

### Purpose of This Checklist

This checklist captures the engineering data needed to perform Protection Device Coordination Studies, ensuring accurate fault analysis, reliable protection design, and full system security.

- Estimates are acceptable note them as 'approx.'
- Attach existing SLD, relay setting files, or test reports.
- Partial data is useful our engineers will follow up on gaps.

### Project / Contact Details

Company / Organization: \_\_\_\_\_

Project Name : \_\_\_\_\_

Site / Facility Name: \_\_\_\_\_

Contact Name & Role : \_\_\_\_\_

Email Address : \_\_\_\_\_

Phone Number: \_\_\_\_\_

Date Submitted: \_\_\_\_\_

## A. SYSTEM OVERVIEW & NETWORK CONFIGURATION

<b>System Type</b>	<i>Industrial / Utility / Renewable / Hybrid</i>	<b>Applicable Standards</b>	<i>IEC / IEEE / Utility-specific / All</i>
<b>Voltage Levels in Network</b>	<i>e.g. 132 kV / 33 kV / 11 kV / 415 V</i>	<b>Earthing / Grounding Philosophy</b>	<i>Solid / Resistance / Unearthed / Petersen coil</i>
<b>Network Configuration</b>	<i>Radial / Ring / Meshed / Mixed</i>	<b>Is Latest SLD Available?</b>	<i>Yes, attach / Partial / No</i>
<b>Known System Issues / Constraints</b>	<i>e.g. Known protection gaps, recurring faults, planned expansion, grid interface restrictions...</i>		

## B. GRID / UTILITY FAULT DATA (Point of Common Coupling, PCC)

<b>Maximum Fault Level at PCC</b>	<i>e.g. 25 kA / 500 MVA (all sources connected)</i>	<b>Minimum Fault Level at PCC</b>	<i>e.g. 10 kA (weak grid / reduced generation)</i>
<b>X/R Ratio at PCC</b>	<i>e.g. 10 (from utility, affects DC offset)</i>	<b>Grid Grounding at PCC</b>	<i>Solid / Resistance / Unearthed</i>
<b>Utility Protection Interface Requirements</b>	<i>e.g. Anti-islanding, DTT, ROCOF, Vector shift</i>	<b>Fault Level Contribution (kA)</b>	<i>Positive / zero sequence if available</i>

## C. EQUIPMENT ELECTRICAL PARAMETERS

### Transformers

Tag / ID	Rating (MVA/kVA)	Voltage Ratio	% Impedance	Vector Group	Z0 / Grounding
<i>e.g. TR-01</i>	<i>10 MVA</i>	<i>33/11 kV</i>	<i>10%</i>	<i>Dyn11</i>	<i>Solid earth</i>

### Generators / DG Sets / Inverter-Based Sources (IBR)

Tag / ID	Rating (MVA/kW)	Type	X"d / X'd	Neutral Grounding	Fault Contribution
<i>e.g. GEN-01</i>	<i>5 MVA</i>	<i>Sync / Async / IBR</i>	<i>0.15 / 0.25 pu</i>	<i>Resistance earthed</i>	<i>Confirmed / Estimated</i>

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**Motors**

Motor ratings & locations	Sub-transient reactance X"d (if known)	Starting method	Neutral grounding
e.g. 630 kW MV motor, Compressor A	e.g. 0.17 pu from datasheet	DOL / Soft starter / VFD	e.g. Resistance / Solid / Unearthed

**D. CABLE & NETWORK IMPEDANCE DATA**

Positive, negative, and zero-sequence impedances are all required for accurate earth fault and SLG fault calculations. Zero-sequence data is frequently overlooked.

Cable / Feeder ID	From → To	Type & Size	Length (m)	R1 / X1 (Ω/km)	R0 / X0 (Ω/km)
e.g. CB-01	Bus-A → TR-01 LV	XLPE 3x185mm <sup>2</sup>	350 m	0.099 / 0.08	0.31 / 0.25

**E. BUSBAR & SWITCHGEAR RATINGS**

Bus / Panel ID	Voltage Level	Bus Rating (A)	SC Withstand (kA)	CB Breaking (kA)	CB Making (kA pk)
e.g. MV-BUS-01	11 kV	1250 A	25 kA / 1 s	25 kA	63 kA

<b>Fuse details (if applicable)</b>	Rating, type, manufacturer, time-current curve ref	<b>Existing fault level utilization (%)</b>	e.g. 18 kA of 25 kA capacity = 72%
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**F. PROTECTION SYSTEM DETAILS**

