Getting it Right from the Start…that's Optimization

Process

PV Vacuum Engineering Pte Ltd
(A member of Darco Water Technologies Limited)

puzair
A subsidiary of PV Vacuum Engineering Pte Ltd

PV Solutions To Power Surge/instability!

Electrically driven has been the back bone or preferred choice for driving the motor of most if not all vacuum generation source.

Whilst the strength of the Power Grids in One Region or Country can be a challenge to the stability of the power supply, modern day dynamic has created its own sets of problems too.

Resources Optimization

With the increase use of artificial intelligent in modern day production, production needs are most of the time fulfil based on demands.

In other words, some utilities will only be triggered to operate when demand exceed certain base production or ambient or human sets parameters.

This is a very efficient way to manage resources, saving the environmental from wastage.

However, it does means that the possibilities of a surge or a dip in voltage become very real. This is because in most facility, power demands of utilities are grouped into different distribution panels.

Therefore, the concurrent / simultaneous starting of many utilities powered from one distribution panel might cause a dip in voltage to every operating utilities that are connected to that panel. ***(The starting Current of a Pump is usually many times higher than its operating current.)***

Of course, distribution panels can be sized to handle the simultaneous starting of all the utilities connected to it. However, this might not be a very prudent approach especially when capital cost is considered.

Production Change

The upgrade or change in production requirement will sometime increase such voltage dip possibilities as new demand are added to a particular distribution panel.

Whilst the temporary stoppage of an utilities might not create major problem, it is still a loss to productive hours preventing task to be completed on time & possibility causing delay to production.

PV Solution

There are many approach to this problem, some creative, some unorthodox and some in line with proven international standards.

PV's prefer the last option!

Therefore, the design of a Contamination Control Vacuum System in Compliance to SEMI F47 and tested ON SITE for Compliance to SEMI F42 might be the best approach to ensure;

- Such Voltage Dip is managed in a SAFE, RELIABLE, PROVEN, FIELD TESTED MANNER!!!

- Without Damaged to the Vacuum Pumps Or Accessories or Endangering any of the staff!!!

Case Study

Please find attached an extraction of Such a Third Party Testing Report on a PV Supplied Central Vacuum System for up to 50% Voltage Dip Situation without any impact to Production.

SEMI F47 VOLTAGE SAG IMMUNITY CHARACTERIZATION REPORT

FOR

PV VACUUM ENGINEERING PTE. LTD.
ON
CONTAMINATION CONTROL VACUUM SYSTEM

415VAC, 3-PHASE PLUS NEUTRAL, 5O HZ POWER

Tests and report by

Dixon Ngiam
Technical Specialist
13th July 2004

Checked by

Eric Lim
Regional Manager
13th July 2004

TESTS OF SEMI F47 VOLTAGE SAG IMMUNITY IN A:

CONTAMINATION CONTROL VACUUM SYSTEM

PRODUCED BY
PV VACUUM ENGINEERING PTE. LTD.

ACCORDING TO SEMI F42-0600

1. Preliminary Comments.

The **Contamination Control Vacuum System** manufactured by **PV Vacuum Engineering Pte. Ltd.** have under went the tests of Voltage Sag immunity F42-0600 as the normalization process to acquire the SEMI F47-0200, regulated by the Semiconductor Equipment and Materials International.

Within classification process of this industrial equipment, this has been certified in accordance to the following standards:

- Semiconductor Processing Equipment Voltage Sag Immunity: F47-0200.

2. Goals of these Tests.

a) Immunity to Voltage Dips, Short Interruptions and Voltage variations in:

- **Contamination Control Vacuum System**

according to the F47-0200 and the test method of SEMI F42-0600.

