

	INTERCONNECTING LARGE 2–20MW GENERATION SYSTEMS		094680
	Asset Type: Electric Transmission and Distribution	Function: Design, Estimating, and Planning	
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Rev. #00: This document replaces PG&E Document TD 2306B-001, Rev. #01. For a description of the changes, see Page 2.			

Purpose and Scope

This document provides criteria to the [Distribution Interconnection Handbook](#) (DIH) to address for interconnecting larger generation, in the 2 – 20 Mega Watt (MW) range, at distribution voltages. This document also discusses the applicability and the allowable restart timing and ramp rates. This document applies to all technologies and for all exporting generating facilities.

1. Utilize the information contained in this document, including but not limited to the following functions: performing studies, planning, protection, design engineering, operations, mapping, and testing.
2. Circuit back-tie consideration: For special consideration of generating during a back-tie circuit configuration (emergency switching), any required transfer trip protection would have to also be on the back-tie circuit. Also, any planning considerations (voltage regulations) would also have to be met by the back-tie.
3. Circuit capability limits: Limiting generation size per circuit to PG&E-standard equipment capabilities of 12MW at 12 kV and 20MW at 21 kV.
4. Dedicated circuits: Dedicated circuits for the larger generator sites have been instituted. Dedicated circuits to be owned by PG&E (can be built by developer per utility standards though). Therefore, the Point of Ownership Change (also referred to as Point of Common Coupling) is at the generator site and the Point of Interconnection (POI) is where the Interconnection Facilities meet with the Distribution System as defined in Attachment I of PG&E's Wholesale Distribution Tariff.
5. Direct Transfer Trip (DTT) communication requirements: DTT may be required when the proposed generation cannot detect a Ground or Phase fault on the line section when separated from the PG&E system within 1.5–2.0 seconds or cannot detect an island condition and trip within 2.0 seconds. Refer to PG&E document, 094681 Distributed Generation Protection Requirements for additional protection requirements.
6. Minimum load: A standard methodology has been developed to calculate minimum load in reference to generation and is included in the System Impact Study (SIS) template.
7. Monitoring true load: Substation metering schemes must be designed to provide monitoring of true loading on circuits and transformers (planning visibility).
8. Overload not allowed on equipment: Special protection (operating) tripping schemes are not allowed, which could provide more flexible (hourly) transformer loading (overload tripping schemes are historically never utilized on transformers).
9. Ramp rate for inverter: SET the inverter ramp rate to 10% per second, or less.
10. Restart timing for multiple inverters: SET the restart timing for inverters no less than 15 seconds for each 1 MW block, to ease possible power quality impacts.
11. RTU needs for status points: Having multiple transfer trips on one circuit due to multiple, separate PCCs may complicate the status requirements of typical industry equipment (requiring additional RTUs)
12. Threshold methodology for 15% peak load: Peak load is monitored and recorded by PG&E for all distribution circuits. The minimum load hasn't traditionally been monitored, yet has been made available in recent years on a few installations via remote metering. Minimum load on radial circuits is typically 30% of the peak load. The data sampling period should be at least one year and represent typical system loading conditions.

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13. Islanding becomes a power quality and protection concern when the maximum aggregate generation on a radial distribution circuit approaches 50% of the minimum load. Therefore, planning engineers use a 15% of peak load screen (50% of 30%) to quickly identify if the interconnection request poses a potential islanding and power quality concern. If the interconnection request and aggregated generation exceed 15% of peak load, PG&E can re-evaluate this screen using minimum load if available as opposed to peak load. Failing this screen a second time would indicate that further study is necessary and special protection requirements may result to allow the interconnection.
14. Tripping generation automatically under loss of communication: Defined that any loss of communication (for 10 seconds) on singular transfer trip signals (no redundancy) requires immediate tripping of generation (i.e. cannot guarantee anti-islanding under loss of communication).
15. Underfrequency concerns: Avoid interconnecting to existing underfrequency load-shed (UFLS) blocks; this prevents tripping significant generation along with load.
16. Voltage flicker concerns: Any dramatic change in current will cause a dramatic change in voltage. This can occur whenever the generator main breaker opens, or during clouding. Flicker is limited to 2 volts (2.5%) on 120V base in urban areas or 5 volts (4.17%) on a 120V base in rural areas.

References	Location	Document
Distributed Generation Protection Requirements		094681
Functionally Equivalent Non-Import Configuration Testing Requirements		094682
Mitigating Substation Power Transformer Overloads Due to PV and BESS		094685
Distribution Interconnection Handbook (DIH)	DIH	TD-2306M
Transmission Interconnection Handbook	TIH	TD-1013M

Revision Notes

Revision 00 has the following changes:

1. Converted TD-2306B-001 to this numbered engineering document.
2. Removed old or unnecessary information.