



# Panel Systems

Panels - ANSI & IEC



# Power System Enterprise Solution

ETAP is the most comprehensive analysis platform for the design, simulation, operation, control, optimization, and automation of generation, transmission, distribution, and industrial power systems.

# Customize ETAP to fit your needs, from small to large power systems

ETAP Enterprise Suite provides one solution to your power system design, analysis, and operation needs. ETAP offers a comprehensive suite of analysis modules that can be configured to suit your specific needs. This modular approach allows you to purchase only the modules you need.

## ◆ Featured in this brochure



### Cable Systems

- Cable Sizing - Phase
- Cable Sizing - Grounding/PE
- Cable Ampacity
- Electric Shock Calculation
- Underground Thermal Analysis
- Cable Pulling

### Base Package

- Cable Ampacity & Sizing
- Transmission Line Constants
- Report Manager
- Project Management Wizards
- Output Report Comparator
- Multi-Dimensional Database
- Libraries

### Distribution

- Unbalanced Load Flow
- Optimal Power Flow
- Transformer Tap Optimization
- Switching Sequence Mgmt.
- Reliability Assessment
- Optimal Capacitor Placement
- GIS View

### Star Protective Devices

- Protection Coordination & Selectivity
- Sequence-of-Operation
- Relay Test Set Interface

### Intelligent Load Shedding

- Adaptive Load Shedding
- Automatic Islanding
- Load Preservation & Management
- System Restoration & Control
- Load Shedding Validation

### Data Exchange

- DataX
- MS Access® & Excel®
- CAD Interface
- e-DPP® Interface
- SmartPlant® Interface
- Third-Party Software

### Transmission Line

- Line Constants
- Line Ampacity
- Mutual Coupling
- Sag & Tension
- HV DC Transmission Link

### Arc Flash

- AC Arc Flash
- DC Arc Flash
- Result Analyzer
- Sequence Viewer

### Monitoring & Simulation

- Real-Time Monitoring
- State Estimation
- Energy Accounting
- Predictive Simulation
- Event Playback
- Load Forecasting

### Ground Grid Systems

- Finite Element Method
- IEEE 80 Method
- IEEE 665 Method

### Dynamics & Transients

- Transient Stability
- Generator Start-Up
- Wind Turbine Generator
- User-defined Dynamic Model
- Parameter Estimation

### Network Analysis

- Short Circuit – ANSI
- Short Circuit – IEC
- Load Flow
- Motor Acceleration

### Energy Management System

- Automatic Generation Control
- Economic Dispatch
- Supervisory Control
- Interchange Scheduling
- Reserve Management

### User-defined Dynamic Modeling

- Graphical Logic Editor
- Transfer Function Blocks
- Import/Export to Simulink®
- Excitor/Governor/Stabalizer
- Generic Load

### Panel Systems

- ANSI Panel
- IEC Panel
- Code Factors
- Schedule Reports

### Renewable Energy

- Wind Turbine Generator
- Wind Farm
- Photovoltaic Array

### Intelligent Substation

- Substation Automation
- Switching Management
- Load Management
- Smart Grid
- Micro Grid

### Power Quality

- Harmonic Load Flow
- Frequency Scan
- Harmonic Filters

### DC Systems

- Load Flow
- Short-Circuit
- Control System Diagram
- Battery Discharge
- Battery Sizing

# Panel Systems

Ultimate Tool for Panel Systems Design and Analysis



Developed for electrical designers and engineers, the Panel Systems module combines a graphical user interface and the intelligence of ETAP to easily design and analyze low voltage distribution systems. Coupled with exclusive features and advanced capabilities, Panel Systems seamlessly integrates between different ETAP power system study modules such as Short Circuit and Load Flow.

## Panel Design & Analysis

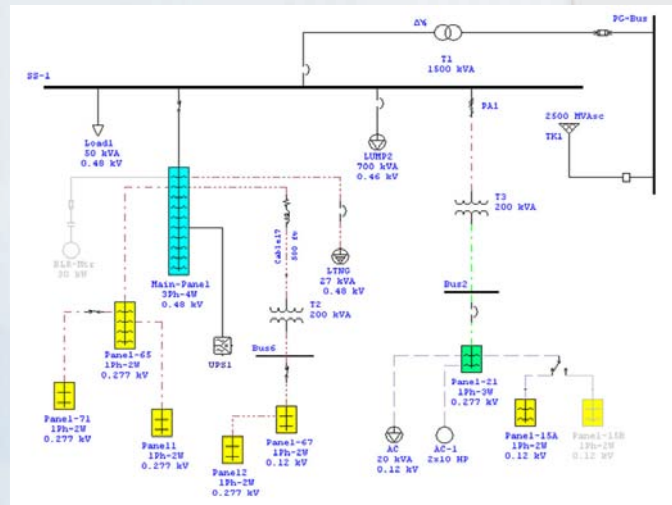
3-Phase & 1-Phase

ANSI & IEC Standards

NEC® & User-Defined Load Factors

Intelligent Panel Calculations

Automatic Update of Upstream Panels



Detailed low voltage distribution

# Intelligent Design with an Integrated Layout

## Capabilities

- NEC • ANSI • IEC Standards
- 3-Phase 3 Wire • 3-Phase 4 Wire
- 1-Phase 2 Wire • 1-Phase 3 Wire
- Column & standard layouts
- Unlimited branch circuits
- Unlimited sub-panel connections
- External network representation
- Internal (spreadsheet) load modeling
- Intelligent panel calculations
- Detailed panel loading summary
- Dynamic panel schedule updates
- Continuous & non-continuous load calculations

