SA Water

Date: 28 February 2019

Our Ref: SN907

Mr Michael Brown MP
Member for Playford
Unit 1, 3 Wilkinson Road
PARA HILLS SA 5096

Via email: playford@parliament.sa.gov.au

Dear Mr Brown

**Freedom of Information – Internal Review Determination**

I refer to your internal review application made under the *Freedom of Information Act, 1991* ("the Act") received by SA Water on 15 February 2019, seeking a review of SA Water's determination made in response to your request for:

> *"All documents (including but not limited to reports, briefings, emails, notes, minutes, plans and other documents) mentioning or related to Tindo Solar."*

In my capacity of Principal Officer, I wish to advise that the original determination, which refused you access to two documents pursuant to section 20 of the Act, has been varied. Following a review of the discovered documents and in consultation with relevant third parties, I have determined to provide you with partial access to these documents.

Section 20 of the Act provides that an agency may refuse access to sections of a document if the information is considered exempt pursuant to the provisions listed under Schedule 1 to the Act (Exempt documents). The sections of the documents which I consider exempt and the reasons for the exemption are explained in more detail below.

Clause 7(1)(b) of Schedule 1 to the Act states that:

**7—Documents affecting business affairs**

*(1) A document is an exempt document—*

...

*(b) if it contains matter—*

*(i) consisting of information (other than trade secrets) that has a commercial value to any agency or any other person; and*

*(ii) the disclosure of which—*

*(A) could reasonably be expected to destroy or diminish the commercial value of the information; and*

*(B) would, on balance, be contrary to the public interest*

I have determined that sections of documents 1 and 2 are exempt pursuant to clause 7(1)(b) of Schedule 1 to the Act.

Document 1 and 2 are tender submissions from CPS National and ITP Renewables in relation to a UV disinfection plant located in the remote community of Murputja. These documents contain material of highly commercial value, such as the project and delivery methodology and pricing structures designed to win the project contract. Given the unrestricted access that is afforded to a document determined for release under the Act, it is my opinion that disclosure of this information would diminish the value of the information and would compromise their business position in the market place in what is a highly competitive industry.

Clause 7(1)(b) requires that I consider the balance of public interest factors when determining the release of this information. I have weighed the public interest factors in favour of disclosure, including the public interest in the ability to scrutinise SA Water's tender process. However, in my view, this is outweighed by the detrimental effect disclosure would have on the competitiveness of these businesses. It is in the public's interest for SA Water to support competitive industries, not undermine them, resulting in fair and balanced tender submissions when securing value for money services. It is for this reason that I consider disclosure of sections of documents 1 and 2 is, on balance, contrary to the public interest.

If you are unhappy with this determination you are entitled to exercise your rights of external review by submitting a request to the South Australian Ombudsman. Alternatively, you can apply to the South Australian Civil and Administrative Tribunal (SACAT). If you wish to seek a review, you must do so within 30 calendar days of receiving this internal review determination. For more information about seeking a review, please contact the Ombudsman's Office on telephone (08) 8226 8699 or SACAT on 1800 723 767.

In accordance with the requirements of the Premier and Cabinet Circular PC045, details of your FOI application, a copy of this notice of determination, a schedule of documents and the documents to which you have been given access, will be published on the SA Water website FOI disclosure log. A copy of PC045 can be found at http://dpc.sa.gov.au/what-we-do/services-for-government/premier-and-cabinet-circulars.

Should you require any further information please contact the SA Water FOI Officer, Mr Ben Roberts on telephone (08) 7424 1777 or email freedomofinformation@sawater.com.au

Yours sincerely

Roch Cheroux
**PRINCIPAL OFFICER**

1.

ITP
Renewables
Consulting | Engineering | Implementation

# TECHNICAL PROPOSAL

## SA Water Murputja Reneweable Energy Supply

## Schedule H

December 2018

## About ITP Renewables

The ITP Energised Group, established in 1981, specialise in renewable energy, energy efficiency and carbon markets consulting, engineering and implementation. The Group has offices and their projects have covered over 100 countries throughout the world.

ITP Renewables (ITP) was established in Australia in 2003 and has undertaken a wide range of projects, including designing and installing grid-connected renewable power systems, providing advice for government policy, feasibility studies for large, off-grid power systems, developing micro-finance models for community-owned power systems in developing countries and modelling large-scale power systems.

The staff at ITP have backgrounds in renewable energy and energy efficiency, research, development and implementation, managing and reviewing government incentive programs, high level policy analysis and research, engineering design and project management.

# Document Control Record

## Document prepared by:

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| Document Control | | | | | |
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| Proposal title | Click here to enter text. | | | | |
| Client RfQ No. | | ITP Proposal Number | 18076 | | |
| File path | G:\Work\1Proposals\2018\18076 SAW Murputja RE Project\Proposal | | | | |
| Client | SA Water | Client Contact | | | |
| Rev | Date | Status | Author/s | Project Manager | Approved |
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A person or organisation choosing to use documents prepared by ITP Renewables accepts the following:

a) Conclusions and figures presented in draft documents are subject to change. ITP Renewables accepts no responsibility for their use outside of the original report.
b) The document is only to be used for purposes explicitly agreed to by ITP Renewables.
c) All responsibility and risks associated with the use of this report lie with the person or organisation who chooses to use it.

# COVER LETTER

JAKE ROE
Category Officer
SA Water Corporation

Dear Jake Roe,

Thank you for the opportunity to submit a tender for the SA Water off-grid power generation system at Murputja, South Australia.

Clause 7 (1) (b) - Business Affairs

[redacted]

Yours sincerely,

Clara Mazzone
Managing Director

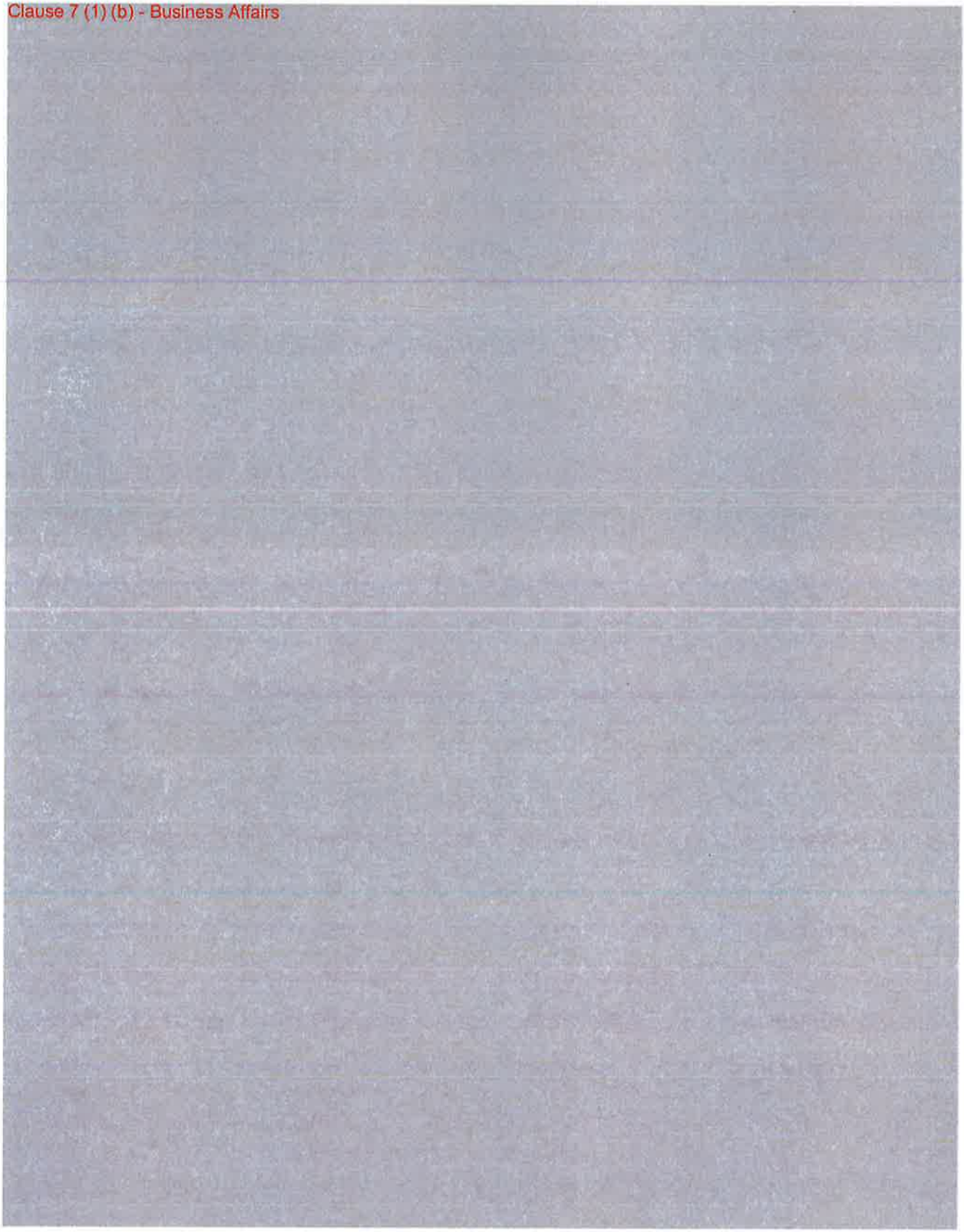
# LIST OF ABBREVIATIONS

| | |
|---|---|
| ARENA | Australian Renewable Energy Agency |
| DA | Development application |
| DB | Distribution board |
| DC | Direct current |
| EPC | Engineering Procurement and Construction |
| $I_{sc}$ | Short circuit current |
| kW/MW | Kilowatt/megawatt, unit of power |
| kWp | Kilowatt-peak, unit of power for PV panels tested at STC, rated output |
| ITP | ITP Renewables |
| MCB | Miniature circuit breaker |
| MCCB | Moulded case circuit breaker |
| MSQA | Management, Surveillance and Quality Assurance |
| PV | Photovoltaic |
| QA | Quality Assurance |
| STC | Small-scale technology certificate |
| UV | Ultraviolet (radiation) |
| $V_{oc}$ | Open circuit voltage |
| WHSE | Work Health, Safety and Environment |

# TABLE OF CONTENTS

Clause 7 (1) (b) - Business Affairs

Clause 7 (1) (b) - Business Affairs



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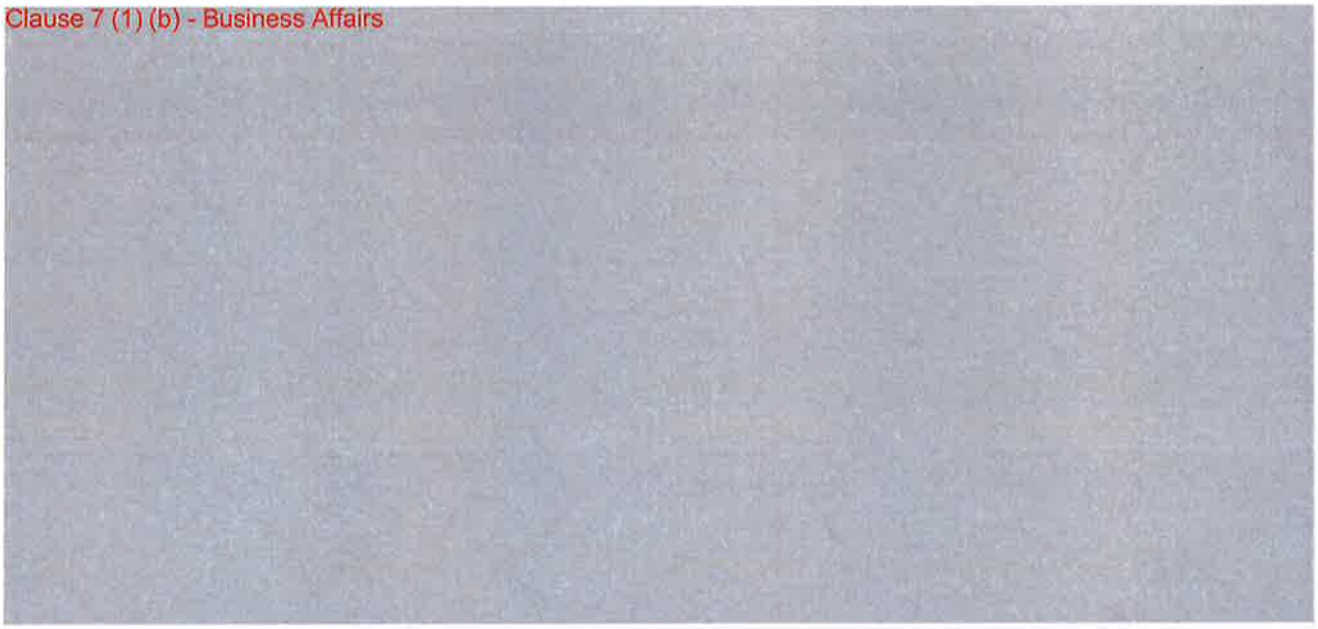

