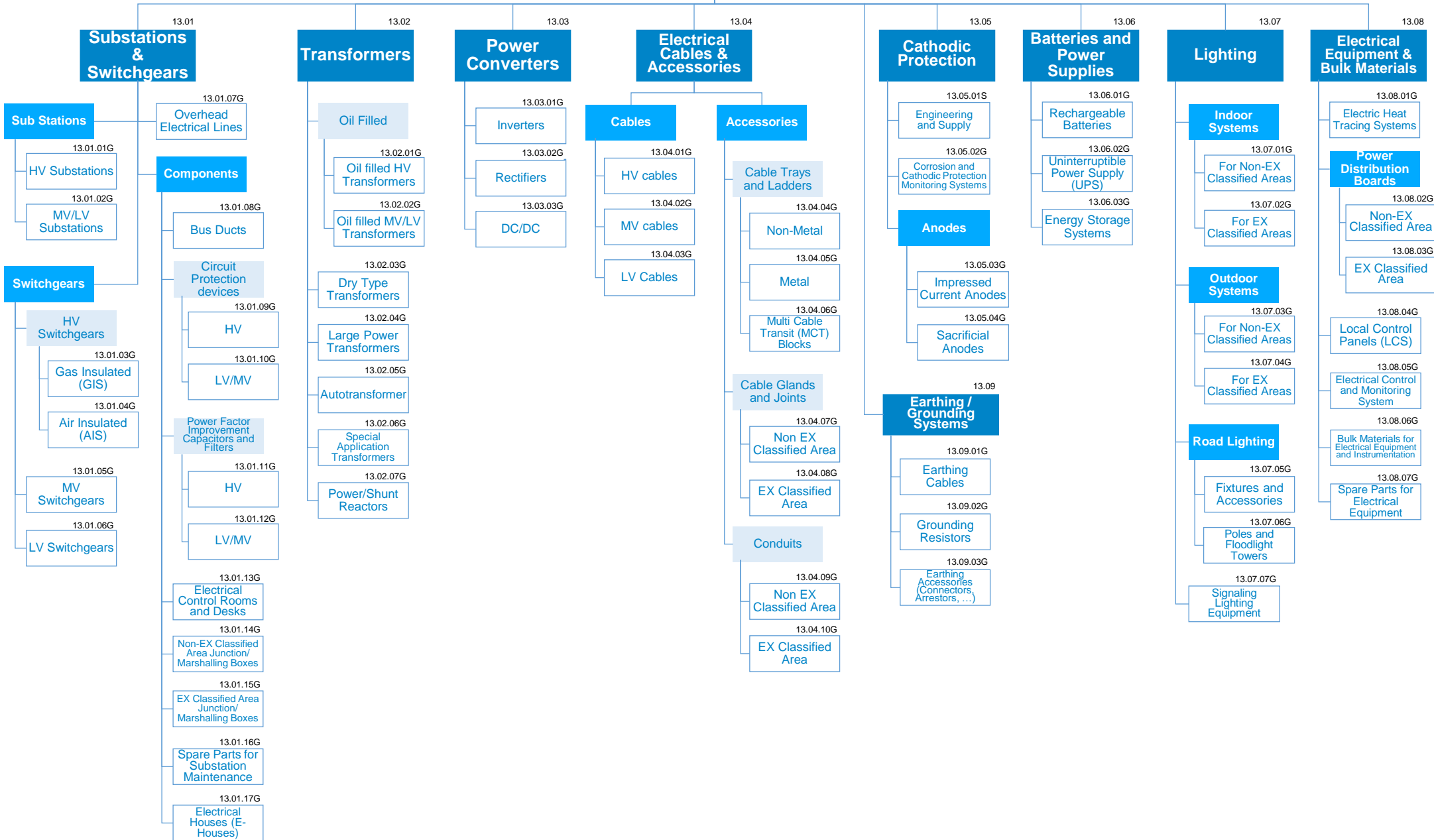


# Electrical Components and Systems



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The set of electrical and mechanical equipment needed for the transmission and use of electrical energy. This can be as simple as a light bulb connected to a battery or as complex as distribution systems that carry power from generating centers to intermediary stations who then feed the power out to plants and housing.