3. Terminology

EUT *(Equipment Under Test)* **–** the Machine, Panel or Automatic Test Equipment intended to be tested, including the equipment mainframe and all subsystem which share the same electrical Power Supply, here by refer to **control in the Contamination Control Vacuum System** manufactured by **PV Vacuum Pump Pte. Ltd.**

4. Measurement equipment used.

Voltage Sag Generator
Model: IPC-480V-100A
Serial number: IPC03010

6. Measurements description

a) Immunity to Voltage Dips (Semi F42-0600)

It has been simulate the voltage Sag in the main supply of the *EUT* through the test generator as specified by the Semi F42-0600, with the specifications of the dips and interruption show in the graph below:

The Contamination Control Vacuum System was operated in production Mode during the testing.

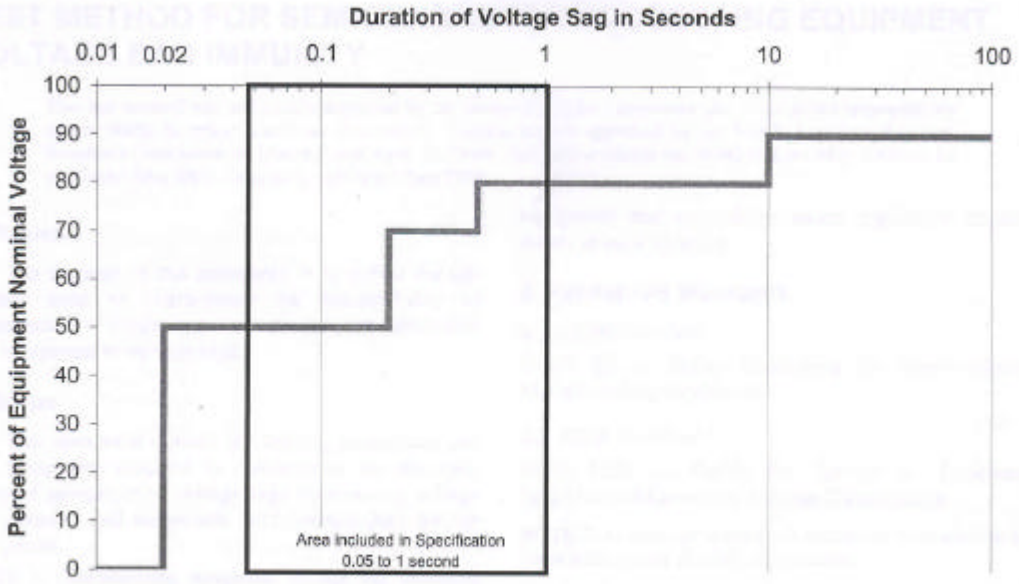


Figure R1-1
Recommended Semiconductor Equipment Voltage Sag Ride-Through Capability Curve from 0 to 100 Seconds

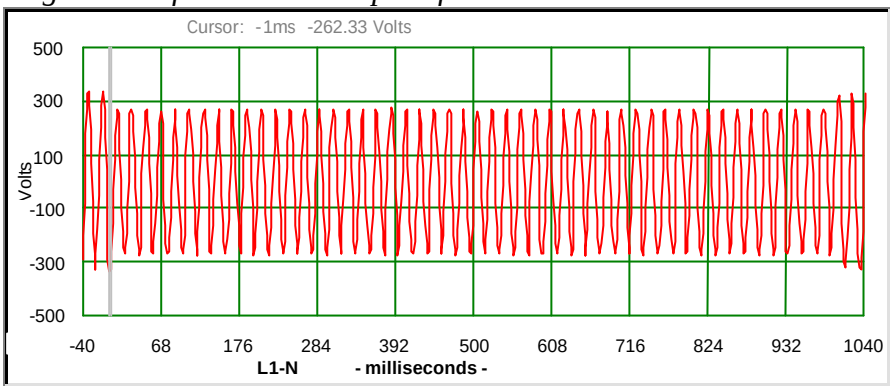
Test Table 1:Testing Table for Phase to Neutral

