Supply Chain and Asset Traceability for Energy (SCATE)

P3476 Work Group

October 30, 2024
Transformers

P3476 SCATE

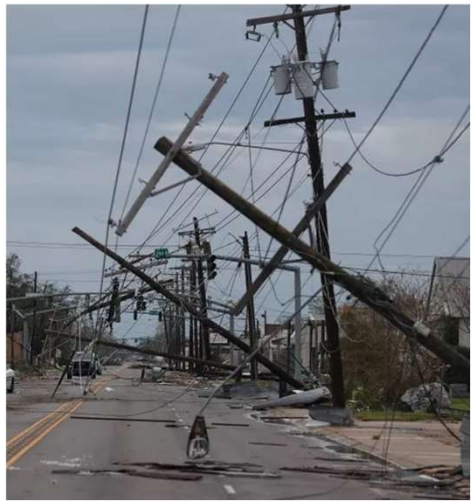
- Standard for Unique IDs and Smart Tags to transfer asset data from manufacturers to end-users in a digital, standardized format
  - Digital Thread
  - Digital Nameplate

- C57.12.35
  - Manufacturers, Serial Number, Date, Customer Catalog ID
  - Catalog ID may not include all critical attribute data

- P3476
  - Industry standard Catalog IDs with all critical attributes
  - Attributes embedded directly into Smart Tag (does not require look-up in another system)
  - Consistent across all asset types (not just transformers)

Use Cases

- Ordering
- Intake Verification
- Inventory Management
- Mutual Assistance
- Storm Restoration
- Digital As-Builting
- Populating Systems of Record (GIS/ERP)
  - Asset Management
  - Manufacturer Recalls
  - Performance Analytics
- End-of-Life: Disposal, Refurbishment, Recycling

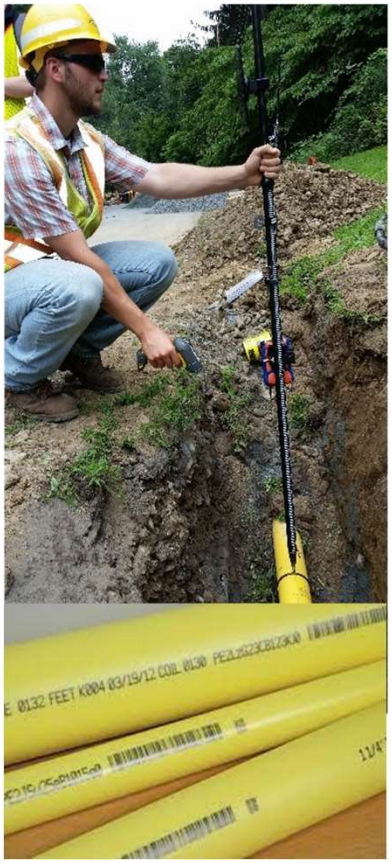


Success Stories from Natural Gas

- ASTM F2897 provides a traceability code for asset type, manufacturer, date, size, material, and lot code

- Use cases include:
  - Regulatory compliance
  - Digital as-builting
  - Material verification
  - Automated project close-out
  - Automated GIS updating

- Full industry adoption in five years



IEEE IC22-009 SCATE

- IEEE Industry Connections Program
- Year 1
  - Use cases
  - Asset types
  - SCATE Specification
  - Asset-specific work groups to develop data models
  - Implementation tests with manufacturers and utilities
- Year 2
  - Implementation
  - Pilots and tests
  - Guidelines and templates

IEEE P3476 Work Group

- Scope
  - Convert the SCATE Specification into a standard
  - Develop unique ID data models for each asset type

- Asset-specific subwork groups to develop the data models

Asset Types

- Energy Transformation Devices
- Interrupting Devices
- Switching Devices
- Relays
- Connectors
- Insulators
- Hardware
- Structures and Supports
- Conductors
- Surge Protection Devices
- Controls
- Communication Devices
- Measurement and Sensor Devices

Energy Transformation

Energy Transformation	Transformers	**Liquid-filled power and distribution**
		Dry-type power and distribution
		Instrument Transformers
		Station Service Transformer
		Voltage Regulators
		Specialty Transformers
	Capacitors	**Shunt Capacitors**
	Inverter	Inverter
		Static Compensators
	Rectifier	Rectifier
	Reactors	Air
		Liquid-filled

Liquid Filled Transformer Data Model

Asset Type
Asset Sub-type
Style
Construction Type
Number of Phases
Frequency
Rating
Temperature Rise
High Voltage Nameplate Rating
High Voltage BIL Rating
High Voltage BIL Rating - Neutral
Low Voltage Nameplate Rating
Low Voltage BIL Rating
Low Voltage BIL Rating - Neutral
Tertiary Voltage Nameplate Rating
Tertiary Voltage BIL Rating
High Voltage Winding Material
Low Voltage Winding Material
Tertiary Winding Material
De-energized Tap Rating
Polarity/Vector Group
Design Impedance
Cooling Class
Insulating Liquid
PCB Content
High Voltage Terminal Arrangement
High Voltage Line Terminal Type

Style	Number of Phases	Frequency	Rating	Temperature Rise	High Voltage Nameplate Rating	High Voltage BIL Rating	High Voltage BIL Rating - Neutral
Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
NA	NA	NA	NA	NA	NA	NA	NA
Other	Other	Other	Other	Other	Other	Other	Other
Overhead (IEEE C57.12.20)	1	60 Hz	0.5 kVA	55 C	120 kV	Permanently Grounded	Permanently Grounded
1Ph Padmount (IEEE C57.12.38)	2	50 Hz	1.0 kVA	65 C	120-600 kV	30 kV	30 kV
3Ph Padmount (IEEE C57.12.34)	3	50/60 Hz	1.5 kVA	55/65 C	208 kV	45 kV	45 kV
Network - Vault Type (IEEE C57.12.40)	Duplex		3 kVA	75 C	220 kV	60 kV	60 kV
Network - Subway Type (IEEE C57.12.40)			5 kVA	65/75 C	240 kV	75 kV	75 kV
1Ph Submersible (IEEE C57.12.23)			7 kVA		277 kV	95 kV	95 kV
3Ph Submersible (IEEE C57.12.24)			7.5 kVA		340 kV	110k kV	110k kV
Distribution Substation Unit-type (IEEE C57.12.36)			10 kVA		347 kV	125 kV	125 kV
Distribution Substation Station-type (IEEE C57.12.36)			15 kVA		380 kV	150 kV	150 kV

Energy Transformation Work Group

- Liquid-Filled
- Dry-Type
- Voltage Regulators
- Shunt Capacitors

Questions and Discussion