**Protection Relays**

Relay Tag	Make & Model	Protection Functions	Location / Panel	Existing Settings?	Comms / Protocol
e.g. R-01	SEL-751 / GE P14D	OCR, EFR, O/V, U/V	Feeder CB-01	Yes attach file	IEC 61850 / Modbus

**Current & Voltage Transformers (CT / VT)**

CT/VT Tag	Location	Ratio	Class	Burden (VA)	Knee Point / ALF
e.g. CT-01	Feeder CB-01	200/1 A	5P20	15 VA	e.g. Vk = 180 V / ALF 20

<b>Auto-reclosing schemes in use?</b>	Yes describe / No	<b>Interlocking / busbar protection?</b>	Yes describe / No
<b>Load shedding scheme?</b>	Yes describe / No	<b>Backup protection philosophy</b>	e.g. Time-graded IDMT / Definite time
<b>Special protection requirements or constraints</b>	e.g. Selectivity requirements, utility interface relay, arc flash limitation, protection for renewable source...		

**G. FAULT SCENARIOS, INSULATION & THERMAL DATA**

**Fault Study Scenarios Required tick all applicable**

- 3-Phase symmetrical fault (all busbars)
- Line-to-Line (LL) fault
- Near-end feeder faults
- Transformer terminal faults (HV & LV)
- Minimum fault condition (weak grid / DG OFF)
- Islanded operation fault scenarios
- Single Line-to-Ground (SLG) fault
- Double Line-to-Ground (DLG) fault
- Far-end feeder faults
- Maximum fault condition (all sources ON)
- N-1 contingency (transformer / feeder outage)
- Motor starting voltage drop / fault contribution

**Insulation Coordination**

<b>Equipment BIL (Basic Insulation Level)</b>	e.g. 95 kV BIL for 11 kV equipment	<b>Lightning Impulse Withstand (kVp)</b>	e.g. 95 kV from equipment test cert
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<b>Switching Impulse Withstand (kVp)</b>	<i>e.g. 250 kV (for HV systems)</i>	<b>System Maximum Overvoltage (pu)</b>	<i>e.g. 1.4 pu temporary / 1.7 pu transient</i>
<b>Surge Arrester Ratings &amp; Locations</b>	<i>e.g. 10 kV MCOV at HV transformer terminals</i>	<b>Arrester Manufacturer / Model</b>	<i>e.g. ABB PEXLIM / Siemens 3EP</i>

**Thermal & RMS Withstand**

<b>Cable short circuit withstand (I<sup>2</sup>t)</b>	<i>e.g. from cable datasheet, 185mm<sup>2</sup> XLPE</i>	<b>Maximum fault clearing time allowed</b>	<i>e.g. 0.5 s (protection must clear within this)</i>
<b>Transformer damage curves available?</b>	<i>Yes, attach ANSI / IEC curve / No</i>	<b>Motor thermal damage curves available?</b>	<i>Yes, attach / No / Not applicable</i>

**H. EXISTING DATA, SITE HISTORY & STUDY OBJECTIVES**

**Documents & Data Available:**

- Single Line Diagram (SLD) with protection devices
- Previous short circuit / protection study report
- CT / VT test records or excitation curves
- Generator / DG datasheets (reactance values)
- Arc flash study (if previously performed)
- Equipment nameplate photographs
- Relay setting files (\*.rcp, \*.iid, \*.cfg, etc.)
- Transformer test certificates (impedance confirmed)
- Cable schedule with impedance data
- Fault / tripping history or event logs
- Utility interconnection agreement / requirements
- SCADA / DCS fault record exports

<b>Known system issues / fault history</b>	<i>e.g. Repeated nuisance tripping on feeder 3, upstream CB failing to clear, discrimination issue on LV board...</i>
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**Study Objectives**

- Short circuit fault level calculation at all buses
- Selectivity / discrimination verification
- Earth fault protection design (SLG/DLG)
- Insulation coordination & surge arrester selection
- Grid code / utility compliance verification
- Arc flash assessment (IEEE 1584 / IEC 62271)
- Protection relay setting calculation & coordination
- Equipment protection adequacy check (SC rating vs fault level)
- Differential / distance protection setting
- RMS / transient overvoltage study
- Protection for renewable / inverter-based generation
- Other, describe below

<b>Specific compliance or utility requirement</b>	<i>e.g. DNO requires protection study before grid connection, utility has issued notice, permit/approval needed...</i>
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<b>Project completion timeline</b>	<i>e.g. Grid connection approval needed by June / No fixed deadline</i>
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<p><b>COMPANY NAME</b></p> <p>Full Name: _____</p> <p>Designation: _____</p> <p>Signature: _____</p> <p>Date: _____</p>	<p><b>What Happens Next</b></p> <p>Our engineer will review your form shortly and contact you.</p>
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