



# THOR SYSTEMS, INC.

## SURGE APPS SA-004: RISK ASSESSMENT/SIZING SPD (Guidelines and application tools to promote improved Power Quality)

3621 Saunders Avenue  
Richmond, VA 23227-4354

### “Risk Assessment” - Sizing Surge Protection: How is Electrical Power Quality (PQ) Impacting Your Business?

Nothing affects business operations and profitability as instantly and dramatically as essential equipment/process downtime. Many businesses are unaware Power Quality (PQ) problems are a primary cause of equipment/process interruptions/restarts, process down awaiting service. Malfunctions of sensitive electronic logic controls, small component failures (e.g. printed circuit cards/chip sets) can cause large financial losses.

#### APPLICATIONS

Applications should match Surge Protection Devices (SPDs) to the installation parameters, requiring evaluation of the surge protection and the electrical environment of the facility. A Site Risk Assessment is a useful tool to perform this coordination. A proper cascading of surge protection is ensured through the use of a coordinated specification.

**Ref. Standards:**  
UL 1449 4th Ed.  
UL 1283 5th Ed.  
C62.41.1: 2002 IEEE  
C62.41.2: 2002 IEEE  
C62.45: 2002 IEEE  
C62.62: 2010 IEEE  
C62.72: 2007 IEEE  
NEMA  
NEC 2014  
NFPA 70  
FIPS 94  
MIL-STD 220A

#### THOR SYSTEMS, INC. SITE RISK ASSESSMENT SPREADSHEET

Determine Surge Protective Device (SPD) placement within facility. Complete Criteria Selections 1-7 below for each facility location (seven locations can be assessed on form). Total the value (refer to Table B for recommended SPD series/size). See Example Application below.

Assessment Criteria Selection	Location(s)							Example Application
	A	B	C	D	E	F	G	
1. Electrical System Capacity (at installation point) 9 (2500-6000A) 7 (1200-2000A) 4 (600-1000A) 3 (225-400A) 2 (125-200A) 1 (Up to 100A)								9 2,500A Switchgear
2. Geographical Location (see Maps below) Isokeraunic Map (Thunderstorm Days/Year): 4 (80-100) 3 (60-70) 2 (40-50) 1 (5-30) Mean Ground Flash Map (Mean Ground Flashes/Yr): 4 (13-18) 3 (9-12) 2 (5-8) 1 (1-4)								3 Dallas, TX 60 Storm Days
3. System Voltage 4 (600V) 3 (480V) 2 (240 or 208V) 1 (120V)								3 480V
4. Distribution System Configuration 3 (WYE) 2 (Delta)(H/Res Ond) 1 (Single Ph)								3 WYE
5. Short Circuit Current (at installation point) 6 (101-200kA) 5 (51-100kA) 3 (26-50kA) 2 (15-25kA) 1 (5-14kA)								5 65kAIC
6. SPD Location (within electrical system) 8 (Svc Entrance w/Transfer Switch; power from utility) 7 (Svc Entrance w/o Transfer Switch; power from utility) 3 (Dist Panel ≥1000A; power from switchgear) 2 (Sub-dist Panel <1000A; power from panel; no Xfmr) 1 (Branch Panel <400A; power Xfmr)								8 Svc Entrance w/Transfer Switch
7. Load Criticality Range: 3 (least) to 10 (most)								10 7x24 Data Ctr
8. Numerical Value Total (see Table B)	0	0	0	0	0	0	0	43 43 = TS/300

Key	Model Number (See Table "A")										Install Location -	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	Description	Qty
Example	TSr	i	300	F	x	3Y4	P	2	01	BFI	MSB1; 2500A, 480/277Vac	1
A												
B												
C												
D												
E												
F												
G												

#### SUSCEPTIBILITY

Susceptibility encompasses the factors which define the ability of a facility to be affected by surge events. These factors include:

- Electrical system ampacity at install point
- Geographical location (Isokeraunic Map & Mean Ground Flash Map)
- System voltage
- Distribution system configuration
- Available short circuit at installation point
- SPD location (within the electrical system)
- Specific application criticality

THOR SYSTEMS' Site Risk Assessment provides the means to identify existing and potential PQ problems and coordinate multiple SPDs and locations.

