Australian BUSINESS COUNCIL FOR SUSTAINABLE ENERGY

Stand-alone POWER SYSTEM

(Small Wind Systems)

SYSTEM INSTALLATION GUIDELINES

Australian Business Council for Sustainable Energy

These guidelines provide a brief summary of the main considerations in the installation of SPS incorporating small wind energy systems (< 10kW). Design and Installation must comply with AS 4509 and AS 4086. Refer to the BCSE SPS (Small Wind Systems) Design Guideline for design information.

GENERAL

The performance of a reliable installation that will meet customer requirements needs both careful design and correct installation practice. Conformance to relevant State Health and Safety regulations is necessary.

STANDARDS

Reference to the following standards is required :

AS/NZS 3000	Wiring Rules
AS 4509	Stand-alone Power Systems
AS 4086.2	Secondary batteries for stand-alone power supplies - Installation and Maintenance.
AS 1768	Lightning Protection
AS 3010.1	Electrical Installations - Supply by I.C. Generating set
AS 1359.109	Rotating electrical machines - General requirements. Noise level limits
AS/NZS 6808	Acoustics - The assessment and measurement of sound from wind turbine generators.
AS 1170.2	Minimum design loads on structures - Wind Loads
AS 1319	Safety signs for the occupational environment

DOCUMENTATION

Stand-alone Power Systems (SPS), like any other complex systems require a User Manual for the customer. Documentation should cover :

- Shutdown and isolation procedure for emergency and maintenance. [Supply signs]
- List of equipment supplied.
- System performance estimate/ guarantee.
- Operating instructions – system and components.
- Commissioning records and installation checklist.
- Warranty information – system and component.
- System connection diagram. Cable locations.
- Equipment manufacturers documentation and handbooks for all equipment supplied.
- Maintenance procedure and timetable.
- Battery record logbook.
- Generating set service logbook.

… from AS 4509.3 SPS Installation and maintenance

Also refer to BCSE SPS Inspection checklist.

These guidelines have been developed by the Australian Business Council for Sustainable Energy
They represent latest industry BEST PRACTICE for the design and installation of Stand-alone Supply Systems.

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WIND ENERGY CONVERSION SYSTEMS

GENERAL

All Wind Energy Conversion System (WECS) structures should be constructed to appropriate local statutory requirements and standards to minimise environmental impacts in respect to vegetation, soil erosion, bird-life, noise and vibration and aesthetic appearance.

For guidelines relating to WECS siting, sizing and selection and lighting protection, refer to ***BCSE Stand-alone Power System (Small Wind Systems) System Design Guidelines.***

WECS INSTALLATION

refer to AS 4509.3

- Footings should be installed by a competent person
- Installation, raising and lowering of the tower and wind turbine fitting should be supervised by a licensed rigger in accordance with manufacturer's instructions.
- Guys should be mechanically protected with high visibility conduit or similar to a height of 2m, to prevent personal injury: AS 4509.1.
- Safety equipment should be used.
- All moving parts should be secured and risk of a turbine suddenly yawing while being manoeuvred or lowered, must be considered.

TESTING and COMMISSIONING

refer to AS 4509.3.

- Check wiring for continuity and shorts.
- Check wiring polarity of generating source(s).
- Check to see that colour coding in multi phase is correct
- Check that earthing and shield connections are low impedance
- Check WECS operation according to manufacturer instruction.
- Connect main battery bank fuse(s)
- Record initial operating parameters for future reference.
- Check overall function of complete system.

MAINTENANCE

- Make the system 'safe', following the shutdown procedures of AS 4509.1 section 4.

Caution :Some WECS regulators require a load whilst the wind turbine is operating i.e. stop the wind turbine before disconnecting the battery.

- Check blades for leading edge wear and replace edge tap if required.
- Check blades for stress or fatigue cracks, UV deterioration.
- Check blade balance
- Wind turbines have a variety of braking systems; these must be well maintained and operable in the event of extreme weather conditions and during routine maintenance.
- Make sure the brake linings have plenty of travel left.
- Look for fatigue, rust, loose bolts, frayed cables, seized parts, and vermin.
- Listen for dry bearings, lash in furling mechanisms and any creaks in the structure.

BATTERY INSTALLATION

Installation of ELV battery banks must be in accordance with AS 4086.2
Secondary batteries for stand-alone power supplies
also refer to AS 2676 - Installation Guidelines
and AS3011 - LV battery banks, where necessary.

LICENCING

EXTRA LOW VOLTAGE (ELV)
All extra low voltage wiring must be performed by a 'competent' person, as defined by
AS 4509.1 Stand-alone Power Systems
- Part 1: Safety requirements

One of the qualifications that are an indication of competence in the SPS field is BCSE Accreditation

LOW VOLTAGE (LV)
All Low Voltage work (240V) must be performed by a licenced electrical worker.

These guidelines alone do not constitute a set of rules and are to be read in conjunction with all relevant Australian Standards

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INSTALLATION CHECKLIST

- Wind resource suitable ☐
- Wind turbine location optimised ☐
- Suitable wind turbine chosen ☐
- Turbine hub height appropriately selected ☐
- Tower is suitable and AS1170.2 compliant ☐
- Tower is securely mounted on appropriately chosen and competently installed footings ☐
- Guy wires are easily visible and adequately anchored and protected to 2m. ☐
- Appropriate fastenings have been used ☐
- Ease of maintenance has been considered ☐
- Lightning protection device(s) installed ☐
- Cabling is suitable and appropriately protected from UV and mechanical damage ☐
- WECS regulator is suitably rated and does not interact with other regulators ☐
- System is properly configured ☐
- Polarities are correct ☐
- Wiring is protected by appropriate circuit breakers or fuses ☐
- Noise levels are acceptable ☐
- Turbine braking / locking devices operational ☐
- Operation & Maintenance Manuals supplied ☐
- Painting, rust-proofing and greasing is complete ☐

BATTERY INSTALLATION

- Battery installation complies with the requirements of AS 4086 ☐

SAFETY

- Installation complies with AS/NZS 3000 ☐
- Safety signage complies with the requirements of AS 4509 ☐
- Other safety apparatus outlined in these guidelines has been supplied ☐

EXTRA LOW VOLTAGE CABLING

- Cabling is sized to minimise losses in accordance with these guidelines ☐
- All sub-circuits are protected by appropriate fuses or circuit breakers ☐
- All links and joiners are appropriately sized and multi-strand cable is correctly terminated. ☐

240 VOLT (LV) INSTALLATION

- All Low Voltage wiring has been installed by a qualified electrical tradesperson ☐

SPS Inspection checklist has been completed ☐

AUTHORISATION :

I, ……

BCSE Accreditation number ……
verify that the following system has been installed to the standard indicated by these guidelines and complies with the relevant Australian Standards.

Name of the person for whom the system was installed
……

System location……

Signed……

Date : / / .

(Attach a separate sheet detailing any departures)