	0.9	277.8	0.92
100°C	297.9	2.02	289.4	1.36	287.8	1.35	287.4	1.35	286.8	1.36
120°C	293.5	2.06	284.6	1.33	283.1	1.31	282.6	1.31	282	1.30

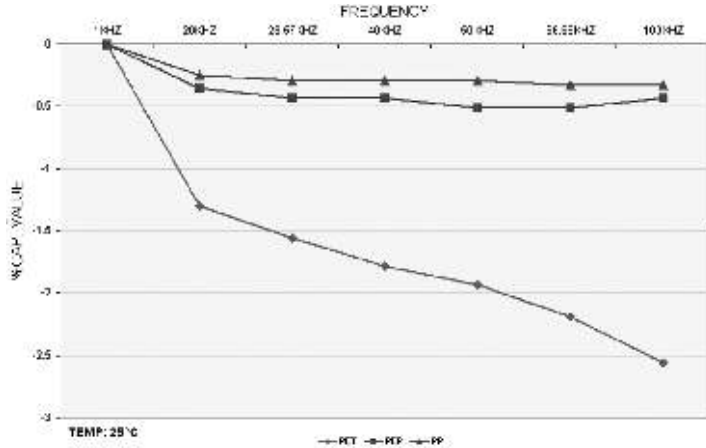
PEP TEMP	1kHz		20kHz		40kHz		50kHz		66.66kHz	
	CAP	TD	CAP	TD	CAP	TD	CAP	TD	CAP	TD
25°C	254.5	0.14	253.6	0.2	253.4	0.24	253.2	0.26	253.2	0.27
60°C	253.5	0.12	252.7	0.18	252.2	0.21	252.1	0.27	252.1	0.22
80°C	253.6	0.29	251.8	0.29	251.6	0.29	251.6	0.3	251.5	0.29
100°C	256	0.74	252.8	0.53	252.3	0.49	252.1	0.48	252	0.46
120°C	254.2	0.72	251	0.52	250.4	0.51	250.3	0.5	250.2	0.47

PP TEMP	1kHz		20kHz		40kHz		50kHz		66.66kHz	
	CAP	TD	CAP	TD	CAP	TD	CAP	TD	CAP	TD
25°C	277.6	0.02	276.9	0.07	276.8	0.08	276.8	0.09	276.7	0.08
60°C	273.9	0.01	273.2	0.06	273.2	0.07	273.1	0.06	273.1	0.07
80°C	270.7	0.04	270.2	0.06	270.1	0.07	270.1	0.07	270.1	0.07
100°C	268.4	0.09	267.6	0.11	267.5	0.11	267.5	0.1	267.5	0.09
120°C	265.4	0.14	264.5	0.13	264.4	0.16	264.4	0.16	264.3	0.18

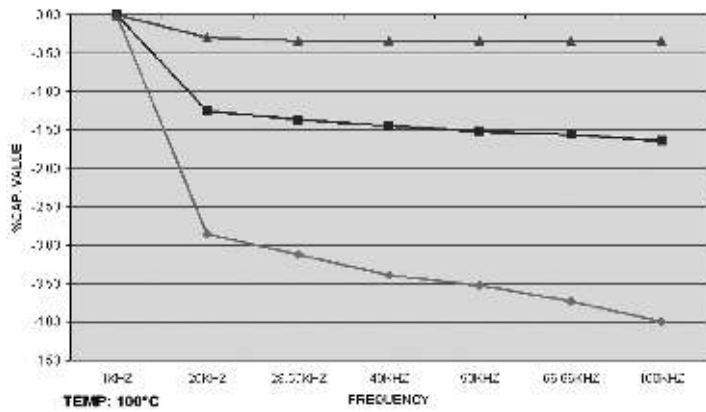
## Capacitance Change w.r.t. Temperature