## Libraries

- Extensive protection & control device libraries
- Comprehensive feeder & cable libraries
- Customizable libraries
- User-configurable defaults & layouts

## Reporting

- Customizable panel schedules in Crystal Reports® format
- Comprehensive load summary for panel sizing
- Customizable reports for branch circuit evaluation
- Export one-line diagrams with results to third party CAD systems

## Flexible Operation

- Diverse operating conditions
- Multiple loading categories
- Multiple demand factors
- Unlimited configurations
- Different nameplate data
- Global & individual bus load diversity factors

#	Phase	Pole	Name	Link	State	VA	W	kV	A	% PF
1	B		Adm. Exp.	Internal	CRK	10000	10000	0.277	36.1	100
2	C			Internal	CRK	10000	10000	0.277	36.1	100
3	A	1	HVAC 1MB	Internal	CRK	500	500	0.277	1.805	100
4	B	1	Rece. Line 2	Internal	CRK	110	110	0.277	0.45	100
5	C	1	Laundry Rm	Internal	CRK	1500	1500	0.277	5.415	100
6	A	3	Panel 3	Ext 1	CRK	12454	12450	0.277	44.96	100
7	B			Internal	CRK	10455	10450	0.277	37.74	100
8	C			Internal	CRK	6130	6130	0.277	22.16	100
9	A	1	Panel 2	Ext 2	CRK	20312	20310	0.277	73.33	100
10	B	2		Internal	CRK	1500	1500	0.48	3.125	100
11	C			Internal	CRK	1500	1500	0.48	3.125	100

## Study Options

- Ten loading categories per circuit
- User-definable load types & factors

## Panel Code Factors

- NEC load demand factors
- Customizable multiplying factors

Connected Load	VA	W	A	% PF	Operating	VA	W	A (avg)	% PF
Continuous - A	36775	36770	132.8	100	Design	83239	83230	100.2	100
Continuous - B	36820	36810	133.1	100	Design	83239	83230	100.2	100
Continuous - C	17643	17641	63.63	100	Design	83239	83230	100.2	100
Total Continuous	75240	75230	269.5	100	Full Load	83239	83230	100.2	100
Non-Continuous - A	8500	8500	30.47	100	Summer Load	83239	83230	100.2	100
Non-Continuous - B	866	790	3.126	87	Winter Load	83239	83230	100.2	100
Non-Continuous - C	866	790	3.126	87	Winter Load	83239	83230	100.2	100
Total Non-Continuous	8000	8000	29.72	100	Winter Load	83239	83230	100.2	100
Connected - A	43274	43270	156.2	100	Start Up	83239	83230	100.2	100
Connected - B	31670	31670	113.7	100	Emergency	83239	83230	100.2	100
Connected - C	18408	18391	66.45	100	Emergency	83239	83230	100.2	100
Total Connected	93270	93230	336.3	100	Shutdown	83239	83230	100.2	100
Code Demand - A	53468	53462	189.4	100	Accident	83239	83230	100.2	100
Code Demand - B	28775	28774	103.6	100	Accident	83239	83230	100.2	100
Code Demand - C	22114	22067	79.37	100	Load Cat. 10	83239	83230	100.2	100
Total Code Demand Cont.	94357	94337	342.4	100	Load Cat. 10	83239	83230	100.2	100
Total Code Demand Non-Cont.	3000	3000	10.7	100	Load Cat. 10	83239	83230	100.2	100
Total Code Demand	110049	110037	393.1	100	Load Cat. 10	83239	83230	100.2	100

Load Name	Watts	FDR	Pk	CB	CMF	CMF	CB	FDR	Watts	Lead Name		
	A	B	C	Req	Req	Req	Req	Req	A	B	C	
Adm. Exp.	10000			6	3	28	1	2	20	12	12000	Panel1
HVAC 1MB	500			12	1	13	1	1	23	1	20310	Panel1
Rece. Line 2	110			12	1	13	1	1	20	2	1500	
Laundry Rm	1500			14	1	13	1	1	12	13	1500	
<b>Total Watts A:</b>	<b>43260</b>								<b>36360</b>			<b>6360</b>
<b>Total Watts B:</b>	<b>21660</b>								<b>20810</b>			<b>750</b>
<b>Total Watts C:</b>	<b>18360</b>								<b>19490</b>			<b>750</b>

# etap.com

## Quality Assurance Commitment

ETAP is Verified and Validated (V&V) against field results, real system measurements, established programs, and hand calculations to ensure its technical accuracy. Each release of ETAP undergoes a complete V&V process using thousands of test cases for each and every calculation module. ETAP Quality Assurance program is specifically dedicated to meeting the requirements of:



ISO 9001:2009

10 CFR 21

ASME NQA-1

CAN/CSA-Q396.1.2

10 CFR 50 Appendix B

ANSI/ASME N45.2

ANSI/IEEE 730.1

ANSI N45.22

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