## MAIN RATIONALES BEHIND THE STANDARD CATEGORIZATION

### Substations & Switchgears

- A Substation is an indoor or outdoor location containing switchgears, transformers, bus ducts and protection equipment.
- Switchgears are the combination of electrical disconnect switches and fuse/circuit breaker used to manage and isolate a power supply system.
- Circuit Protection devices include all the methods of equipment protection and human safety. This category refers to fuses, circuit breakers and disconnectors – earthing systems are in family 13.09.
- Whenever HV is separated from MV or LV it is because of the different requirements specific power stations may have (High Voltage is intended as greater than 33KV)
- Switchboards are not included as a category since they can be considered a subset of Switchgears. Thus they would be listed under LV Switchgears.

### Transformers

- The rationale was to separate transformers based on type of insulation: Oil Filled (HV destined to primary distribution, LV destined to low voltage distribution) and Dry Type (air or resin).
- Large Transformers are mainly intended for HV power stations and interconnecting systems.
- Grounding resistors protect power transformers and generators from damaging fault currents.
- Power Reactors are not to be confused with transformers. While a Power Transformer is designed for efficient power transfer from one voltage system to another, a shunt reactor is intended only to consume reactive VARs.
- Special Application: includes furnace transformers, traction transformers and mobile transformers.

### Power Converters

- The rationale was to separate converters based on type of application:
- DC/AC Converters (Also Called Inverters)
- AC/DC Converters (Also called Rectifiers)
- DC/DC Converters (Also called DC transformers)

### Electrical Cables & Accessories

- Communication Cables can be found in the Instrumentation group as this group only concerns electrical components only.
- Subsea solutions have been separated due to their nature and specific skills required to install such systems.
- HV is intended as above 33KV, MV between 1KV and 33KV and LV up to 1KV
- Cable Glands are also known as fittings since they are a device designed to attach and secure the cable to the equipment.
- EX classified areas refers to places with specific requirements due to potential hazards. Therefore, this equipment must be thoroughly tested to ensure it does not trigger any dangerous events (e.g. explosions).
- Industrial type refers to generic use for any industry.

### Cathodic Protection

- Cathodic protection refers to the technique used to reduce the corrosion of a metal surface.
- 13.05.01G is intended as a full supply. Basically a, complete ready to use protection system (including anodes, rectifier etc.)

### Batteries and Power Supplies

- These are used in industrial applications where readily available energy is needed but might not always be available.
- UPS differ from Emergency generators in that they can provide almost instantaneous protection from power interruptions since they supply energy stored in batteries. This category includes both general purpose and specific application systems (e.g. Marine UPS, which need to be resilient to elevated levels of vibration).
- Energy storage systems are a full integrated turnkey solution, typically contained in a metal jacket.

### Lighting

- The rationale is to divide systems based on the type of usage: industrial (indoor and outdoor) and road.
- The further distinction between EX classified areas and generic industrial use was made due to the specific needs of the former areas.

### Electrical Equipment & Bulk Materials

- Electrical heat tracing systems are used to maintain or raise the temperature of an object (usually a pipe or a vessel). Turnkey kits have to be distinguished from simple cables that wrap around the object to heat.
- Spare parts include everything might be needed as a replacement in an electrical system (e.g. switches, plugs, etc.)
- 13.08.06G includes all bulk materials used for construction and assembly of electrical equipment and instrumentation.

### Earthing / Grounding Systems

- This Family is similar to Circuit Protection devices. The distinction to be made is that here the categories include full systems and are specifically for earthing and grounding purposes and therefore include all surge and lightning arrestors and bonding systems as well.