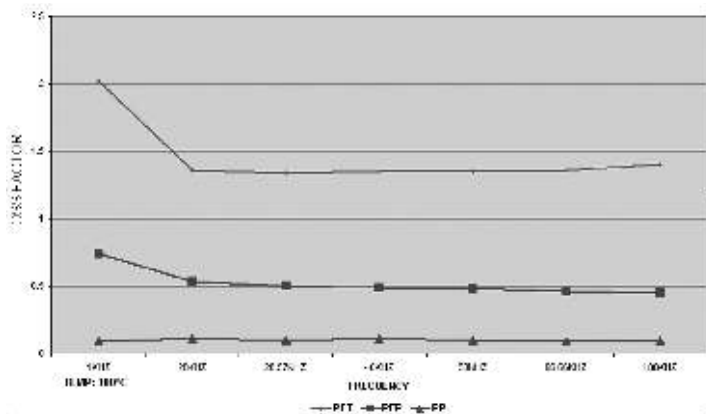
## Capacitance Change w.r.t. Frequency



## Capacitance Change and Loss Factor Change at 100°C w.r.t. Frequency



## Capacitance Change and Loss Factor Change at 100°C w.r.t. Frequency



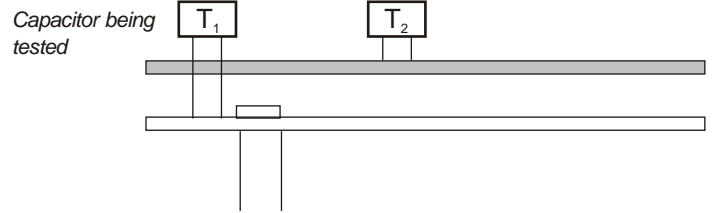
Looking at the data you will observe that the capacitance value of a PEP capacitor is much more stable compared to PET or PP at different frequencies and at different temperatures. The capacitance change is well within 1.0% band. This makes it ideal for applications like timer and tuning circuits at high temperature and high frequency.

When we use a capacitor for AC application, we have to ensure that its power handling capability is adequate.

### Method for Plotting Frequency Derating Curve

After applying the AC voltage to the capacitor with certain frequency, we can measure the hot spot temperature of the capacitor by infrared thermometer. From that we can calculate  $?T$ .

$$?T = \text{hot spot temperature} - \text{ambient temperature.}$$



T1 is the capacitor under test,  
T2 is capacitor which has no connection

Distance between T1 and T2 should be about 50mm and 100mm from other components. The capacitor under test is separated by polystyrene.

$$?T_m = T_1 - T_2$$

For correctly selected capacitor temperature rise due to electrical stress should be less than 7° C.

To confirm usage of film capacitors at high frequency and high current applications there are two alternatives:

1. test under actual conditions, or alternatively,
2. test in shorter time with high frequency and high current source.

Deki conducts such application life tests with its own custom built, high frequency, high current power source to ensure zero defect film capacitors for customers.

### Deki High Frequency & High Voltage Simulator

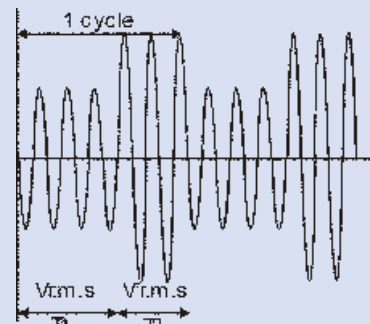
For simulating the actual working in CFL and HF ballasts our testing has two distinct parts. The first is ignition and the second is steady state operation. The capacitor is subjected to 10,000 cycles and checked thereafter.

The simulator is equipped with:

- High frequency with high voltage ( 200 kHz, 1000 V<sub>rms</sub>)
- High current

In this simulator we can vary the frequency from 20 kHz to 200kHz and the voltage from 50 volts to 1000volts. Depending upon the capacitance we can load 1 to 10 pieces simultaneously.