During a Site Survey, critical equipment/processes with their respective service expenses are reviewed and documented, often providing the necessary information to identify poor PQ as the root cause of a problem.

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**SITE RISK ASSESSMENT**

Proj Name: \_\_\_\_\_  
 Proj Location: SSS  
 Company: \_\_\_\_\_  
 Contact: \_\_\_\_\_  
 Email: \_\_\_\_\_  
 Prepared by: SSS  
 Date: SSS

**Table "A" MODEL NUMBER**

Example Model #: TSr300Fx 3Y4 P201 BFI

Key (1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

**Table "B" Numerical Total**

Numeric Total	kA Rating	Product Series
42 - 48	300kA	TS/300
35 - 41	250kA	TS/250
28 - 34	200kA	TS/200
21 - 27	150kA	TSr/TSn150
18 - 20	100kA	TSr/TSn150
11 - 15	50kA	TSr/TSn150

**Ground Improvement Required?**

Resistance	Best	Required?
< 5 Ohms	Yes	No
5-10 Ohms	Typical	No
> 10 Ohms	High	Yes

**Isokeraunic Map (number thunderstorm days / yr)**

**Mean Ground Flash Map (flash / km² / yr)**



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### SOLUTIONS

The information gathered during a site visit is formatted into three basic elements: **Scope of Work**, **Recommended Equipment Proposal**, and **Detailed Installation Guide**. These documents are the cornerstone of a proactive PQ improvement program which enables businesses to focus on creating and maintaining an enhanced PQ operating environment to facilitate continuous, improved business operations and increased ongoing profitability.

#### Modular Designs Offered – Series TSr Products

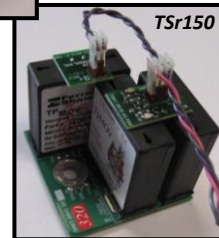
- Field replaceable, upgradable modules
- 50 through 300kA per mode (all modes protected)
- Applications: Service Entrance, Main Distribution, and where protected equipment criticality is a vital consideration



**TSrc300 with Disconnect**  
NEMA 4X Enclosure, Clear Hinged Lexan Cover



**Replaceable Surge Tiles**  
(Series TSr Only)



#### Non-modular Designs Offered – Series TSn Products

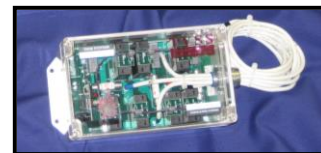
- Compact, non-field replaceable modules
- 50 through 150kA per mode (all modes protected)
- Applications: Lower ampacity Distribution, Sub-distribution, and Branch Panels



**Series TSn150**



**Series TSn100**



**Series TSn050**

Thank you for your interest in THOR SYSTEMS, INC. We would like to become an information resource for surge protection applications. THOR SYSTEMS offers products and services that provide protection from the more *obvious external* to the more *frequent internal* transient voltage sources.

#### Ref. Documents:

TSI 104	Site Survey: Problems & Audit Options
TSI 104-DS	Site Survey Documentation Sheet
TSI 100	Site Survey: A Roadmap to Reliability
TSI 0119	Site Risk Assessment Spreadsheet
3G TSr	Product Spec Sheet
3G TSn	Product Spec Sheet

Our consistent focus on improved product performance and increased value to the customer is conveyed by our products' transparent cover enclosures, showcasing the TILE Architecture, unique component configurations, and providing per mode status indication.

Should you have any questions, please feel free to contact us (804.355.1100) or visit our Web site, [www.ThorSystems.us](http://www.ThorSystems.us).