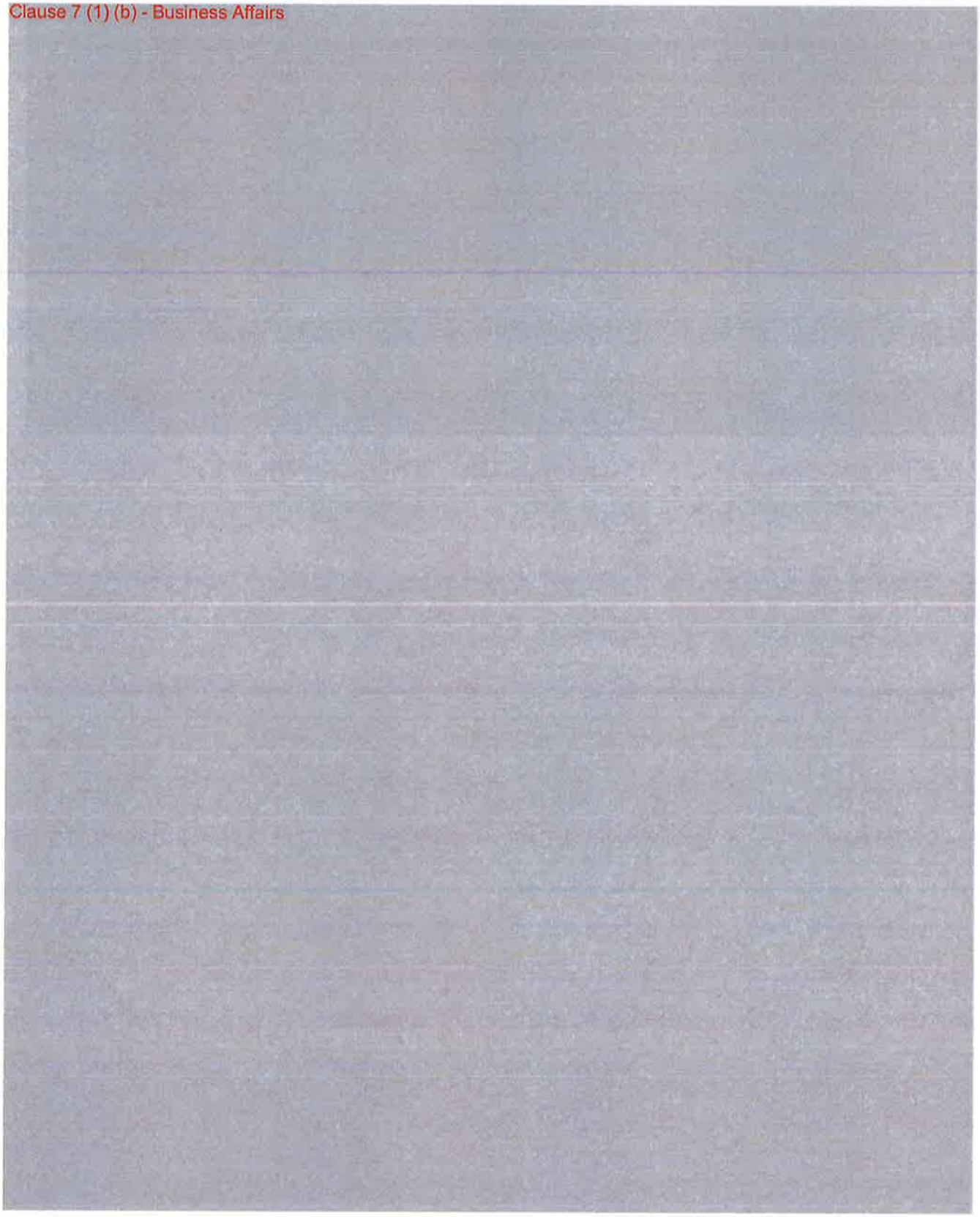
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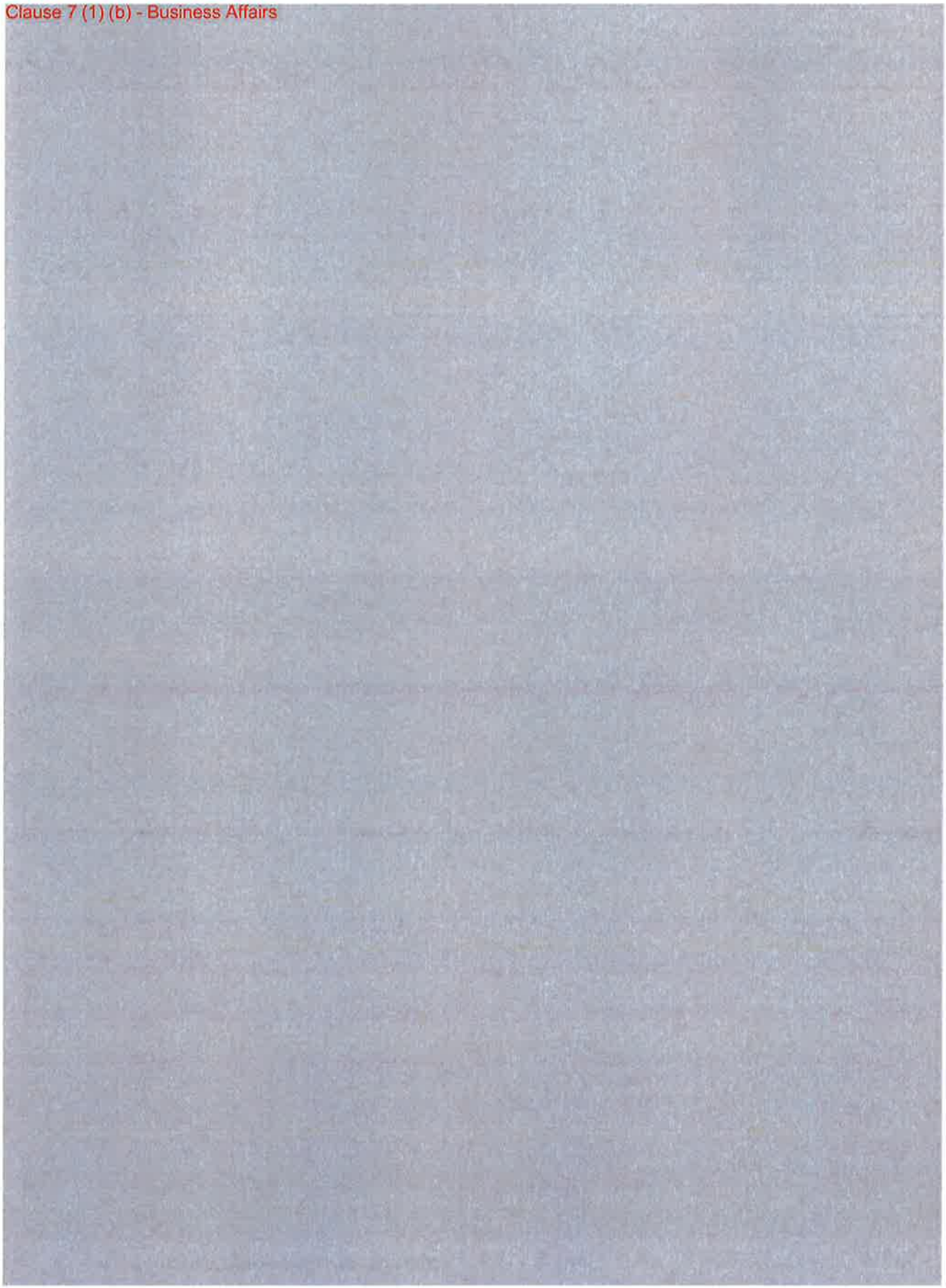
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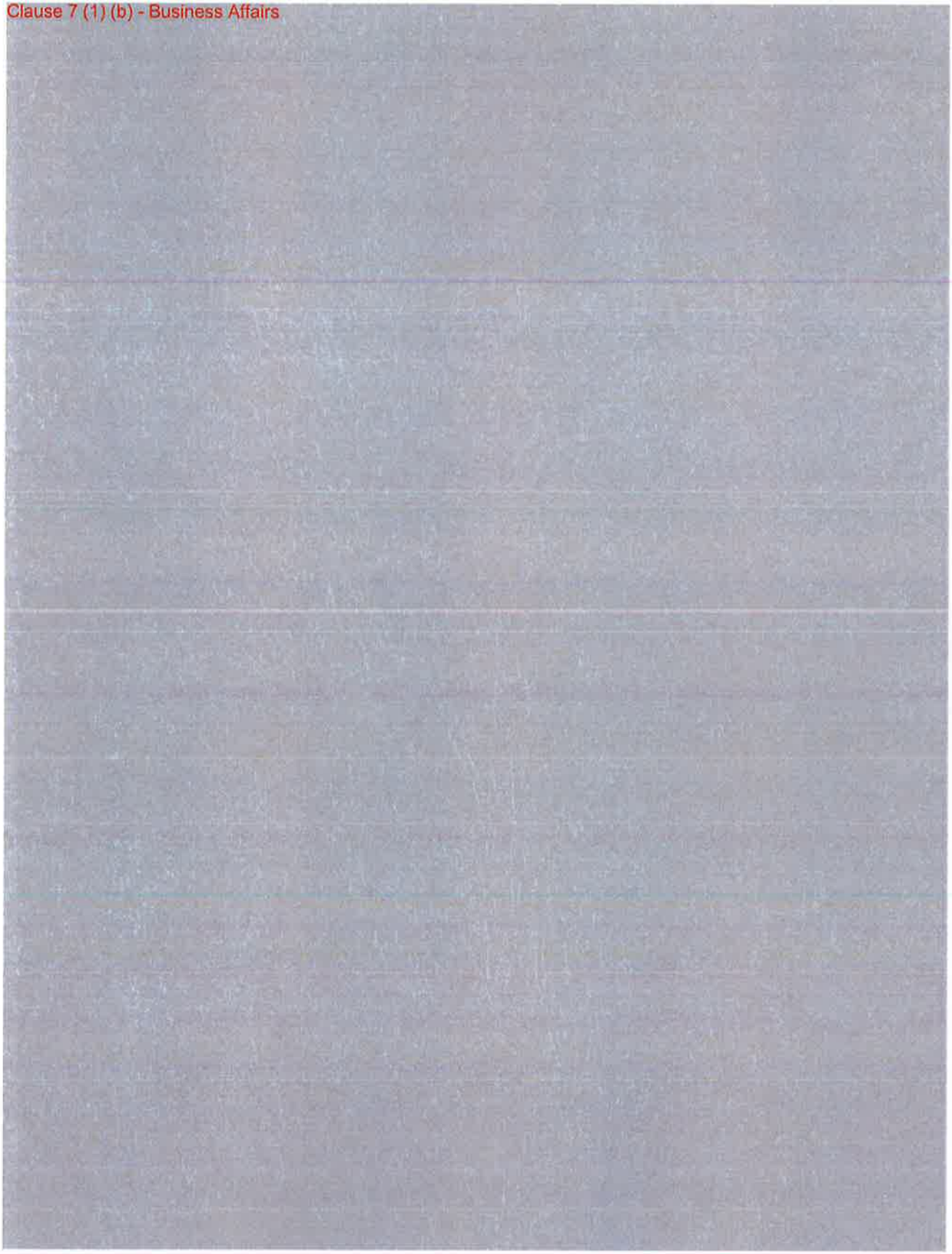

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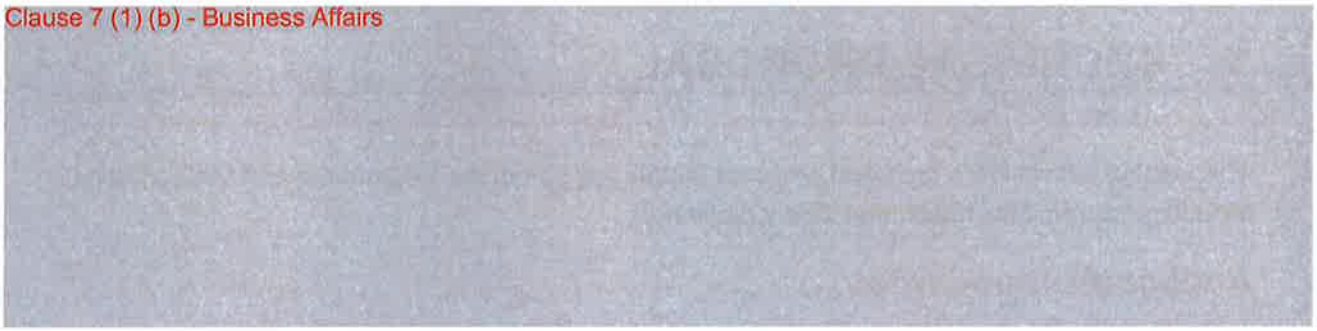

# 3. TECHNICAL PROPOSAL

This section details ITP's technical proposal and all aspects of the programme and methodology, including occupational health and safety planning.

## Applicable Standards

The system is to be installed in accordance with the following standards:

- AS/NZS 3000:2007 – Wiring Rules
- AS/NZS 3008:2009 –Selection of Cables
- AS/NZS 5033:2014 – Installation & Safety Requirements for Photovoltaic (PV) Arrays
- AS/NZS 4777.1:2016 – Grid-connection of Energy Systems via Inverters: Installation Requirements
- AS/NZS 4777.2:2015 – Grid-connection of Energy Systems via Inverters: Inverter Requirements
- AS/NZS 1170 – Structural Design Actions
- AS 60529 – Degrees of Protection Provided by Enclosures (IP Code)
- AS/NZS 3947 – Low Voltage Switchgear & Control gear
- AS/NZS 3439 – Low Voltage Switchgear & Control gear Assemblies
- AS/NZS 1768 – Lightning Protection
- Clean Energy Council Design & Installation Guidelines for 30kW to 100kW Systems and battery systems.
- TS 1a – Surface Preparation and Protection of Steelwork Using an Inorganic Zinc silicate Coating
- TS13 – Surface Preparation and Protection of Steelwork Using Solventless Ultra High Build Epoxy
- TS 30a – Welding Specification – Welding & Welding Procedure Qualification
- TS 79 – The Supply and Installation of Low Voltage Electrical Equipment
- TS80 – The Design Supply and Installation of a Solar Power Supply System
- TS 95 – Engineering Drawing Deliverable Requirements
- TS151 – Requirements for the Provision and Presentation of Operating and Maintenance Manuals
- TS155 – SID Risk Assessments
- TG 13 – General Principles for the Design of Electrical Installations
- TG 25 – The Painting and Coating of Mechanical Plant
- TG 61 – Practical Understanding and interpretation of TS30a

# Design Proposal

ITP Renewables is pleased to submit the following technical proposal for the installation of a PV and battery energy system at Murputja. ITP's fundamental design philosophy is centred around the specification of high quality components to ensure superior lifetime performance of the systems we install. Highlights of the systems proposed include:

- Modules from a Tier 1 PV module manufacturer with a proven track record in Australia, or alternatively, a high-quality Australian manufactured PV modules.
- Leading global manufacturer of Lithium ion batteries with a proven track record of implementing this battery product throughout Australia and internationally.
- Leading inverter manufacturer
- Leading PV mounting manufacturer
- High Quality BoS components ensuring long system life with minimal maintenance requirements
- Electrical components selected and system designed to minimise unnecessary power losses and maximise system yield
- Pre-assembled insulated shipping container for rapid deployment on site.

## Proposed system technology overview

This section outlines the technologies selected for the design detailing their attributes and configurations. A complete set of design drawings can be found in Appendix A.

*Table 1 System Design summary*

| Component | Make & Model | No. units Murputja |
|---|---|---|
| PV module | JA Solar 330 W or Tindo Karra 300 W | 72 |
| Module Racking | Clenergy PV-ezRack® SolarRoof™ | 1 set |
| PV inverter | SMA STP20000TL-30 | 1 |
| DC isolators | Benedict LS40 | 4 |
| Battery inverters | SMA SI8.0H | 6 |
| ATS | NHP Socomec 80A (9354 4008) | 1 |
| AC isolators | NHP (various sizes) | 1 set |
| Battery | BYD B-Box Pro LV 10 kWh | 6 |
| Battery Isolator | Weber WESTL-00S Triple HRC fused switch (or similar) | 4 |
| Controller | SMA Data Manager | 1 |

| Switchboards | Basic switchboard units | 2 |
|---|---|---|
| A/C | 5kW AC Unit (>3.5kW) | 1 |

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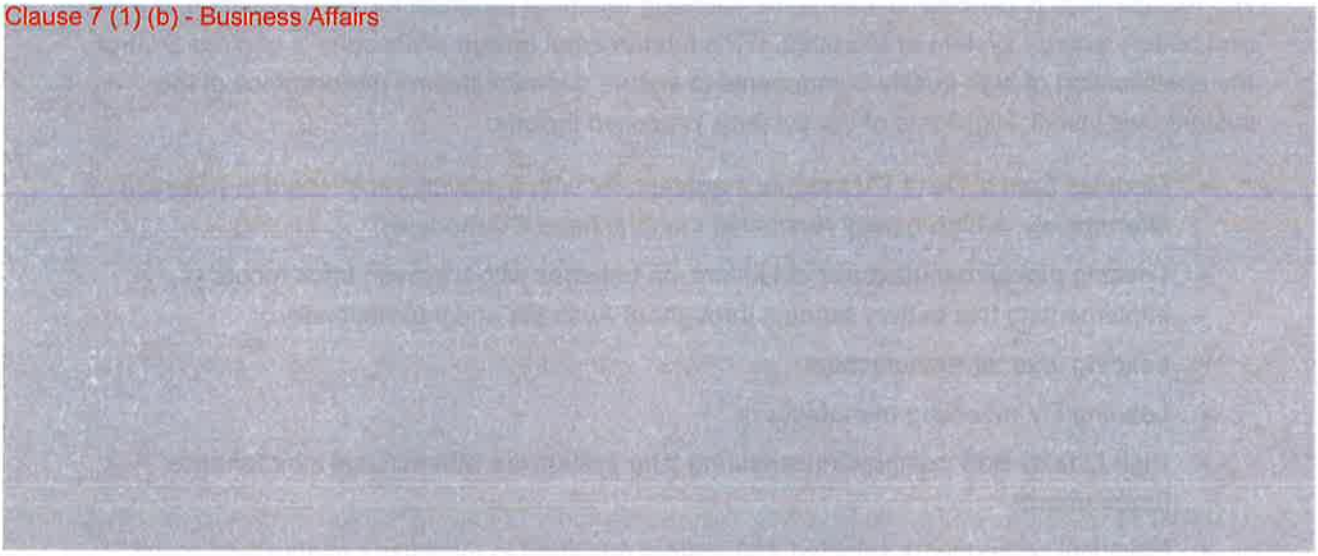

## Details of Components to be installed

A full set of technical design documents can be referred to in Appendix B, and datasheets for all the components listed can be found in Appendix E. This section provides an overview of their contents and the reason for their selection.

### PV Modules

ITP has included two options for PV module suppliers. The first option is JA Solar 330 W modules. JA Solar is a Tier 1, world leading manufacturer of high-performance solar power products for residential, commercial, and utility-scale power generation. JA Solar is one of the world's largest producers of solar cells and modules. Its standard and high-efficiency product offerings are among the most powerful and cost-effective in the industry. JA Solar owns and operates a fully vertically integrated manufacturing plant and boasts a global PV module manufacturing capacity of 4 GW per annum. Refer to Appendix B for the JA 330 W module datasheet. The 330W module allows the full 24kW installation on the roof area provided by the existing roof.

*Figure 2: The JA Solar module is a 60 cell module used for commercial scale systems*

The second option is Tindo Karra 300 W modules, manufactured in South Australia and used in other SA Water projects. An option for Tindo panels is included separately in the pricing schedule however it should be noted that the available roof space only allows for 21.6kW of capacity. Refer to Appendix B for the Tindo 300 W module datasheet.

## Mounting

A Clenergy mounting solution has been selected for this location as it is one of the most commonly-used mounting systems for both roof-mounted and ground-mounted PV arrays. They are quick to install, and are available from wholesalers in Australia so supply should not be a problem. This mounting has a robust design and uses high quality materials. Corrosion resistance is achieved through anodised structural grade aluminium and stainless steel components. The unique and innovative Z-module technology enables quick and easy installation. The system will be mounted flush on the cover structure that will be constructed above the battery and RO plant shipping containers.

*Figure 3: Clenergy PV-ezRack® SolarRoof™*

## PV Inverters

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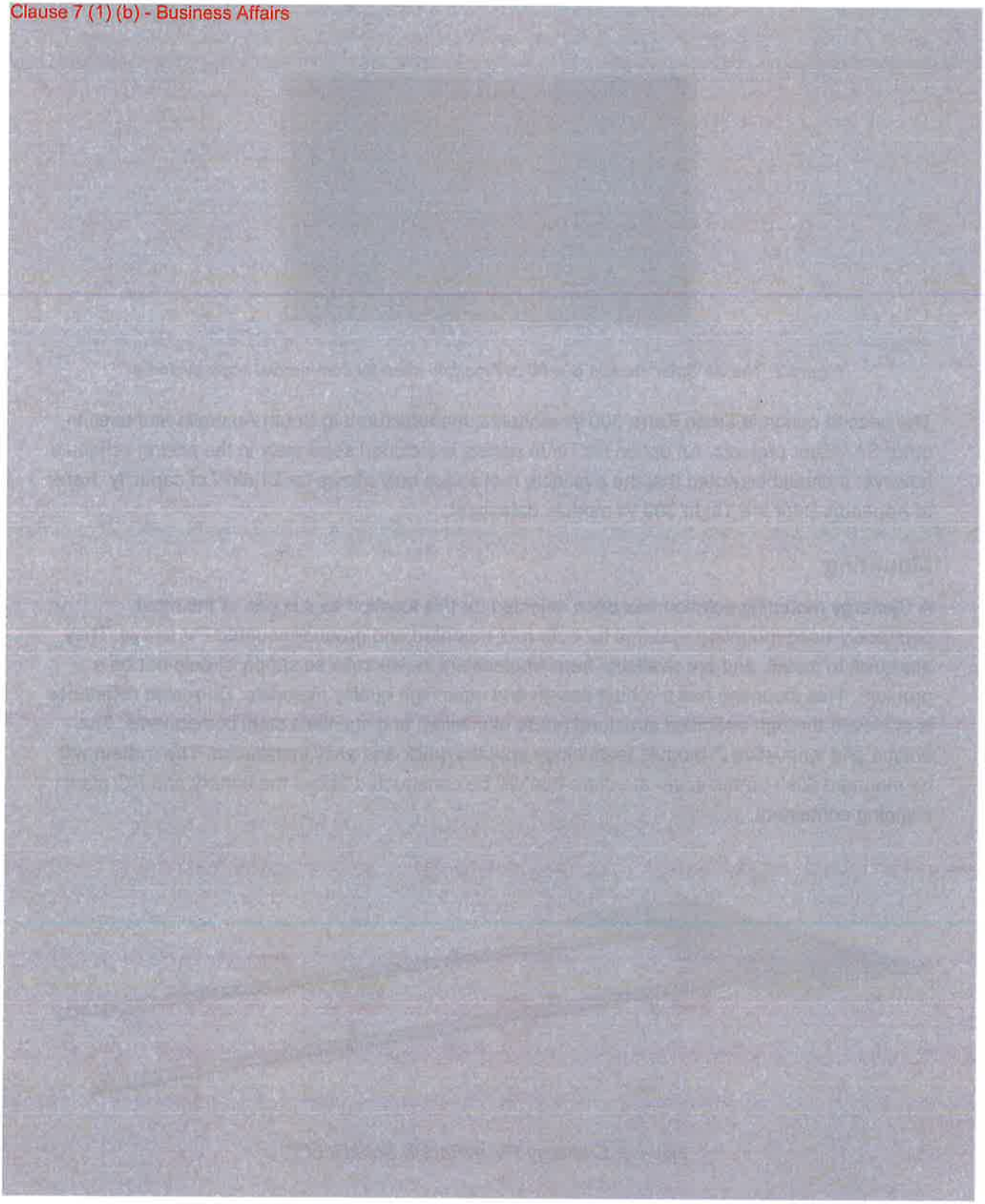