### Switching test condition for long life filament capacitor



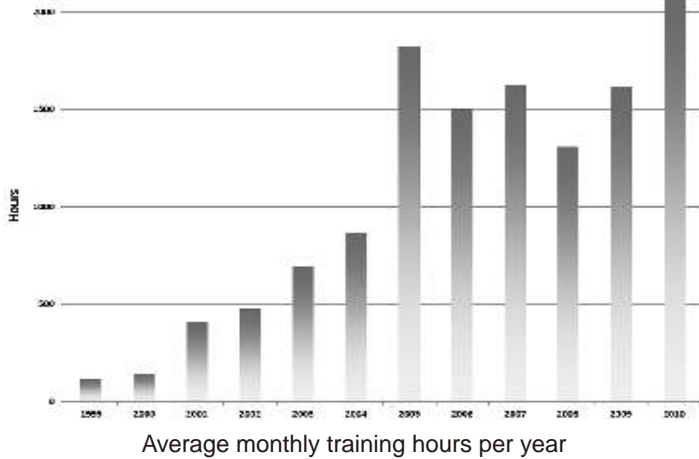
Vrms	-	100V
Vrms	-	500V
T1	-	8 sec
T2	-	0.1 sec
Frequency	-	50kHz
No. of cycles	-	12000
Room Temperature	-	30°C

PEP capacitors qualify 12000 cycles whereas PET capacitors pass through 4000 cycles only.

**For 50,000 cycle, please use Deki's patented DPSH capacitor. Ask for details.**

## Training in Deki

Training in Deki has been growing consistently. In the year 2010 there was a 40% jump in training hours per month from 1620 to 2265. This comes to a very healthy 2.6 man hours per person per month. Detailed stage wise training is being conducted in which knowledge of the process and the machines is being imparted. This is followed by a written test. An employee has to score a minimum of 80% at critical stages to qualify to run the machine.



## Suggestion Scheme

The suggestion scheme in Deki has been growing continuously. The scheme, easily understood by every one, saw a growth of nearly 36% in 2010 over 2009. As part of the scheme employee fills up a suggestion form mentioning:

- the present process
- the proposed process, and,
- the savings/benefits from the proposed process.

## Clusters for Lean Manufacturing and Skill Development

ELCINA organised a half day programme on February 2, 2011 at Deki on "Cluster in NCR for Lean Manufacturing Implementation under Subsidy scheme by MSME".

In this programme, attended by a number of companies, National Productivity Council( NPC), the nodal agency for the LMC scheme, made a presentation on the scheme.

An 80% subsidy is given to MSMEs for implementation of Lean Manufacturing practices. Dr S N Nandi, ex-NPC, gave a presentation on Lean Manufacturing. Most of the attendees were unanimous that this is a good scheme and will benefit all MSMEs.

## ESI Peer Educator Training



A view of the training session

ESI organized a 1 day "Peer Educator" training programme at Deki under project "Sankalp" on November 13, 2010. The

objective of the programme was to train the shop floor employee on ESI benefits, HIV/AIDS, RCH, etc. The Peer Educator in turn educates his fellow employees. In addition to 20 Deki employees some employees of Eureka Forbes and Quality Needles also attended the programme.

## Deki bags ELCINA EFY award for R&D and EMS for 2009-10



Mr P. Shankar Raj received the award on behalf of Deki

Deki bagged the 2nd prize in R&D for development of Polyester Extra Strength (PES) capacitor. This capacitor is smaller in size but gives a higher minimum breakdown than the conventional design. Deki also received the Certificate Of Merit for excellent work in Environment Management.

The awards were given on September 24, 2010 at the ELCINA EFY awards function held at India Habitat Centre, Delhi.

## Deki Executives Day Out



Deki executives enjoyed a day out at a ranch in NOIDA on January 15, 2011.

Whilst the ladies spent time walking around the ranch and collecting fresh vegetables the gents went about playing cricket, football and volleyball. Matches were played in full earnest after which the exhausted and hungry executives feasted on the excellent and piping hot food dished out by Mohammed Mian of Jama Masjid.

Whilst leaving, all executives took with them the vegetables that the ladies had collected as a remembrance.

It was truly a memorable day and now all executives are looking forward to the next year's day out.