Test #	% L1-N	% VL2-N	% L3-N	**Voltage Sag Duration (in second)**	**Remarks**	**Graph #**
1	100%	100%	100%	Continuous	-	-
2	***80%***	100%	100%	1	Ride-Through	1-3
3	***70%***	100%	100%	0.5	Ride-Through	4-6
4	***50%***	100%	100%	0.2	Ride-Through	7-9

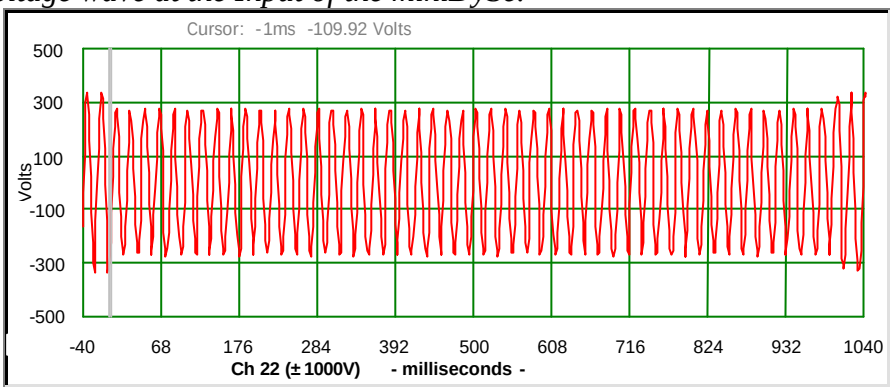
Test 2

Equipment Under Test: Control System of Contamination Control Vacuum System
Nominal power: 240 / 50 Hz / Single phase 2-wire + PE
Event Characteristic: 80.0% Vn, 1sec, L1-N

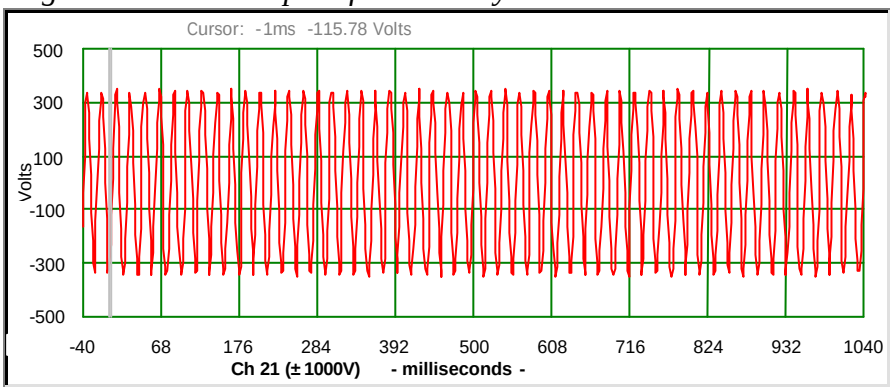
Graph 1: Voltage wave of L1-N at the Input of EUT.



Graph 2: Voltage wave at the Input of the miniDySc.



Graph 3: Voltage wave at the Output of the miniDySc.

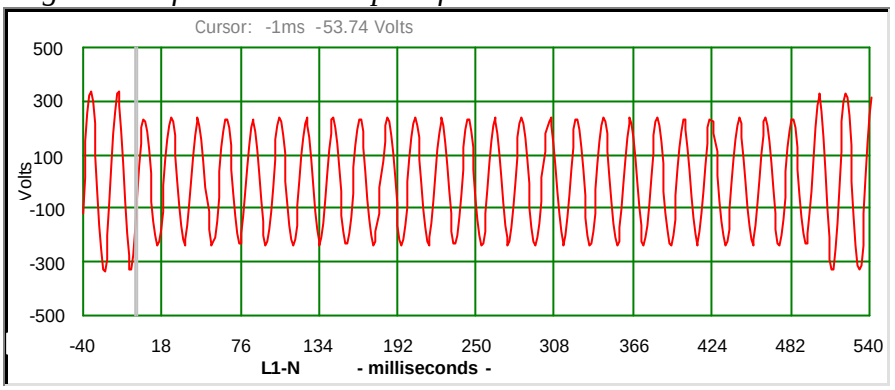


Results: **The only observation during this Sag was the slowing down of the Pump. Other than this event, no fault was indicated by the system.**