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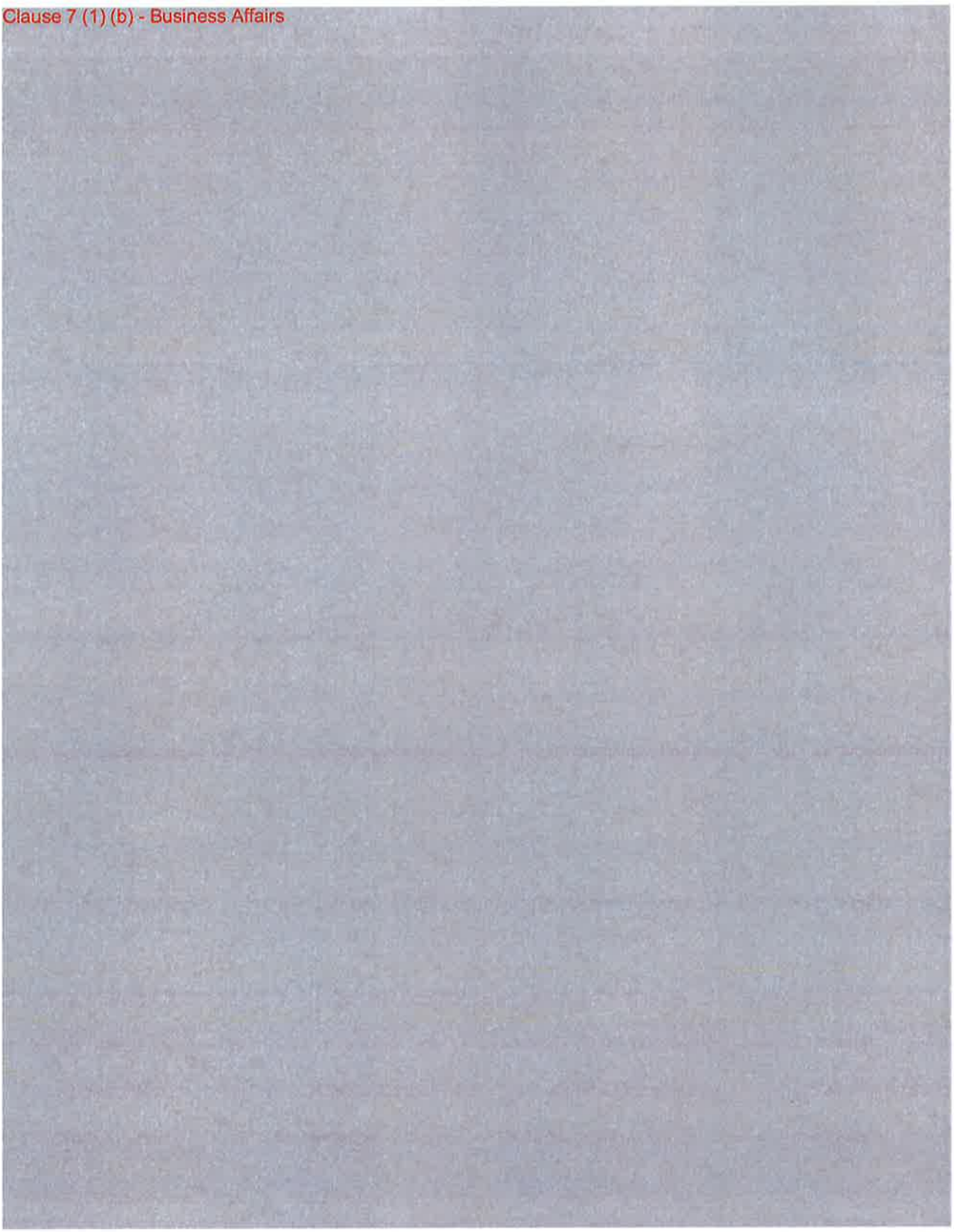

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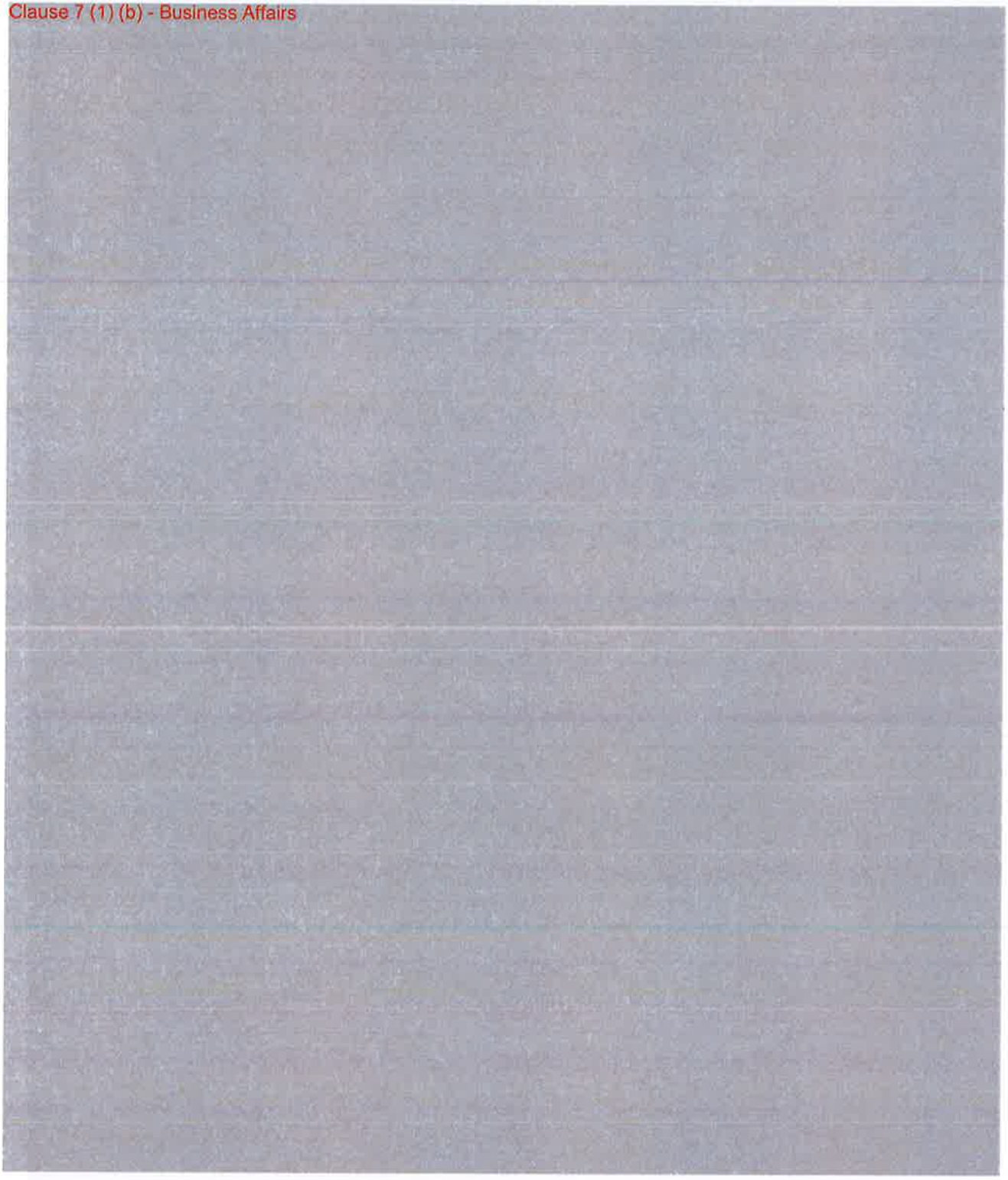

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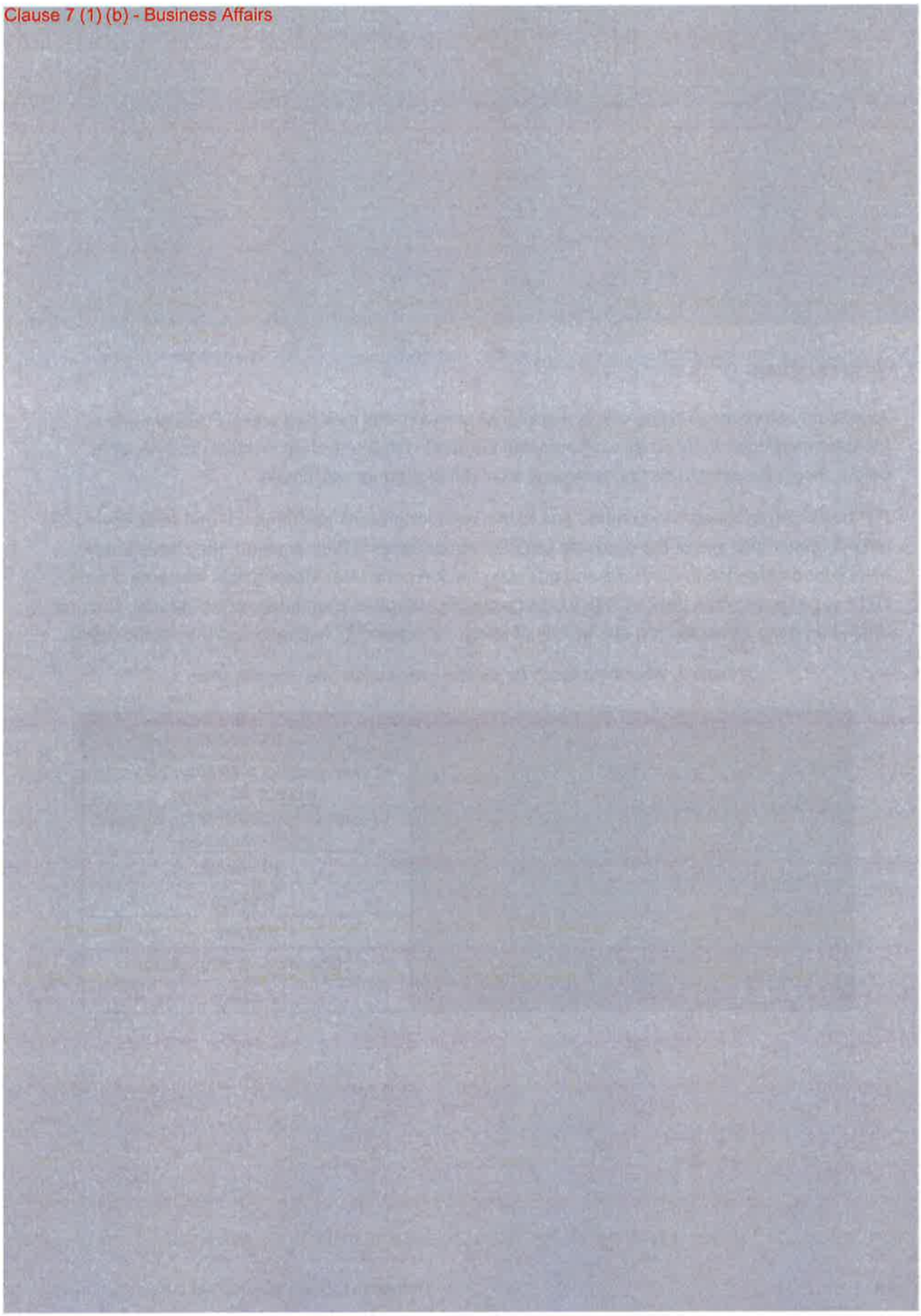

## Warranties

All system components come with a manufacturer's warranty included and ITP will provide a comprehensive warranty on all workmanship included with the system installation. The table below shows the system components and associated product warranties.

ITP has selected these components due to the superior product performance and reliability. In the unlikely event that one of the products selected experiences a fault or failure they have a well-established presence in Australia and a proven track record when dealing with warranty claims. ITP's experience when dealing with warranty claims with other manufacturers' products, such as SMA, has been disappointing due to lack of follow up support in Australia and the pacific region.

*Table 2: Warranty periods for system components and workmanship*

| Component | Scope of Manufacturers' Warranty |
|---|---|
| PV Module JA 330 W | 10 year product warranty, 25 years output warranty |
| PV Module Tindo 300 W | 12 year product warranty, 25 year output warranty |
| Clenergy module racking | 10 years |
| SMASTP20000TL-30 | 5 years |
| Battery inverters SMA SI8.0H | 5 years |
| BYD Battery | 10 years or 2,560 cycles |
| SMA Data Manager | 2 years |

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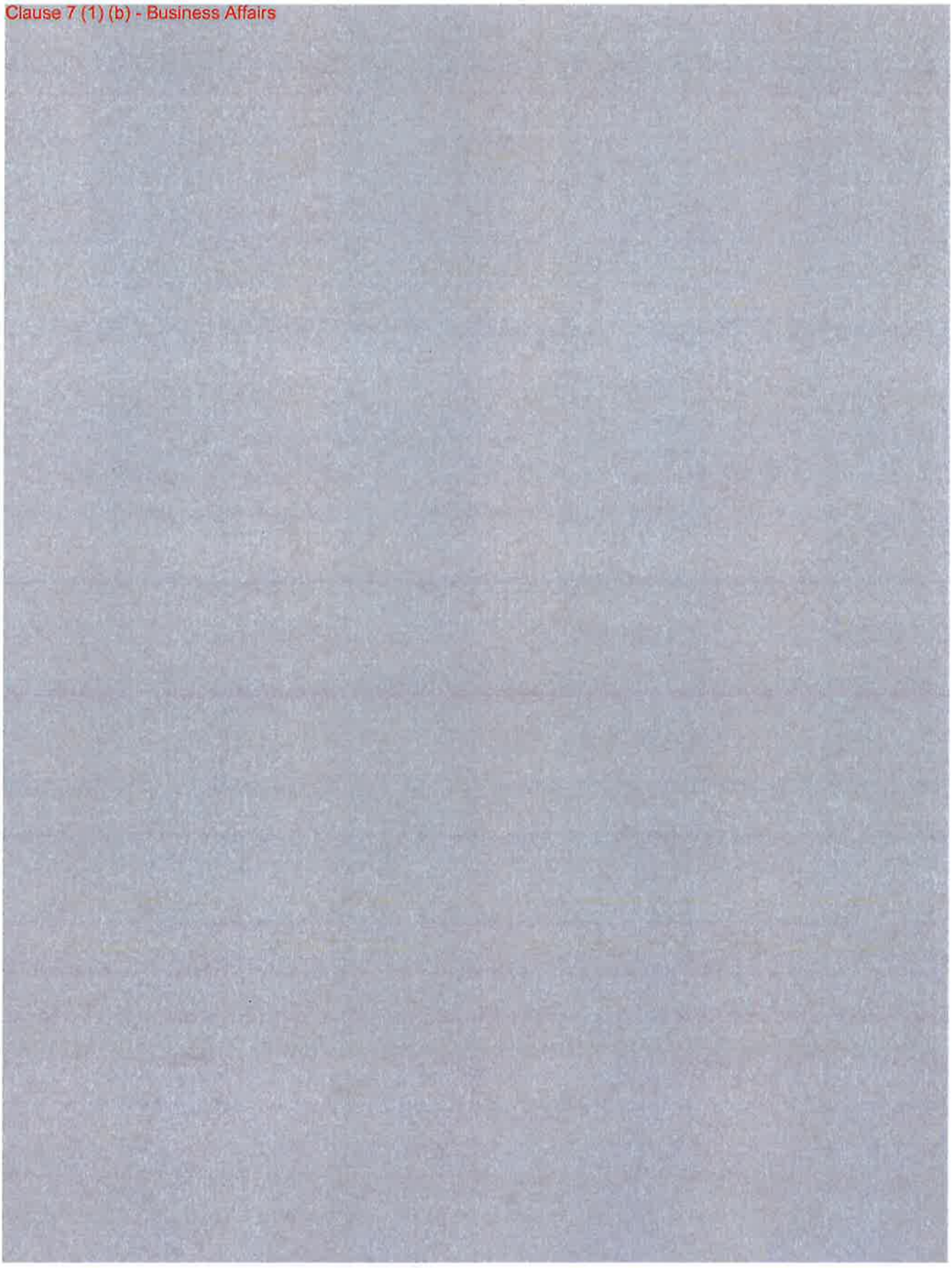

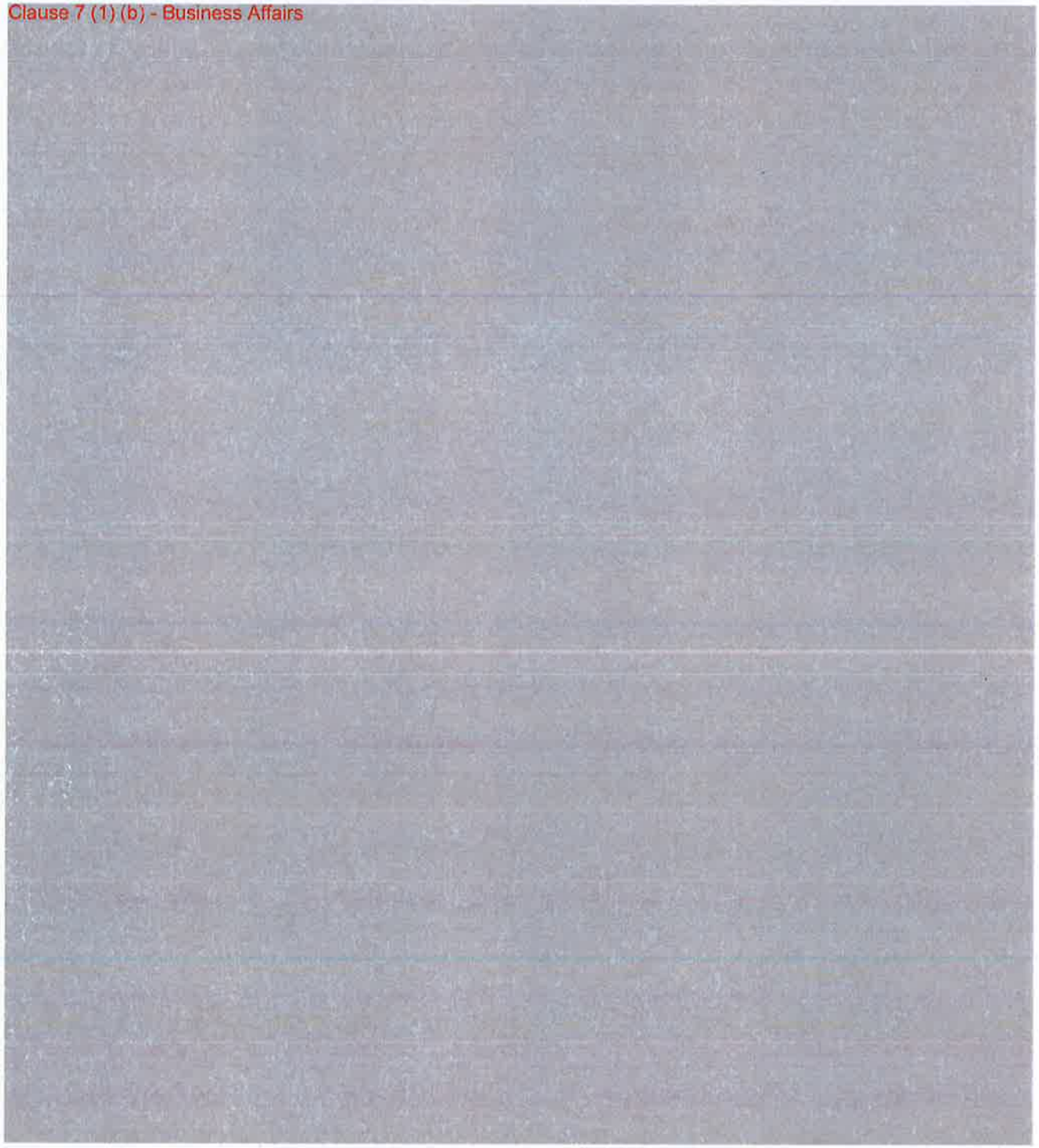
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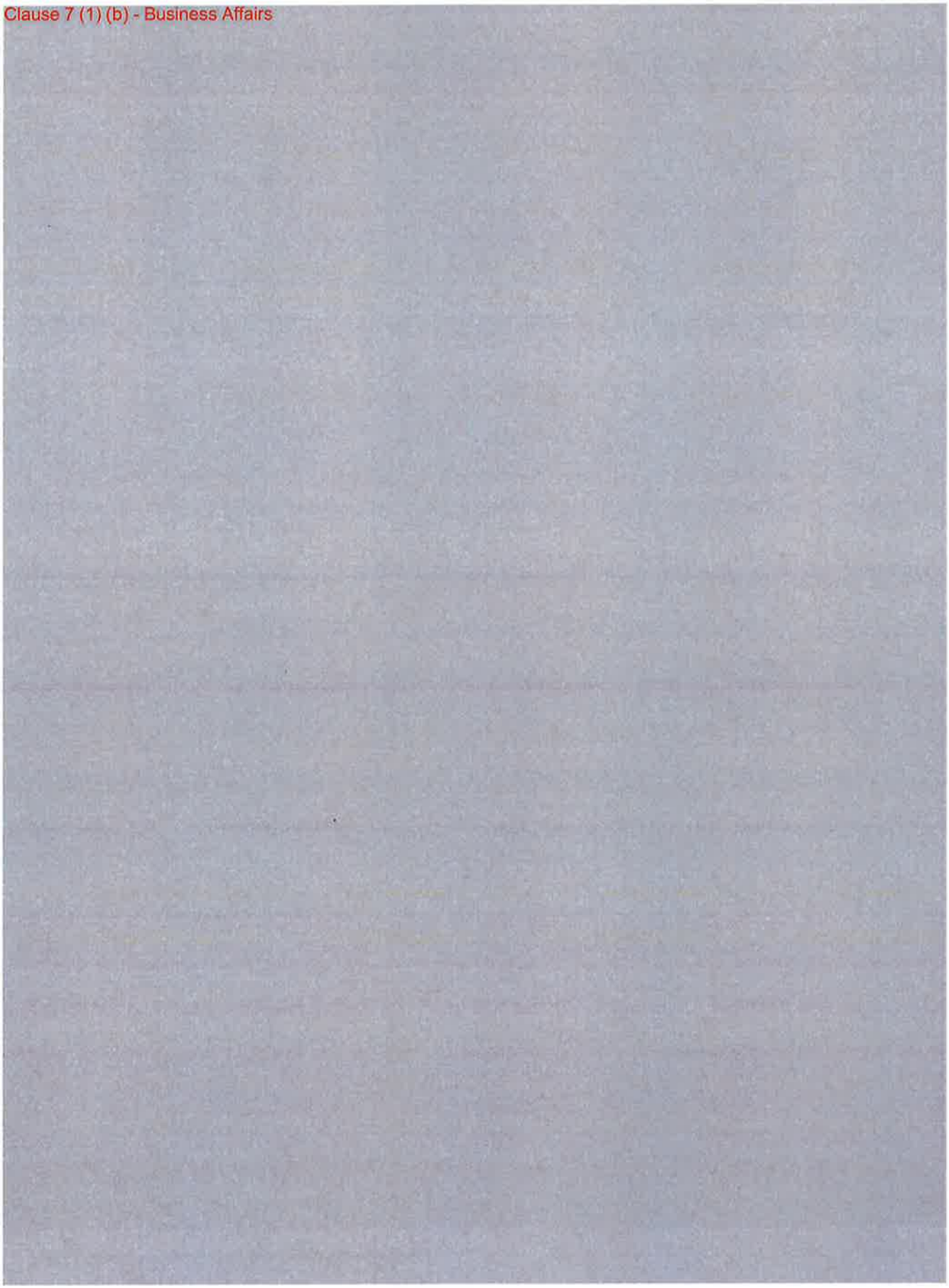

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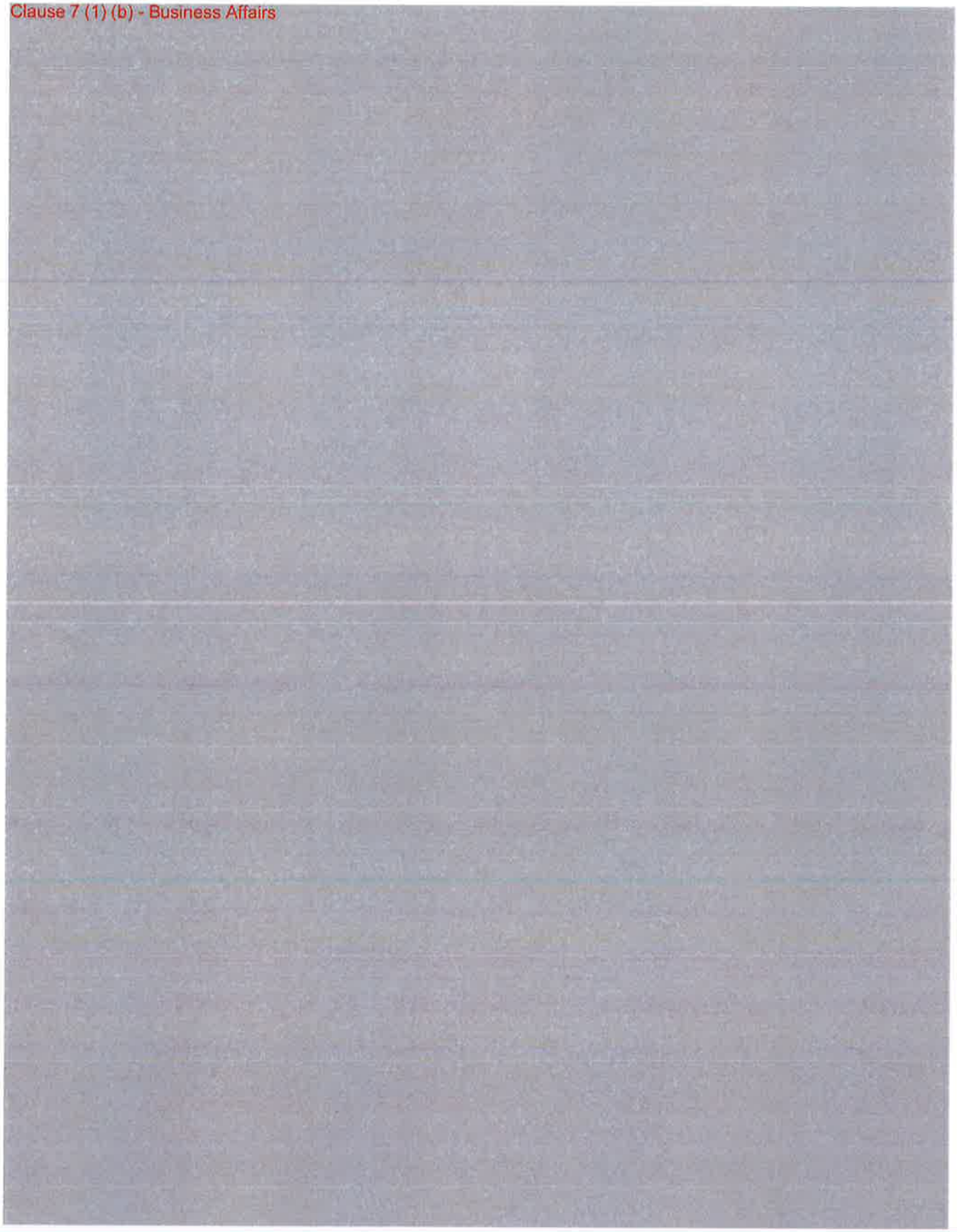

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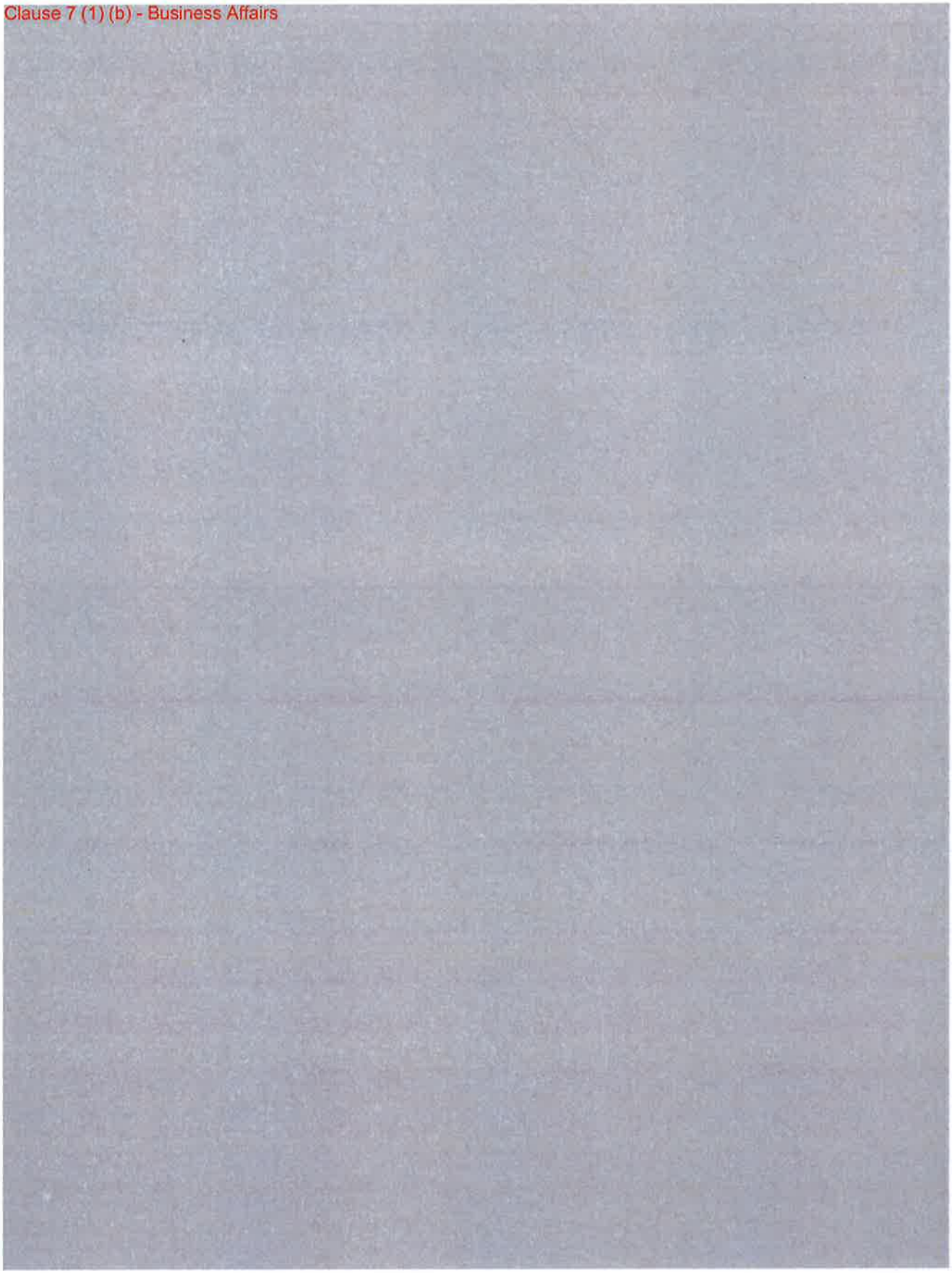

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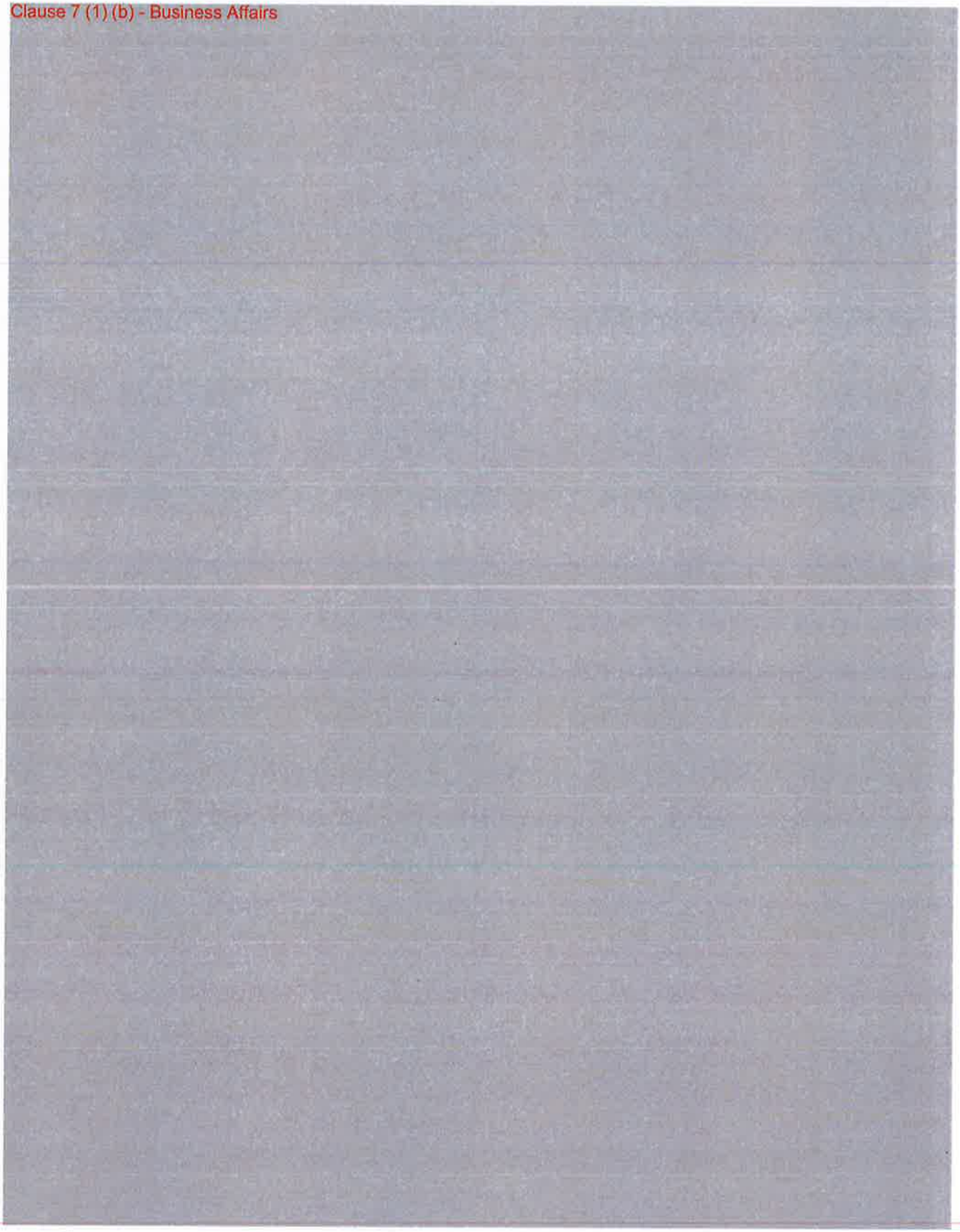