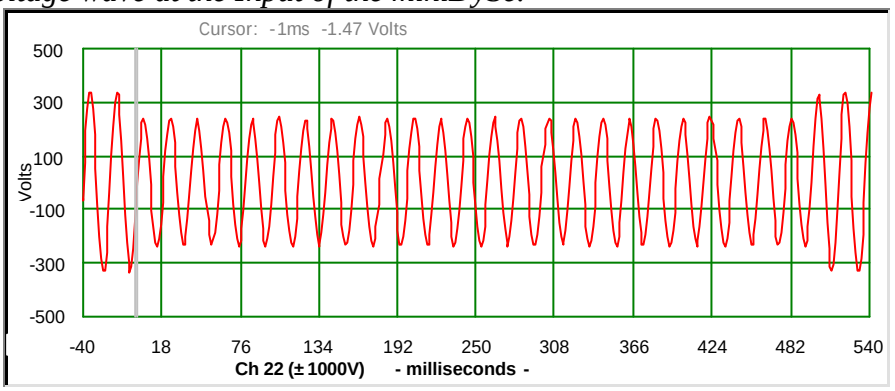
Test 3

Equipment Under Test: Control System of Contamination Control Vacuum System
Nominal power: 240 / 50 Hz / Single phase 2-wire + PE
Event Characteristic: 70.0% Vn, 0.5sec, L1-N

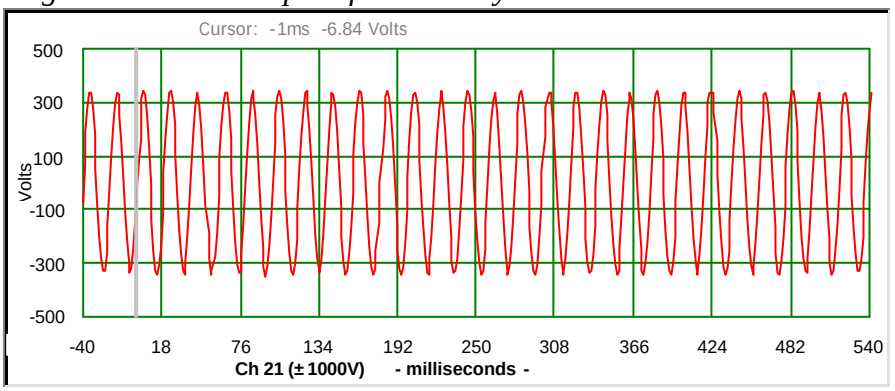
Graph 4: Voltage wave of L1-N at the Input of EUT.



Graph 5: Voltage wave at the Input of the miniDySc.



Graph 6: Voltage wave at the Output of the miniDySc.

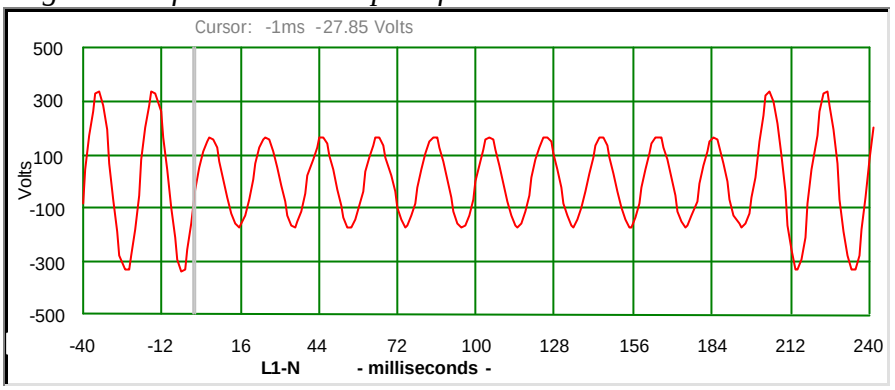


Results: **The only observation during this Sag was the slowing down of the Pump. Other that event, no fault was indicated by the system.**