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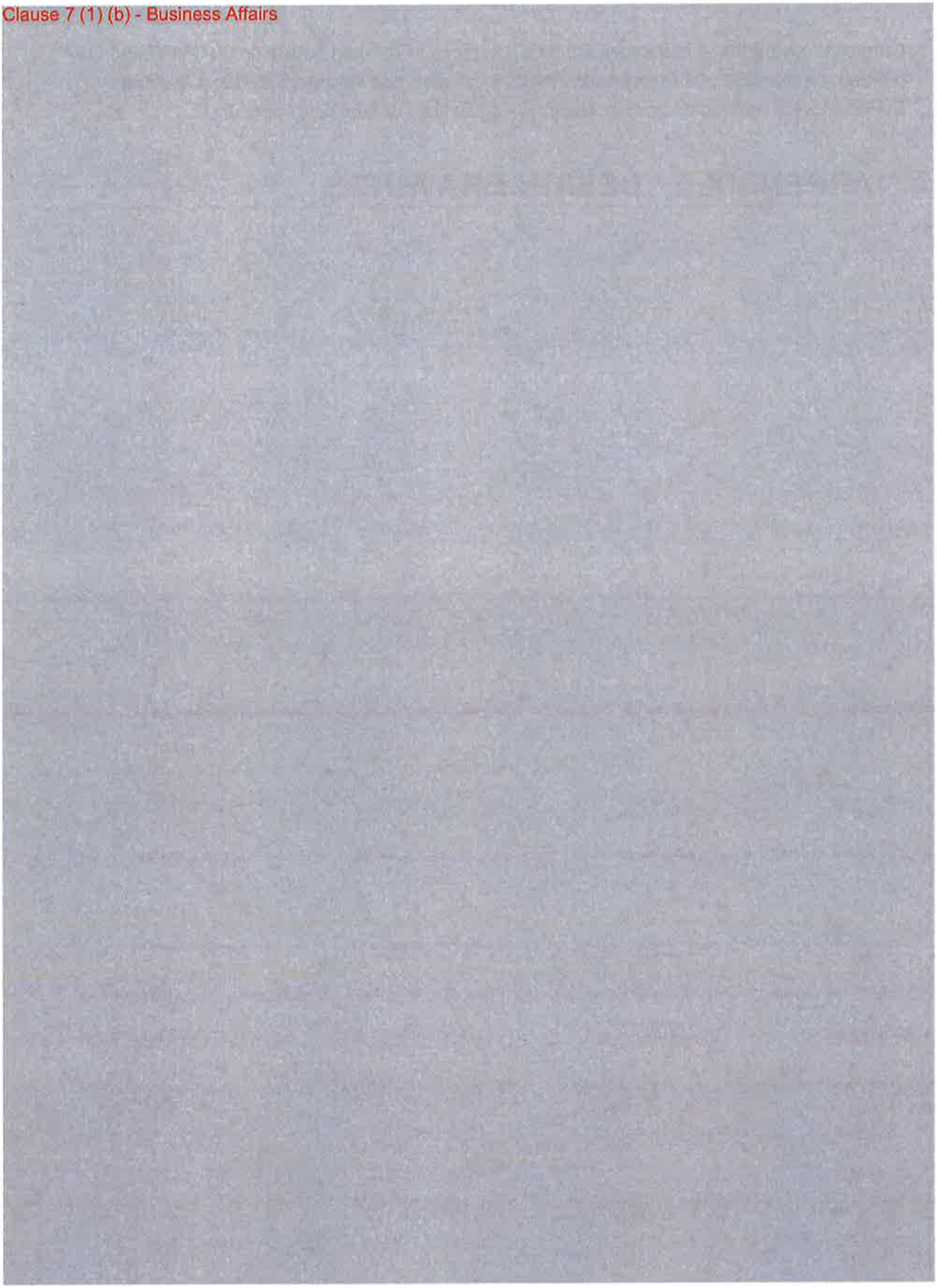

On project award these processes will be put in place. For more details on ITP WHS and QA policies, an example of a site specific WHSE & QA plan and detailed Safe Work Method Statements for working on or near electrical installations or services Appendix F:

# APPENDIX A: DESIGN DRAWINGS

| DRAWING NUMBER | DRAWING NAME | PREPARED BY |
|---|---|---|
| 2018-0###-01 - 18076 MU001-E001 | MURPUTJA ELECTRICAL SCHEMATIC - SLD | ITP |
| 2018-0###-02 - 18076 MU010-COMMS | MURPUTJA NETWORK SLD | |
| 2018-0###-03 - 18076 MU003-L001 | MURPUTJA PROJECT LOCATION | |
| 2018-0###-04 - 18076 MU004-L002 | MURPUTJA STRUCTURAL DIAGRAM | SA WATER |
| 2018-0###-05 - 18076 MU005-B001 | MURPUTJA BATTERY INVERTER ENCLOSURE - TOP VIEW | ITP |
| 2018-0###-06 - 18076 MU006-B002 | MURPUTJA BATTERY INVERTER ENCLOSURE - EAST / WEST WALL | |
| 2018-0###-07 - 18076 MU007-B003 | MURPUTJA BATTERY INVERTER ENCLOSURE - NORTH WALL | |
| 2018-0###-08 - 18076 MU008-B004 | MURPUTJA BATTERY INVERTER ENCLOSURE - SOUTH WALL | |

REVISION PANEL

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CURRENT REVISION CONTRACTOR:

DESIGN PANEL

DESIGNED: MPOR
AUTHORISED: N/A
DRAWN: MPOR
SIGNATURE:
REVIEWED: CM

CONTRACTOR: ITP RENEWABLES

SA Water



MURPUTJA
DRAWING INDEX

A3 SHT SIZE
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TOTAL SHEETS: 8
DISCIPLINE:
SUPERSEDES: N/A
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YEAR NUMBER SHEET

MU 001 MURPUTJA SLD

SINGLE LINE DIAGRAM

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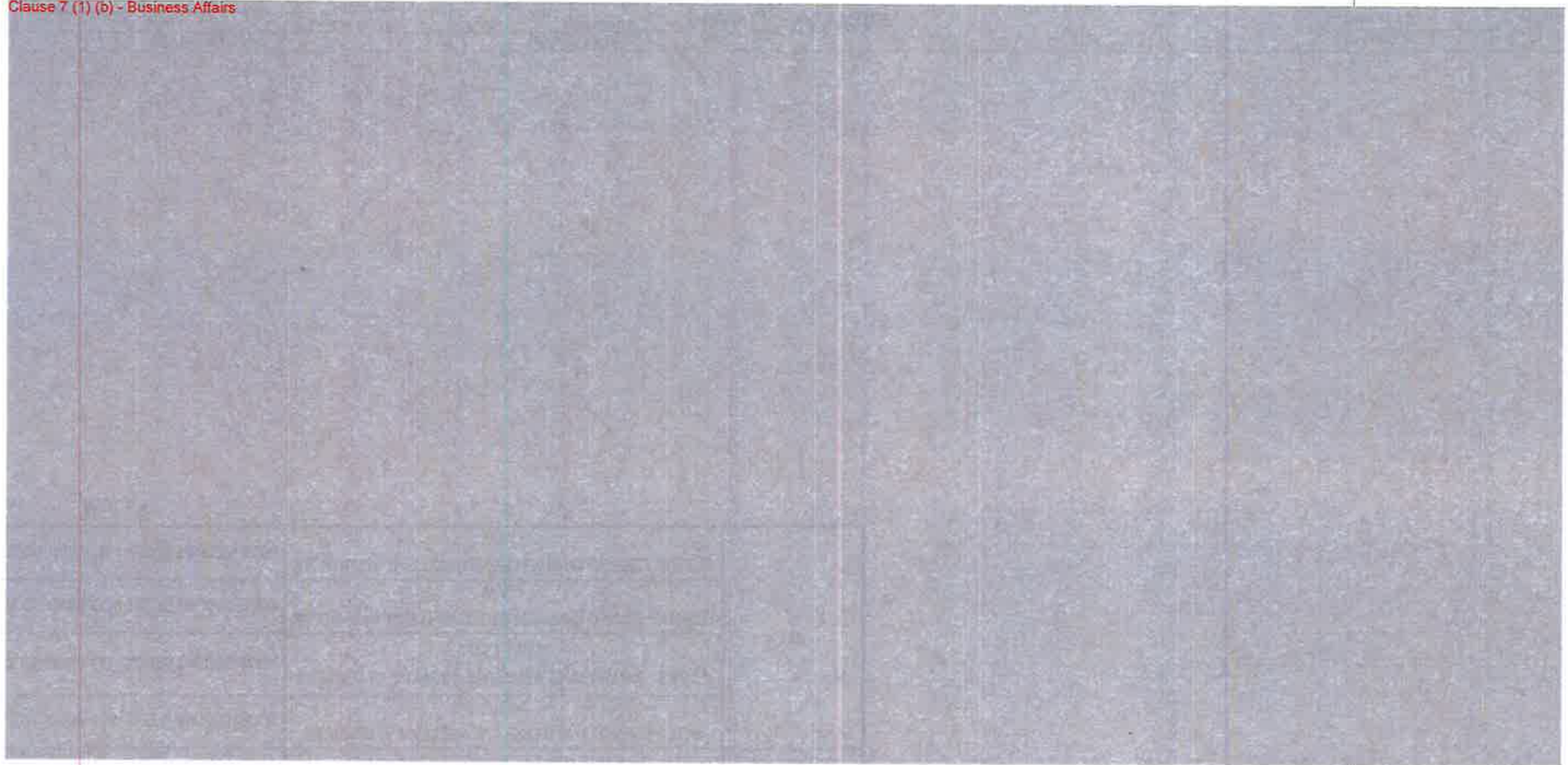

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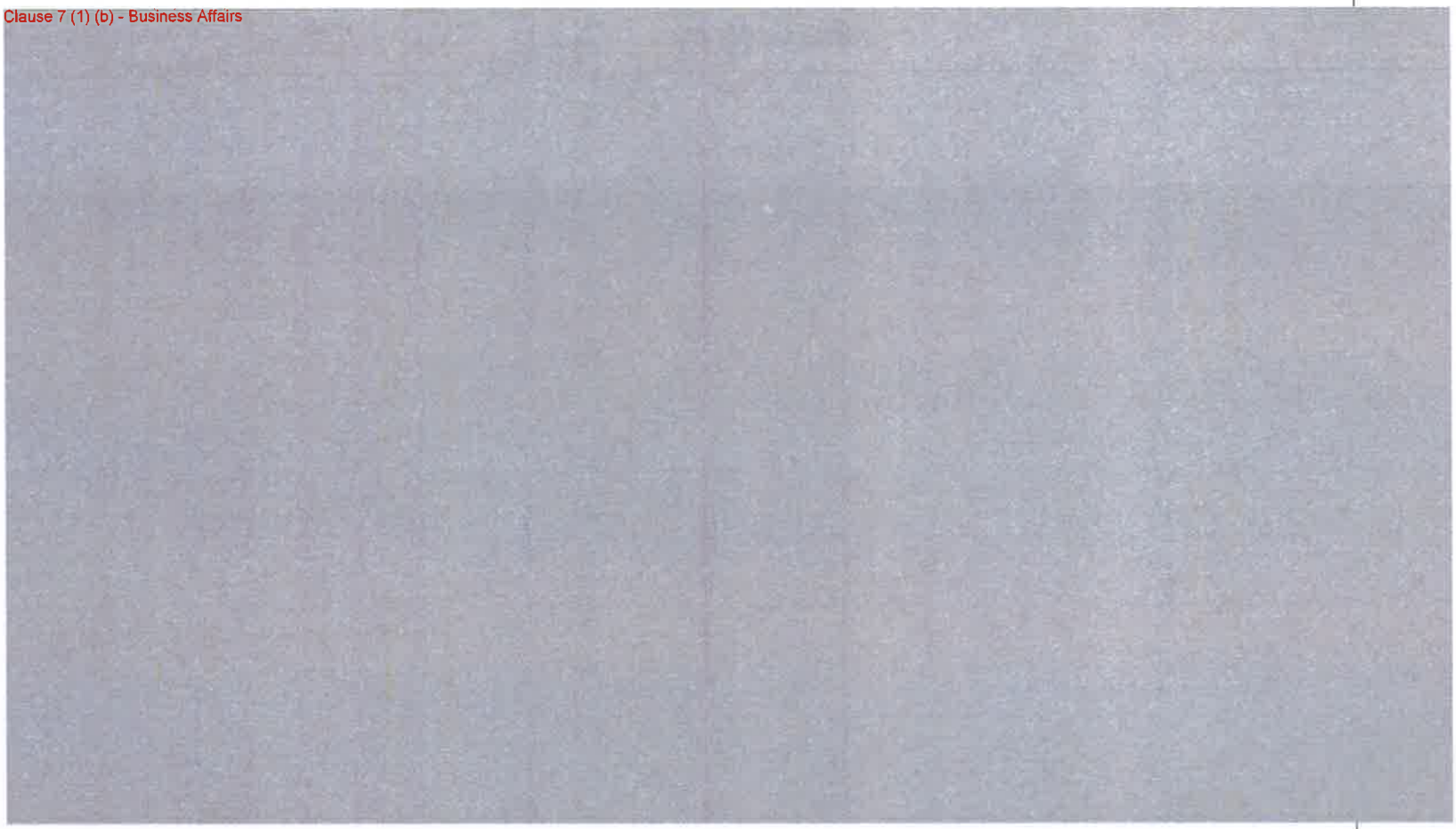

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MU PROJECT LOCATION

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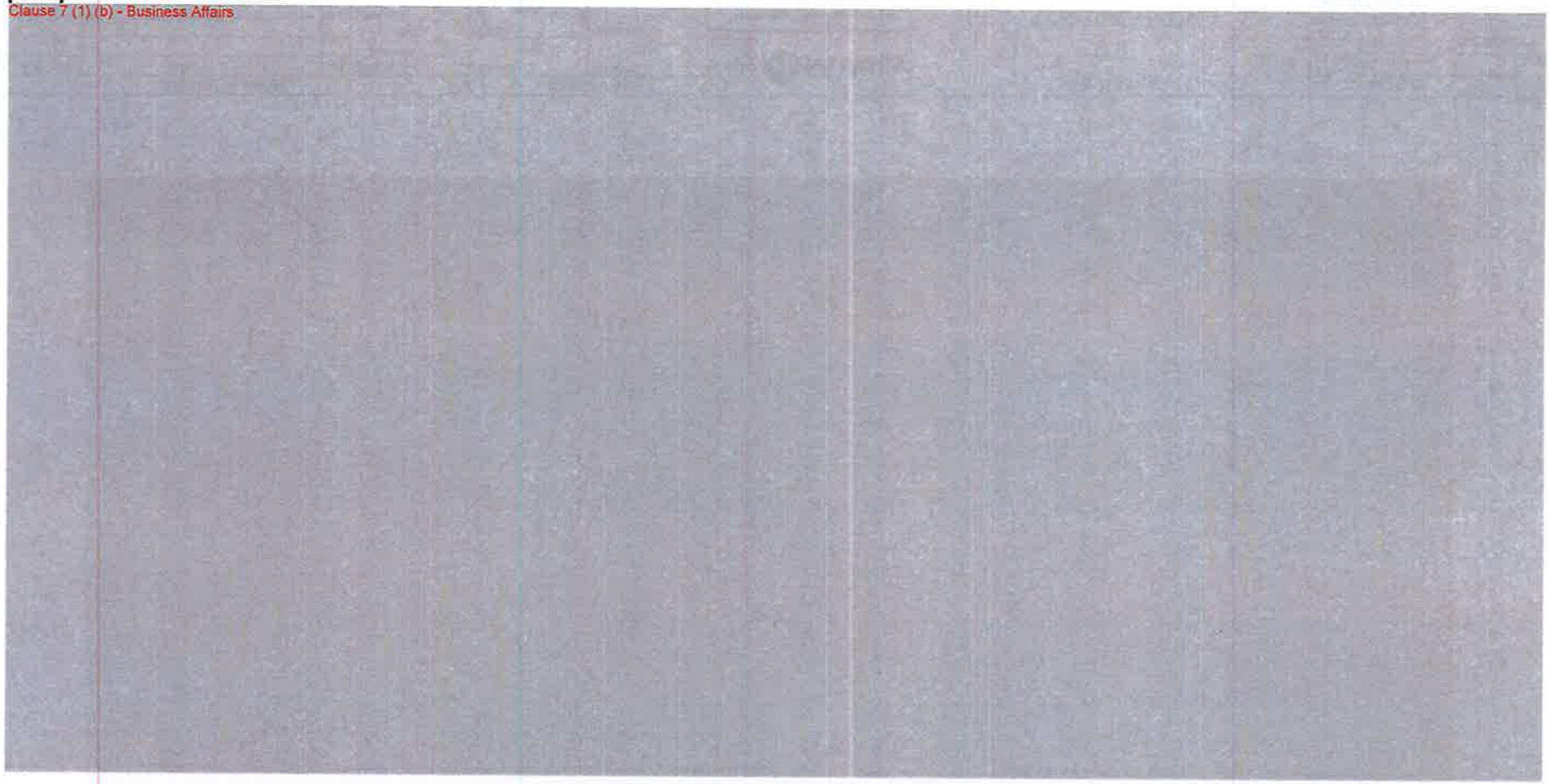

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| DRAWN: MPOR | SIGNATURE: |
| REVIEWED: CM | |
| CONTRACTOR: ITP RENEWABLES | |

SA Water



MURPUTJA
PROJECT LOCATION

18076.MU003-L001

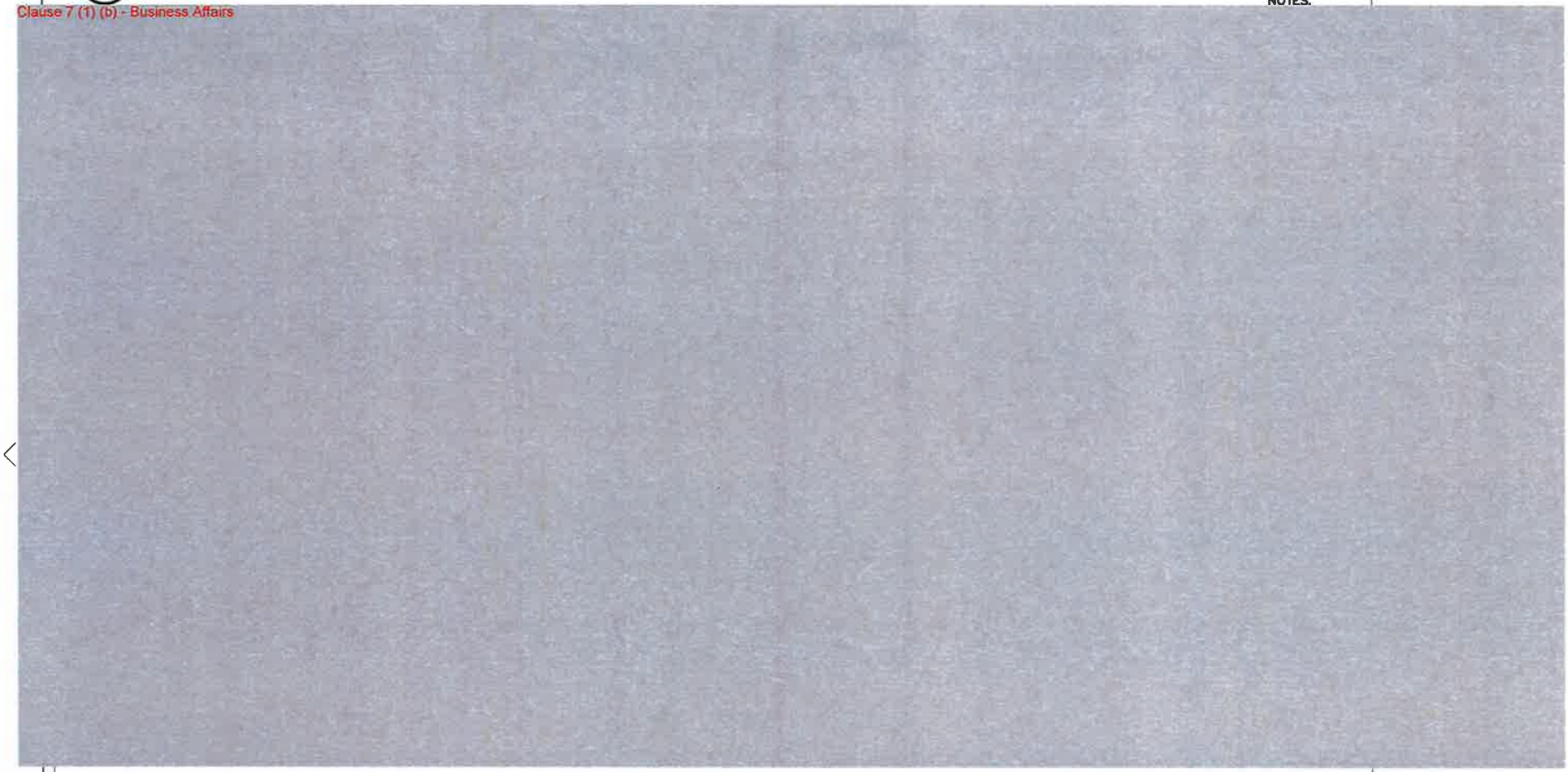
| | | |
|---|---|---|
| A3 SHT SIZE | MAXIMO ID: / PROJECT No: | 0 REVISION |
| TOTAL SHEETS: 8 | DISCIPLINE: EL | |
| SUPERSEDES: NA | | |
| DRAWING NUMBER 2018 -0### -03 (YEAR / NUMBER / SHEET) | | |

MU 004 MURPUTJA STRUCTURAL DIAGRAM - SA WATER

ALL VIEWS



NOTES.



ELEVATION

0 700 1600 3200mm

SCALE 1:50 @A1

| REVISION PANEL | | | | | DESIGN PANEL | |
|---|---|---|---|---|---|---|
| REV | DATE | DRN | DETAILS | APR | CURRENT REV AUTHORISED: | DESIGNED: FL / AUTHORISED: N/A |
| | | | | | SIGNATURE: | DRAWN: CMD / SIGNATURE: |
| | | | | | | REVIEWED: FL |
| 1 | | | | | CURRENT REVISION CONTRACTOR: | CONTRACTOR: |

SA Water



MURPUTJA
STRUCTURAL DIAGRAM
ALL VIEWS
18076.MU004-L002

A3 SHT SIZE | MAXIMO ID: | PROJECT No: | REVISION

TOTAL SHEETS: 8 DISCIPLINE: EL

SUPERSEDES:

DRAWING NUMBER

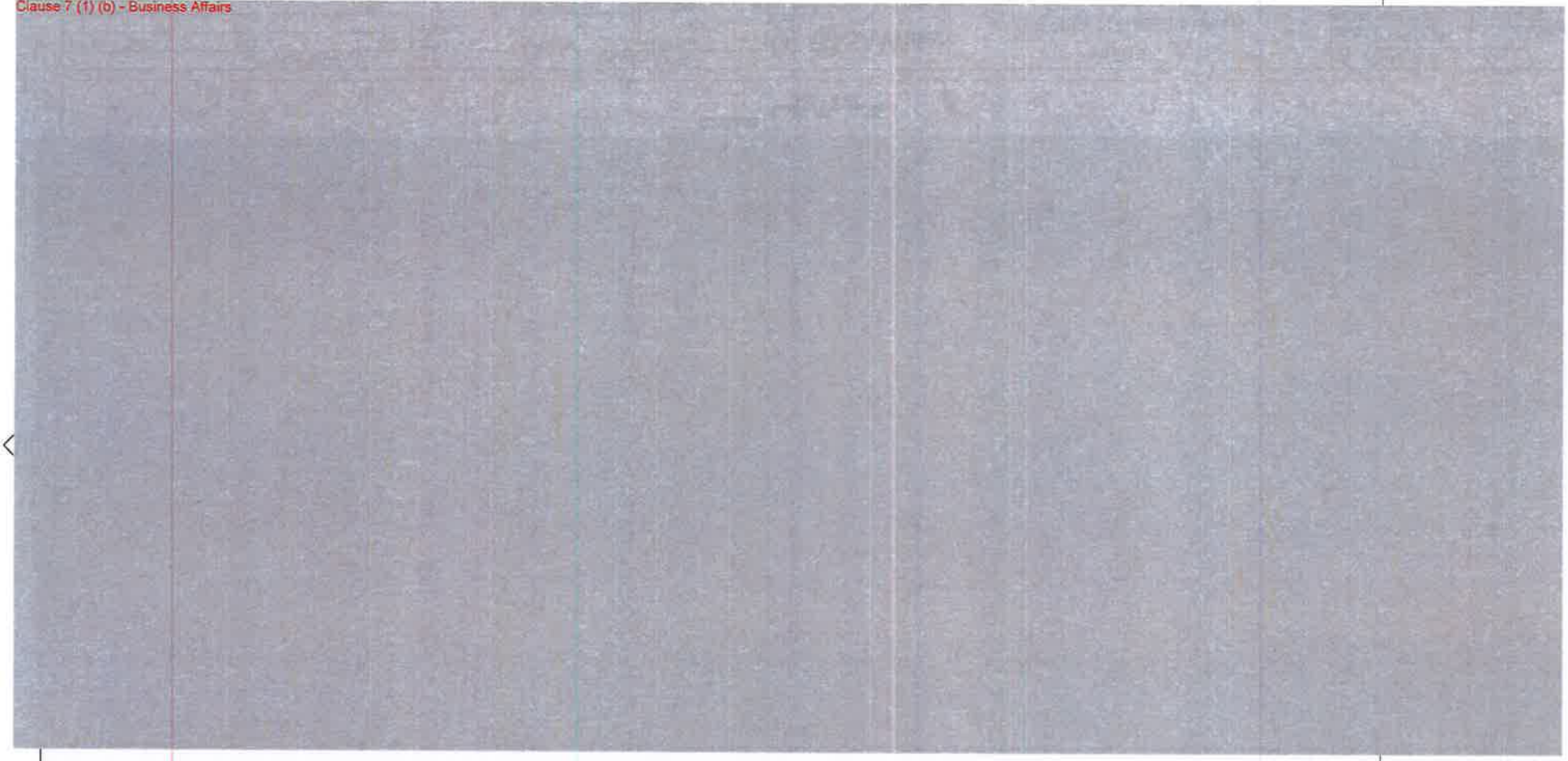
2018 - 00561 - 12

YEAR NUMBER SHEET

MU 005 BATTERY/INVERTER ENCLOSURE

TOP VIEW

Clause 7 (1) (b) - Business Affairs



| REVISION PANEL | | | | | |
|---|---|---|---|---|---|
| REV | DATE | DRN | DETAILS | APR | CURRENT REV AUTHORISED: N/A SIGNATURE: |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 1 | | | | | |
| CURRENT REVISION CONTRACTOR: | | | | | |

| DESIGN PANEL | |
|---|---|
| DESIGNED: MPOR | AUTHORISED: N/A |
| DRAWN: MPOR | SIGNATURE: |
| REVIEWED: CM | |
| CONTRACTOR: ITP RENEWABLES | |



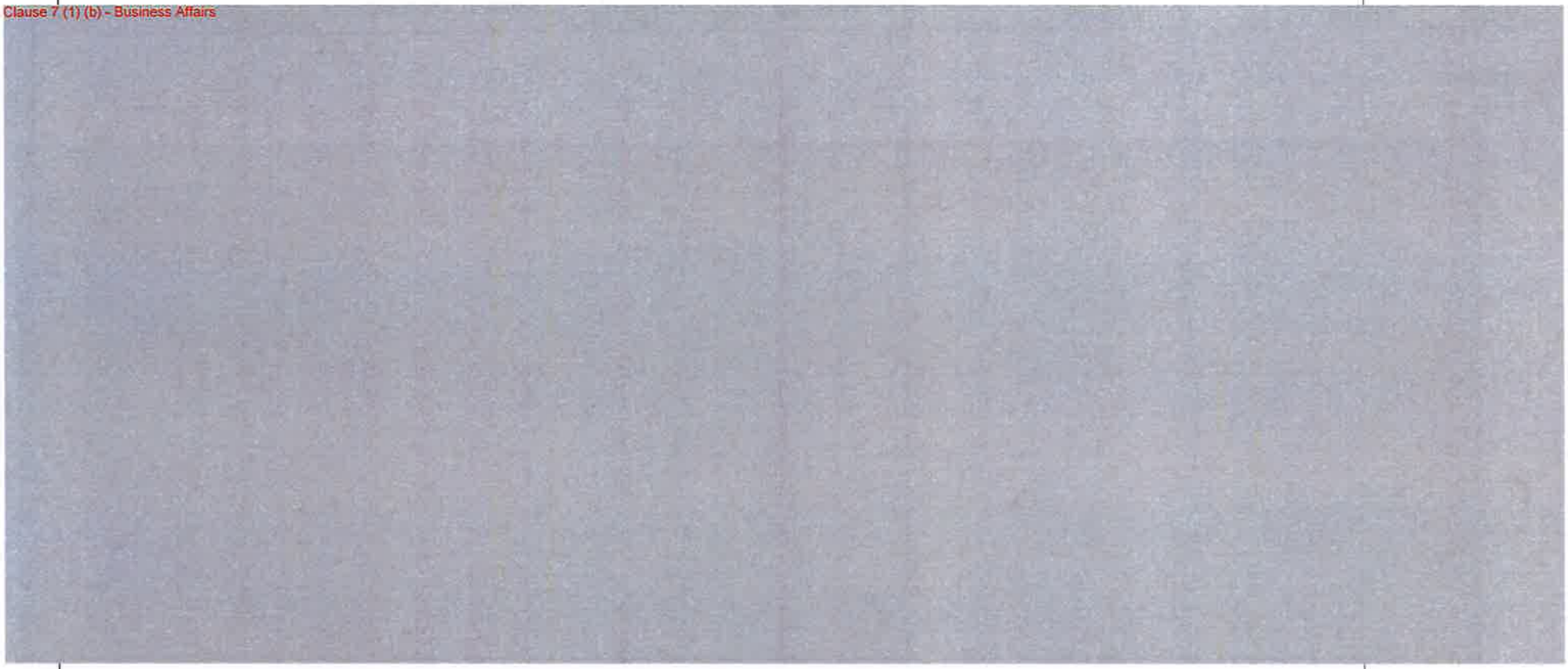
MURPUTJA
BATTERY INVERTER ENCLOSURE
TOP VIEW
18076.MU005-B001

| | | |
|---|---|---|
| A3 SHT SIZE | MAXIMO ID: / PROJECT No: | 0 REVISION |
| TOTAL SHEETS: 8 | DISCIPLINE: EL | |
| SUPERSEDES: NA | | |
| DRAWING NUMBER 2018 -0### -05 | | |
| YEAR | NUMBER | SHEET |

MU 006 BATTERY/INVERTER ENCLOSURE

SECTION VIEW-EAST & WEST WALL

Clause 7 (1) (b) - Business Affairs



| REVISION PANEL | | | | | |
|---|---|---|---|---|---|
| REV | DATE | DRN | DETAILS | APR | CURRENT REV AUTHORISED: N/A SIGNATURE: |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| CURRENT REVISION CONTRACTOR: | | | | | |

| DESIGN PANEL | | |
|---|---|---|
| DESIGNED: MPOR | AUTHORISED: N/A | |
| DRAWN: MPOR | SIGNATURE: | |
| REVIEWED: CM | | |
| CONTRACTOR: ITP RENEWABLES | | |

SA Water



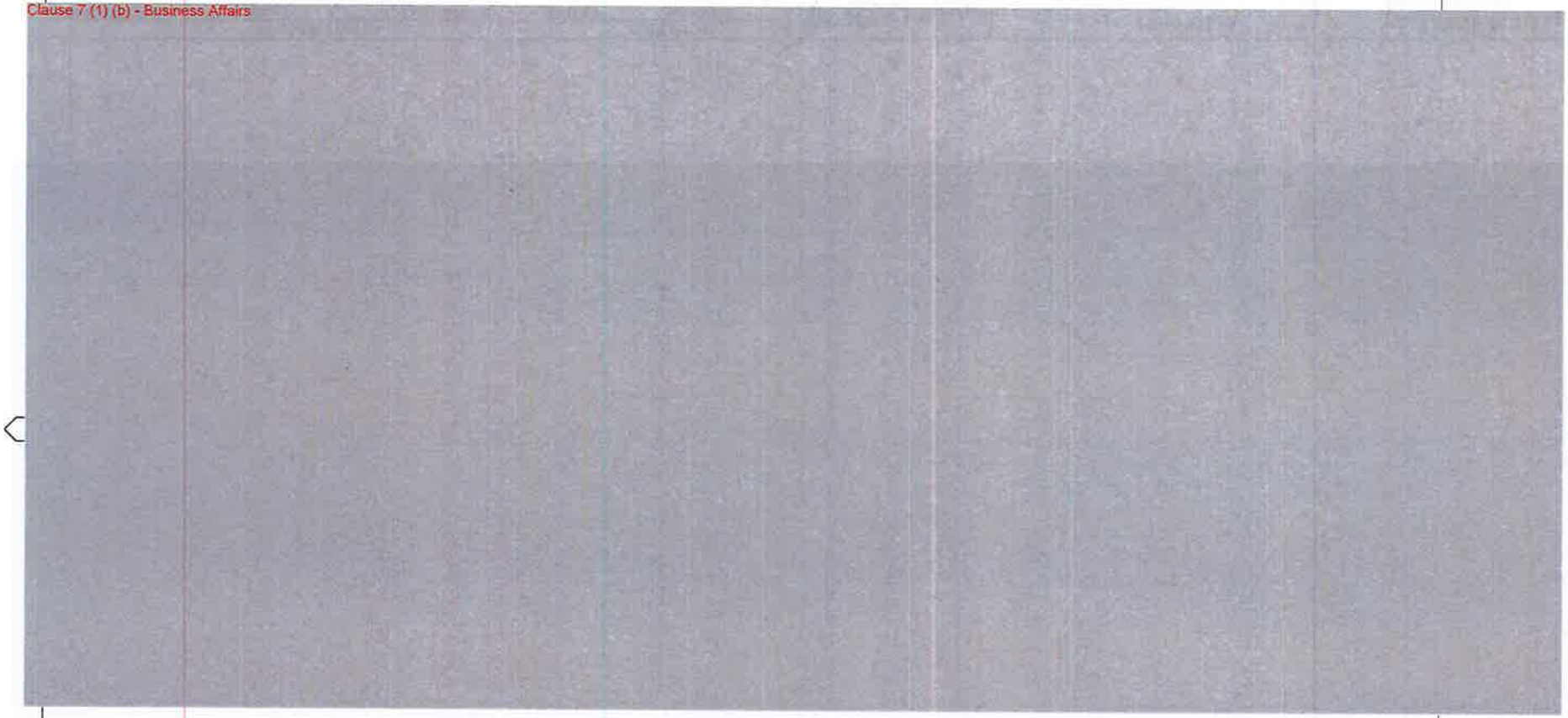
MURPUTJA
BATTERY INVERTER ENCLOSURE
EAST & WEST WALL
18076.MU006-B002

| | | |
|---|---|---|
| A3 SHT SIZE | MAXIMO ID: PROJECT No: | 0 REVISION |
| TOTAL SHEETS: 8 | DISCIPLINE: EL | |
| SUPERSEDES: NA | | |
| DRAWING NUMBER 2018 -0### -06 YEAR NUMBER SHEET | | |

YL 007 BATTERY/INVERTER ENCLOSURE

SECTION VIEW - NORTH WALL

Clause 7 (1) (b) - Business Affairs



SCALE 1:20

| REVISION PANEL | | | | | |
|---|---|---|---|---|---|
| REV | DATE | DRN | DETAILS | APR | CURRENT REV AUTHORISED: SIGNATURE: |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| CURRENT REVISION CONTRACTOR: | | | | | |

| DESIGN PANEL | |
|---|---|
| DESIGNED: MPDR | AUTHORISED: N/A |
| DRAWN: MPDR | SIGNATURE: |
| REVIEWED: CM | |
| CONTRACTOR: ITP RENEWABLES | |

Government of South Australia

SA Water



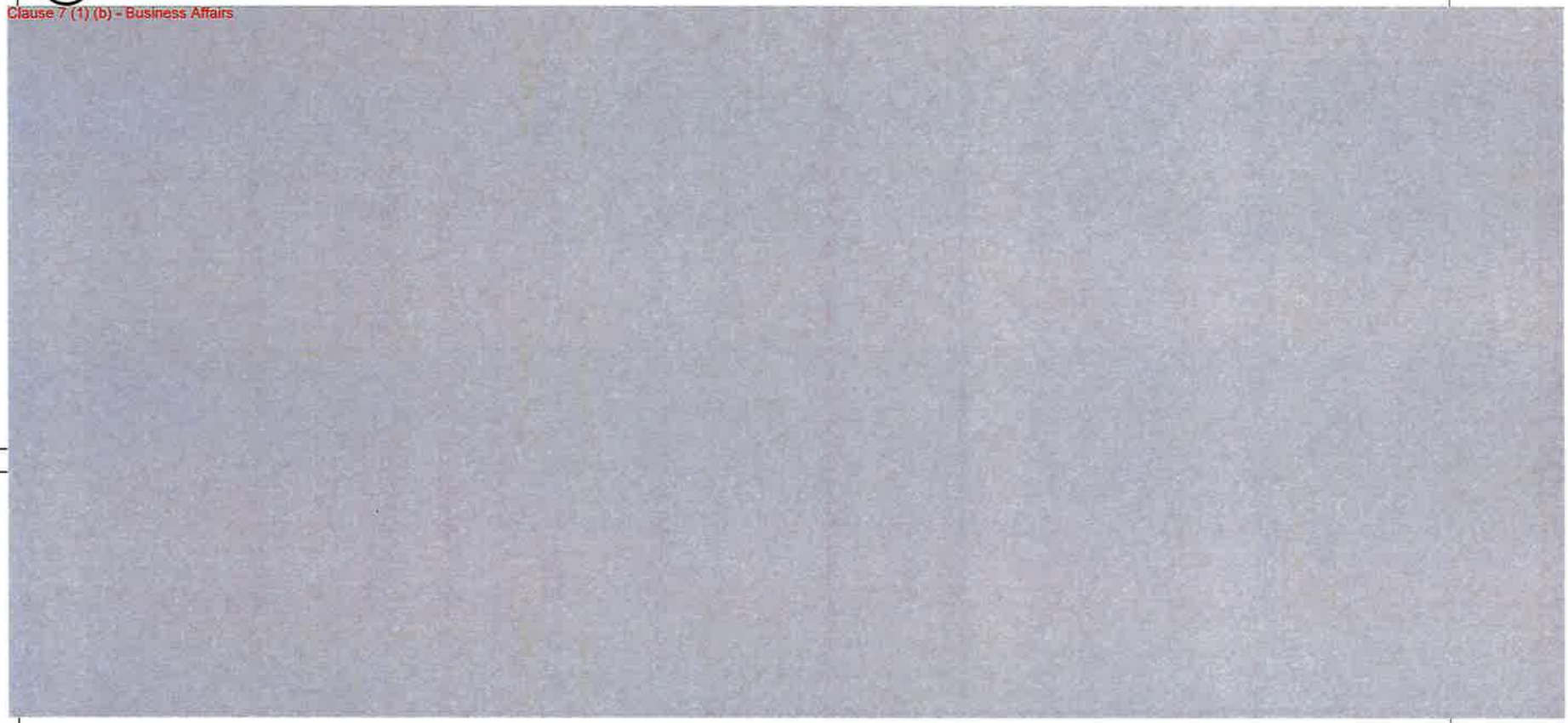
MURPUTJA
BATTERY INVERTER ENCLOSURE
NORTH WALL
18076.MU007-B003

| | | |
|---|---|---|
| A3 SHT SIZE | MAXIMO ID: PROJECT No: | 0 REVISION |
| TOTAL SHEETS: 8 | DISCIPLINE: EL | |
| SUPERSEDES: NA | | |
| DRAWING NUMBER 2016 -0### -07 YEAR NUMBER SHEET | | |