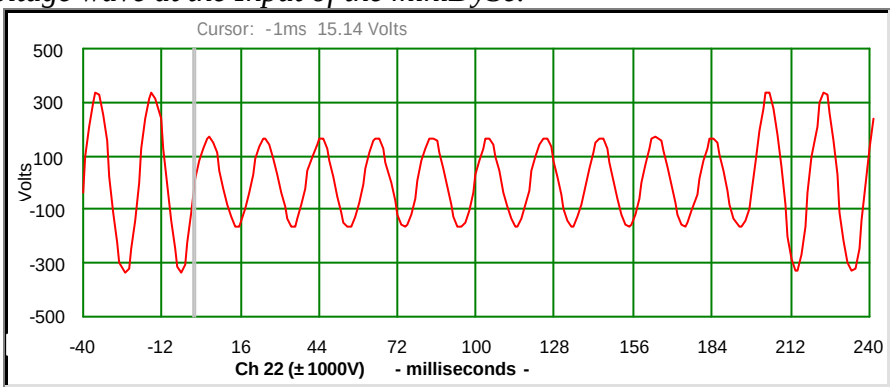
Test 4

Equipment Under Test: Control System of Contamination Control Vacuum System
Nominal power: 240 / 50 Hz / Single phase 2-wire + PE
Event Characteristic: 50.0% Vn, 0.2sec, L1-N

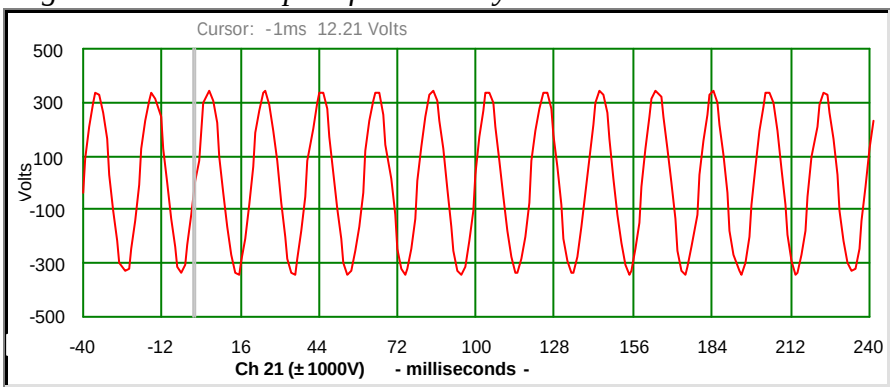
Graph 7: Voltage wave of L1-N at the Input of EUT.



Graph 8: Voltage wave at the Input of the miniDySc.



Graph 9: Voltage wave at the Output of the miniDySc.



Results: **The only observation during this Sag was the slowing down of the Pump. Other that event, no fault was indicated by the system.**

b) All the Tests were done with the EUT in Production Mode.

7. Staff in charge of the Tests.

System Engineer: Soh Tze Lip, PV Vacuum Engineering Pte Ltd.
Test Engineer: Dixon Ngiam, EFI Asia Pacific Pte Ltd.

8. Conclusions.

The **Control System of the Contamination Control Vacuum System** manufactured by **PV Vacuum Engineering Pte Ltd** has accomplishes the tests of Voltage Sag immunity F42-0600 as the normalization process to acquire the SEMI F47-0200, regulated by the Semiconductor Equipment and Materials International.

Note: The motor of the pump slow down during the few cycles of the Voltage Sag. As there is no fault indicated during the pump slow down, it is assume as F42 accomplished. Therefore, Contamination Control Vacuum System can be declared as F42 compliances.

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