MU 008 BATTERY/INVERTER ENCLOSURE

SECTION VIEW - SOUTH WALL

Clause 7 (1) (b) - Business Affairs



SCALE 1:20

| REVISION PANEL | | | | | |
|---|---|---|---|---|---|
| REV | DATE | DRN | DETAILS | APR | CURRENT REV AUTHORISED: N/A SIGNATURE: |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| CURRENT REVISION CONTRACTOR: | | | | | |

| DESIGN PANEL | |
|---|---|
| DESIGNED: MPOR | AUTHORISED: N/A |
| DRAWN: MPOR | SIGNATURE: |
| REVIEWED: CM | |
| CONTRACTOR: ITP RENEWABLES | |



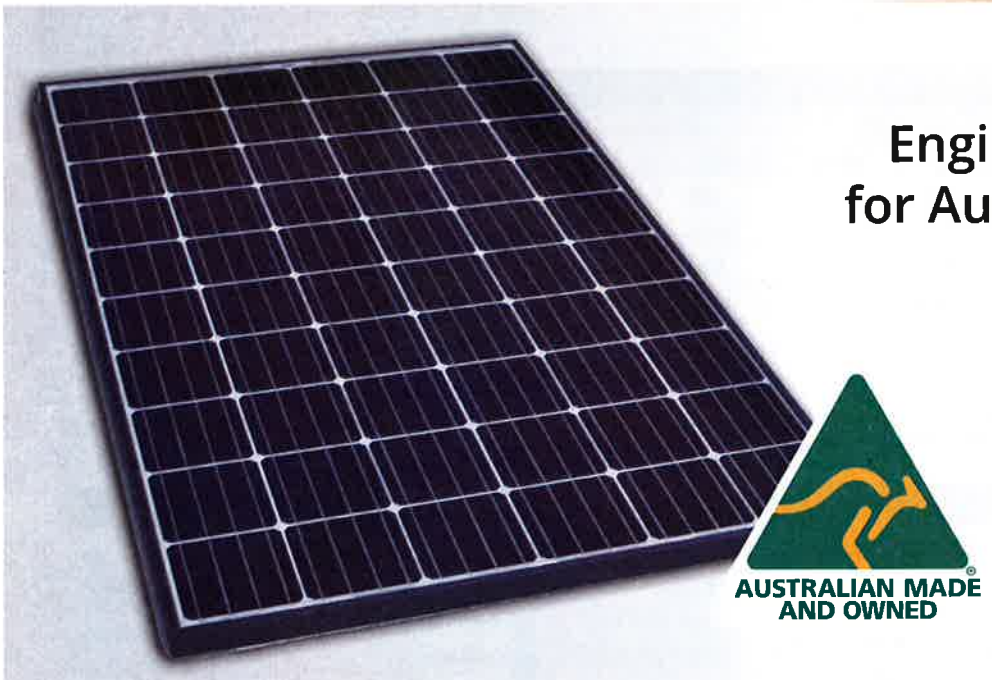
MURPUTJA
BATTERY INVERTER ENCLOSURE
SOUTH WALL
18076.MU008-B004

| | | |
|---|---|---|
| A3 SHT SIZE | MAXIMO ID: | 0 REVISION |
| | PROJECT No: | |
| TOTAL SHEETS: 8 | DISCIPLINE: EL | |
| SUPERSEDES: NA | | |
| DRAWING NUMBER 2018 -0### -08 (YEAR / NUMBER / SHEET) | | |

# APPENDIX B: TECHNICAL DATASHEETS

# Tindo Karra 300 PERC

285 - 300 Watt
Mono-Crystalline Module



## Engineered in Australia for Australian Conditions

AUSTRALIAN MADE AND OWNED

CLEAN ENERGY COUNCIL MEMBER

DESERT KNOWLEDGE AUSTRALIA Solar Centre

### A Secure & Reliable Investment
Tindo Solar has extended the product warranty of our Karra panels by an additional 2 years, from 10 years to 12 years.

### Great Visual Appearance
The Tindo Karra series has been designed with appearance in mind. Their deep black cells, with black frames and thinner wires give an aesthetically pleasing appearance.

### High Efficiency
Higher module conversion efficiency (up to 18%) benefit from Passivated Emmiter Rear Contact (PERC) technology.

### Proven Field Performance
Our panels are mounted and performing everyday at the Desert Knowledge Testing Centre in Alice Springs. The Karra series panels are consistently one of the highest performing panels at the centre.

### Maximum Cost Reductions
Much lower logistics costs due to our modules being made in South Australia with flexible module numbers per pallet on request.

### Innovative All Weather Technology
Optimal yields, whatever the weather with excellent low-light and temperature behaviour.

### Low-light Performance
Advanced glass and solar cell surface texturing allow for excellent performance in low-light environment.

Tindo Operations Co Pty Ltd
1300 846 367
www.tindosolar.com
6 Second Avenue Mawson Lakes SA 5095

tindo solar

# Karra Series Data Sheet

## Electrical Characteristics

| 60Cells Panel Description | | Karra-285 | | Karra-290 | | Karra-295 | | Karra-300 | |
|---|---|---|---|---|---|---|---|---|---|
| Item | Unit | *STC | *NOC | STC | NOC | STC | NOC | STC | NOC |
| Max. Power (Pmax) | Wp | 285 | 208.84 | 290 | 212.51 | 295 | 216.15 | 300 | 219.81 |
| Max. Power voltage (Vmp) | V | 31.81 | 28.88 | 32.19 | 29.23 | 32.56 | 29.56 | 32.93 | 29.90 |
| Max. Power current (Imp) | A | 8.96 | 7.23 | 9.01 | 7.27 | 9.06 | 7.31 | 9.11 | 7.35 |
| Open circuit voltage (Voc) | V | 39.20 | 36.17 | 39.50 | 36.44 | 39.80 | 36.72 | 40.10 | 37.00 |
| Short circuit current (Isc) | A | 9.50 | 7.73 | 9.55 | 7.77 | 9.60 | 7.82 | 9.65 | 7.86 |
| Panel efficiency | % | 17.1 | 12.5 | 17.4 | 12.7 | 17.7 | 13.0 | 18.0 | 13.2 |
| Power tolerance | % | STC ± 3 / NOC ± 5 | | | | | | | |

*STC(Standard Test Condition) : 1,000W/m², AM 1.5, 25 °C / *NOC(Nominal Operating Condition) : 800W/m², 20°C, wind speed 1m/s, NOCT

## Thermal Characteristics

| Rating | | Unit | Value |
|---|---|---|---|
| *NOCT | | °C | 45±2 |
| Temperature Coefficient | Isc | %/°C | + 0.045 |
| | Voc | %/°C | - 0.292 |
| | Pmax | %/°C | - 0.410 |

*NOCT : Nominal Operating Cell Temperature

## Qualification Test

| | |
|---|---|
| Thermal cycling test | - 40°C to 85°C for 200 cycles |
| Damp heat test | 85°C and 85% relative humidity for 1000hr |
| Front load test | 5400Pa |
| Rear load test | 3600Pa |
| Hail impact test | 25mm hail at 23m/s from 1m distance |

## Mechanical Characteristics

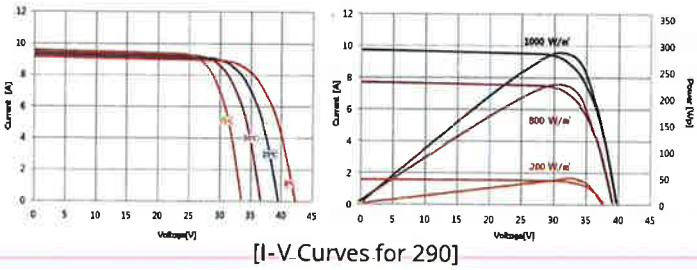
| | |
|---|---|
| Cells per Panel | 60Cells (6 x 10) |
| Cell Type | 4BB Mono-crystalline |
| Panel Dimension (L x W x H) | 1667 x 1000 x 40 mm |
| Panel Weight | 18.2Kg |
| Front Glass | 3.2mm Tempered Glass |
| Back Sheet | Tedlar film-based / Dupont |
| Frame | Anodized Aluminum |
| Junction Box | 3 bypass diode / IP67 |
| Output cable | (+, -) 1,000mm / 4mm² cable |
| Connectors type | PV-KST4 (male), PV-KBT4 (female) / Multi Contact |
| Edge seal & J -box Sealant | Dow Corning |

## Safety Ratings & Warranties

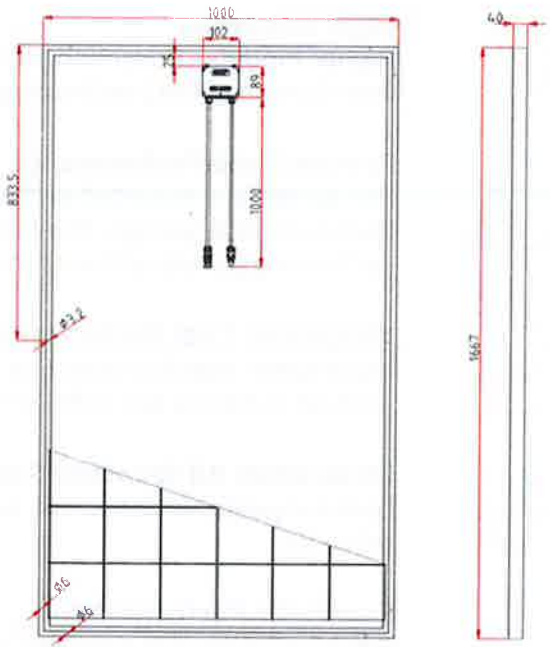
| | |
|---|---|
| Safety application class | Class A |
| Fire Safety Classification | Class C |
| Certifications | IEC 61215, IEC 61730 |
| Warranty | 12 years limited product warranty |
| Performance guarantee | 25 years limited warranty 80% power |

## System Integration Parameters

| | |
|---|---|
| Temperature range | -40°C to 85°C |
| Maximum system voltage | 1,000 V DC(IEC) |
| Maximum over-current protection | 15 A |



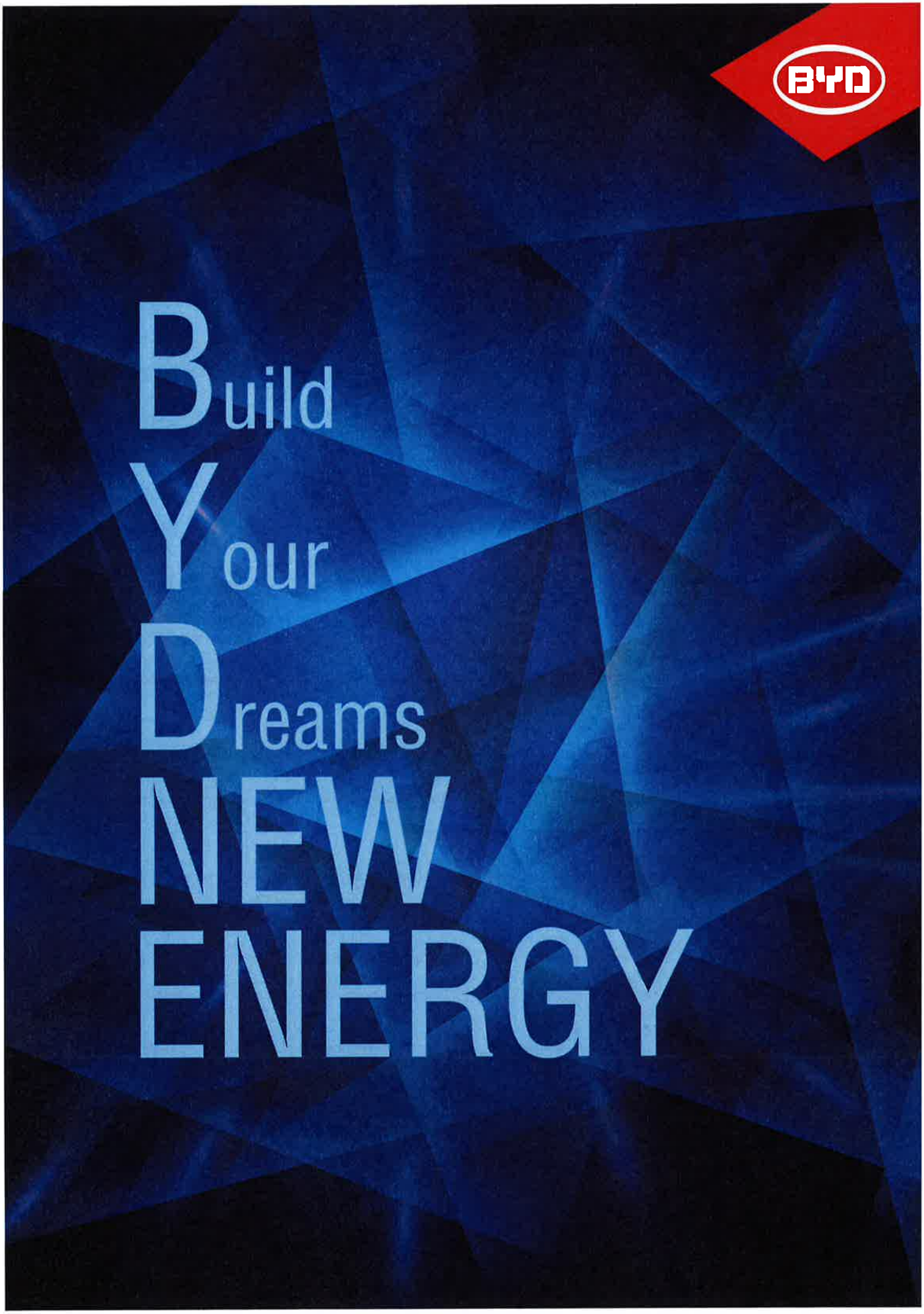

[I-V Curves for 290]




[Panel Diagram]

tindo solar

Tindo Operations Co Pty Ltd
1300 846 367
www.tindosolar.com
6 Second Avenue Mawson Lakes SA 5095


BYD
Build
Your
Dreams
NEW
ENERGY

## Safe Battery Chemistry

B-Box is designed with $LiFePO_4$ chemistry battery which has been widely recognized as one of the safest battery technologies. $LiFePO_4$ chemistry features stable structures and its thermal runaway temperature is over 480℃. That's 100% higher than NCM and NCA chemistry. It is designed for residential and commercial applications with absolute safety.

## Railway and Automotive Standard Battery

As the world's largest Electric Vehicle manufacturer, BYD brings railway and automotive battery standards to residential and commercial solutions: B-Box. 6+ years' track records of large scale applications in Electric Vehicles ensure its safety and reliability. All products have been certified according to international standards including TUV, UL and RCM.

## High Power Output

B-Box has the highest output power in industry, which brings the highest performance to customers. The system is able to reach C rate at max 1C and 2C at peak to support critical loads such as A/C and pumps, etc.

## Easy Installation and Uninterruptible Maintenance

All B-Box systems have modular design featuring uninterruptible maintenance, and easy installation.

## Flexible Extension Life Time

B-Box is equipped with modular design and smart BMS (Battery Management System), allowing extension throughout its lifetime.

## Natural Cooling

B-Box is designed with natural cooling providing optimum efficiency.

## 10 Years Warranty

10 Years Warranty provides the best guarantee of operation.

# BYD B-Box BATTERY STORAGE

## B-Box HV

| Model | B-Box H 6.4 | B-Box H 7.7 | B-Box H 9.0 | B-Box H 10.2 | B-Box H 11.5 |
|---|---|---|---|---|---|
| Battery Type | $LiFePO_4$ | | | | |
| Battery Module | B-Plus-H (1.28 kWh) | | | | |
| | 5 modules | 6 modules | 7 modules | 8 modules | 9 modules |
| Usable Energy[1] [kWh] | 6.40 | 7.68 | 8.96 | 10.24 | 11.52 |
| Max Output Power [kW] | 6.40 | 7.68 | 8.96 | 10.24 | 11.52 |
| Peak Output Power [kW] | 12.8, 5mins | 15.36, 5mins | 17.92, 5mins | 20.48, 5mins | 23.04, 5mins |
| Round-Trip Efficiency | ≥95.3% (Under test condition [1] ) | | | | |
| Nominal Voltage [V] | 256 | 307 | 358 | 409 | 460 |
| Operating Voltage Range [V] | 200~282 | 240~338 | 280~395 | 320~451 | 360~500 |
| Communication | CAN / RS485 | | | | |
| Dimension [W×H×D,mm] | 580×894×380 | 580×1014×380 | 580×1134×380 | 580×1254×380 | 580×1374×380 |
| Net Weight [kg] | 148 | 174 | 200 | 226 | 252 |
| Enclosure Protection Rating | IP55 | | | | |
| Warranty | 10 years | | | | |
| Ambient Temperature Range[2] [℃] | -10 ~ +50 | | | | |
| Certification & Safety Standard | CE / UL1642 / RCM / Sicherheitsleitfaden Li-Ionen-Hausspeicher | | | | |
| Scalability | Max. 5 systems in parallel (Available for Q1, 2018) | | | | |
| Compatible Inverters | SMA / KOSTAL, more brands to be announced | | | | |

[1] Test conditions: 100% DOD, 0.5C charge & discharge @+25℃
[2] -10℃~10℃ will be derating
*System Usable Energy may be variant with different inverter brands.

*Build Your Dreams*

# BYD B-Box BATTERY STORAGE

## B-Box LV Professional

B-Box Pro 2.5~10.0

B-Box Pro 13.8

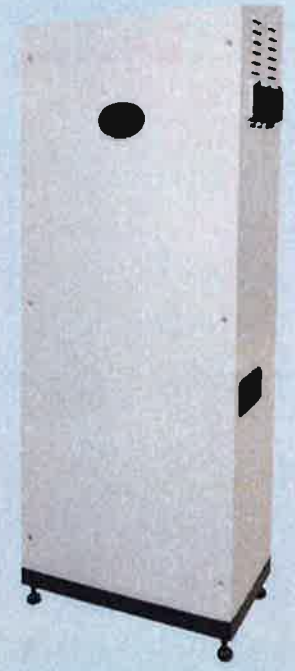
| Model | B-Box Pro 2.5 | B-Box Pro 5.0 | B-Box Pro 7.5 | B-Box Pro 10.0 | B-Box Pro 13.8 |
|---|---|---|---|---|---|
| Battery Type | LiFePO4 | | | | |
| Battery Module | 1 module | 2 modules | B-Plus 2.5 (2.56 kWh)<br>3 modules | 4 modules | B-Plus 13.8 (13.8 kWh) |
| Usable Energy[1] [kWh] | 2.56 | 5.12 | 7.68 | 10.24 | 13.8 |
| Max Output Power [kW] | 2.56 | 5.12 | 7.68 | 10.24 | 12.8 |
| Peak Output Power [kW] | 5.12, 30s | 10.24, 30s | 15.36, 30s | 20.48, 30s | 13.3, 60s |
| Round-Trip Efficiency | ≥95.3% (Under test condition [1] ) | | | | |
| Nominal Voltage [V] | 51.2 | | | | |
| Operating Voltage Range [V] | 43.2~56.4 | | | | |
| Communication | CAN / RS485 | | | | |
| Dimension [W×H×D, mm] | 600×883×510 | | | | 650×800×550 |
| Net Weight [kg] | 79 | 113 | 147 | 181 | 175 |
| Enclosure Protection Rating | IP20 | | | | |
| Warranty | 10 years | | | | |
| Ambient Temperature Range[2] [℃] | -10 ~ +50 | | | | |
| Certification & Safety Standard | TUV / CE / UN38.3<br>Sicherheitsleitfaden Li-Ionen-Hausspeicher | | | | CE / RCM / UN38.3 |
| Scalability | Max. 8 B-Box Pro 10.0 systems in parallel | | | | Max. 32 systems in parallel |
| Compatible Inverters | SMA / GOODWE / SOLAX / victron, more brands to be announced | | | | |

[1]Test conditions: 100% DOD, 0.5C charge & discharge @+25℃
[2] -10℃~10℃ will be derating
*System Usable Energy may be variant with different inverter brands

*Build Your Dreams*

# BYD B-Box BATTERY STORAGE

## B-Box LV Residential

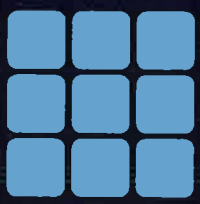


| Model | B-Box Res 2.5 | B-Box Res 5.0 | B-Box Res 7.5 | B-Box Res 10.0 |
|---|---|---|---|---|
| Battery Type | $LiFePO_4$ | | | |
| Battery Module | B-Plus 2.5 (2.56 kWh) | | | |
| | 1 module | 2 modules | 3 modules | 4 modules |
| Usable Energy [1] [kWh] | 2.56 | 5.12 | 7.68 | 10.24 |
| Max Output Power [2] [kW] | 2.56 | 5.12 | 5.12 | 5.12 |
| Peak Output Power [2] [kW] | 5.12, 30s | 5.12, 30s | 15.36, 5s | 20.48, 2s |
| Max Output Power [3] [kW] | 2.56 | 5.12 | 7.68 | 10.24 |
| Peak Output Power [3] [kW] | 5.12, 30s | 10.24, 30s | 15.36, 30s | 20.48, 30s |
| Round-Trip Efficiency | ≥95.3% (Under test condition [1] ) | | | |
| Nominal Voltage[V] | 51.2 | | | |
| Operating Voltage Range [V] | 43.2~56.4 | | | |
| Communication | CAN / RS485 | | | |
| Dimension [W × H × D, mm] | 620×1650×335 | | | |
| Net Weight [kg] | 103 | 137 | 171 | 205 |
| Enclosure Protection Rating | IP55 | | | |
| Warranty | 10 years | | | |
| Ambient Temperature Range [4] [℃ ] | -10 ~ +50 | | | |
| Certification & Safety Standard | TUV / CE / RCM / UN38.3 | | | |
| Scalability | Max. 8 B-Box Res 10.0 systems in parallel | | | |
| Compatible Inverters | SMA / GOODWE / SOLAX / victron, more brands to be announced | | | |

[1]Test conditions: 100% DOD, 0.5C charge & discharge @+25℃
[2] Max current of main circuit breaker
[3] Bypass main circuit breaker and use a seprate circuit breaker
[4] -10℃~10℃ will be derating
*System Usable Energy may be variant with different inverter brands

*Build Your Dreams*

V2.4 2017




BYD COMPANY LIMITED

Address: No.3009, BYD Road, Pingshan, Shenzhen, 518118, P.R.China

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Web: www.byd.com/energy

Tel: +86-89888888-61801/61579 /61581

Facebook.com/bydcompany Twitter.com/bydcompany Youtube.com/bydcompany

# WARRANTY LETTER FOR BYD BATTERY BOX & BATTERY PLUS (B-BOX&B-PLUS)

**Draft version (14/12/2016)**

Thanks for selecting the **Battery box & Battery plus (B-Box&B-plus)**; hereinafter referred to as "Product") of BYD Lithium battery Co., Ltd (hereinafter referred to as "BYD").

Following warranty service is provided for the Product: B-BOX 2.5/5.0/7.5/10.0

1. Applicable region

The warranty is only applicable for home application Products sold in the territory of Australia.

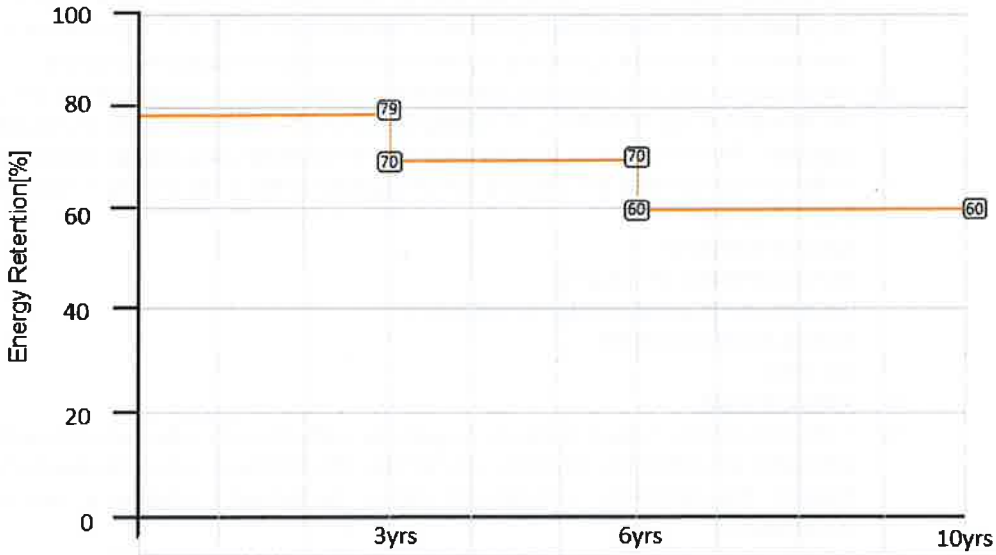
2. Warranty period

Unless otherwise specified herein, the commencement time and period of the warranty shall be as follows:

2.1 Ten (10) years after the Date of the customer purchase invoice.

3. Warranty

Products capacity warranty:Please refer to the below warranty chart for the first ten (10) years use and at least sixty percent (60%) of battery's usable capacity (net capacity) after the tenth ($10^{th}$) year of the date of invoice from vendor or within the throughput energy as shown in below chart.




| | 3yrs | 6yrs | 10yrs |
|---|---|---|---|
| B-BOX 2.5 | 2.2MWh | 4.2MWh | 6.4MWh |
| B-BOX 5.0 | 4.5MWh | 8.4MWh | 12.8MWh |
| B-BOX 7.5 | 6.8MWh | 12.6MWh | 19.2MWh |
| B-BOX 10.0 | 9MWh | 16.8MWh | 25.6MWh |

**Capacity test standard:**

Environment temperature: 25~30℃

Working temperature: 25~30℃

Charge/discharge method:

i. Discharge the battery with constant 0.2C until the battery voltage is 40V or battery self-protection

automatically.

ii. Lay aside the battery for 10mins.

iii. Charge the battery with constant 0.2C and constant 56.5V until the current is 0.05C.

iv. Lay aside the battery for 10mins.

v. Discharge the battery with constant 0.2C until the battery voltage is 40V or battery self-protection automatically. Calculate discharged capacity. Monitor current timely.(If it's constant current, Calculate formula is: discharge time × constant current value=capacity).

vi. Charge the battery with constant 0.2C and constant 56.5V until the current is 0.05C.

3.1 If the battery is within capacity warranty period and the battery capacity is lower than warranted capacity which verified by personnel recognized or authorized by BYD, BYD agrees to provide replace or repair service subject to this Warranty Letter.

4. Preconditions for warranty

Following preconditions shall be met:

4.1 Product shall fall within the warranty period.

4.2 Any system failure, fault or warning information must be reported to BYD or authorized service partner within 2 weeks of appearance.

4.3 Product shall be installed by personnel recognized or authorized service partner.

4.4 Customer shall correctly operate and use the system according to user manual and installation manual.

4.5 Customers shall provide the proof of the original purchase of the product.

4.6 Provided that in any event the installation of the Subject of the Warranty for the Customer shall be completed within twelve (12) months from the date of manufacturing date of the Subject of the Warranty.

4.7 The ambient temperature during the operation of the product must not exceed 0 ℃~50 ℃ temperature range and the product shall not be exposed to or to be stored in a temperature higher than 55 ℃.The battery room must be ventilated in accordance with the requirements of the battery manufacturer.

4.8 The product can only be installed and operated in household energy storage applications with an average of one full cycle[1] per day. The B-BOX is not suitable for supplying life-sustaining medical devices and automotive application. The warranty will be voided if usage exceeds household energy storage applications.

4.9 Product must be operated with a battery inverter approved by BYD as stated in the compatibility list of BYD from time to time.

Approved Inverter list:

SMA:Sunny Island 3.0/4.4/6.0/8.0

GOODWE:GW5048D-ES/GW3648D-ES/GW2500 BP

SolaX:SK-SU3000/3700/5000

(4Q. 2016)

5 Replace or Repair

5.1 In the event that any Product covered by the warranty as this Warranty Letter and confirmed by BYD to be defective or non-conformity, BYD shall replace or repair the defective or non-conforming Product at its own discretion. Any maintenance or replacement shall not be deemed as extension or recalculation of the warranty period.

5.2 BYD or Service Provider should respond within 2 working days after receipt after service.

5.3 BYD will be responsible for the approved repair or replacement costs in connection with such non-conforming or defective Product. BYD reserves the ownership of replaced battery or Products. Unless otherwise agreed by BYD, the replaced battery or Products shall be returned by customer to the place designated by BYD in the same or similar package within 4 weeks.

5.4 Provided that BYD has discontinued the manufacture of the Product in issue at the time the related warranty claim which confirmed by BYD, BYD shall, at its sole option, replace it with a different type of Product (of

[1] Full cycle:Discharge the usable capacity of a fully charged battery and fully charge it afterwards. Micro cycles sum up to full cycles according to amount of energy charged and discharged.

mutually agreed size, color, shape and/or power) or refund the purchase price prorated by the days of the relevant Warranty Period remaining.

5.5 Replacement of battery, components or Products may not be brand new but with quality and specification compliant with the Product specifications.

6 Exception of Warranty:

6.1 Quality or capacity warranty period expires.

6.2 Damage and defect caused to products by customer due to improper use, misuse, abuse, which nonconforming with user manual or accident.

6.3 Damage caused during transport, incorrect product installation, exceed of temperature range and improper use.

6.4 Unauthorised wiring and use with faulty or incompatible devices or devices with safety issues.

6.5 Product arbitrarily modified or its function changed without authorization from BYD.

6.6 Any changes to the installation do not in accordance with the B-BOX installation manual.

6.7 Damage caused to product due to maintenance and other services conducted not by personnel authorized by BYD.

6.8 Customer fails to provide correct product serial number or product serial number is undecipherable or modified without permission.

6.9 Product damage caused by external force, force majeure (unforeseeable, unavoidable and insurmountable objective events, including but not limited to war, civil war, strike, riot or other activities intervened by government) or other third party.

6.10 The defect cannot be overcome under the technology condition when the Products sold to customer.

6.11 Defects of Products arising due to technology update, or renewal of the national or regional laws or regulations.

6.12 Product damage caused by customer deliberately or by willful acts;

6.13 Failure report not provided within 2 weeks of appearance.

7 Non-Applicability of warranty claim

In case a warranty claim is reported which shows not to be valid, the costs incurred by BYD or installer due to this non-applicability of warranty claim shall be covered by customer unless this non-applicability was not visible for customer according to given circumstances.

8 Warranty restriction

Unless otherwise specified herein, to the extent permitted by applicable law, the Warranty Letter and above remedies shall be exclusive and replace all other guarantees and remedies, oral or in writing, expressed or implied. To the extent permitted by applicable law, BYD expressly reject any and all legal or implied warranty, including but not limited to warranties of merchantability, fitness for a particular purpose and hidden or potential defects. If BYD cannot abandon implied warranty as prescribed by applicable law or the guarantee specified by applicable laws, all of such guarantees and warranties shall limit to implied warranty as prescribed by applicable law or the scope within applicable laws and shall be under mandatory application according to applicable law. No distributor, agent or staff of BYD is authorized to make any revision, extension or addition to the quality warranty. The legality and enforceability of remaining clauses herein shall not be affected or damaged if any of clauses herein is adjudged to be illegal or unenforceable.

Unless otherwise specified herein, to the maximum range permitted by applicable law, BYD shall not be liable for any direct, indirect, special, accidental or derivative losses caused by the purchase or use of products and its system, including but not limited to the loss of use, loss in income, actual or expected loss in revenue (including contract revenue losses), loss of the use of money, loss of anticipated savings, loss of business, loss of opportunity, loss of goodwill, loss of reputation, personal injury or damage loss, or the indirect or derivative loss or damage (including any expense arising from the replacement of equipment and property, resumption of production, etc.) caused by any reasons.

BYD'S LIABILITY FROM ANY CAUSE WHATSOEVER SHALL IN NO EVENT EXCEED THE AMOUNT OF THE PURCHASE PRICE PAID BY CUSTOMER TO BYD FOR SUCH PRODUCT GIVING RISE TO THE LIABILITY.

9 Update of warranty

To the extent permitted by the applicable law, BYD shall reserve the right update this warranty from time to time, and such update may by published on the official website of BYD or sent by email or to the address of customer(if provided by customer when purchase the Products).

10 Service out of warranty

As for the service for the Products out of warranty, BYD agrees to provide certain after sales service to customer upon the written request, and all the costs and expenses which include but not limited to the materials, parts or labor costs, shall be borne by customer. In case of customer give written notice to request the service out of warranty, customer shall provide detail description of defects so that BYD is able to detect whether such defect can be cured or not. For avoidance of doubt, in no event will BYD be liable for the service out of warranty, and this clause 10 will not constitute the promise of BYD to provide such service out of warranty.

11 Reporting of warranty

Please report warranty claims to one of the following addresses:
Customer Service Mailbox: *(eubatterygrp@byd.com)*

BYD LITHIUM BATTERY Co.,LTD
No.1,Baoping Road,Baolong Industrial Town Longgang Shenzhen, 518116, P.R.China

To receive customer support, the following information is required.

Product type
Serial Number
Connected PV module type and number
Option equipment
Any using problem please contact us by below address

**Contact us:**

**China**
BYD LITHIUM BATTERY Co.,LTD
Customer Service Mailbox: eubatterygrp@byd.com
Telephone:+86 0755 89888888
Address: No.1,Baoping Road,Baolong Industrial Town Longgang Shenzhen, 518116, P.R.China

**Austrlia**
Peng (Leo) Liu
Managing Director
Alps Power Pty Ltd
U201 15Chatham Road
West Ryde NSW 2114 Australia
M: +61478 140 287
E: leol@alpspower.com.au
W: www.alpspower.com.au

JA SOLAR

# JAP6(K)

## -72/310-330/4BB
## F 40-35

MULTICRYSTALLINE SILICON MODULE

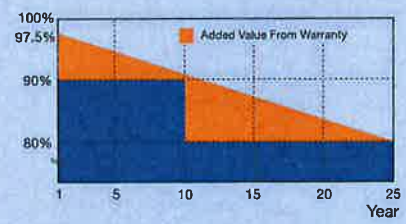
## JA Solar Holdings Co., Ltd.

JA Solar Holdings Co., Ltd. is a world-leading manufacturer of high-performance photovoltaic products that convert sunlight into electricity for residential, commercial, and utility-scale power generation. The company was founded on May 18, 2005, and was publicly listed on NASDAQ on February 7, 2007. JA Solar is one of the world's largest producers of solar cells and modules. Its standard and high-efficiency product offerings are among the most powerful and cost-effective in the industry.


Add: Building No.8, Nuode Center, Automobile Museum East Road, Fengtai District, Beijing
Tel: +86 (10) 63611888
Fax: +86 (10) 63611999
Email: sales@jasolar.com market@jasolar.com


## Superior Warranty

- 12-year product warranty
- 25-year linear power output warranty




## Key Features

- JA 4BB design module reduce cell series resistance and stress between cell interconnectors improves module reliability and module conversion efficiency
- High output, 16.99% highest conversion efficiency
- Designed for DC IEC 1000V applications
- Anti-reflective and anti-soiling surface reduces power loss from dirt and dust
- Outstanding performance in low-light irradiance environments
- Excellent mechanical load resistance: Certified to withstand high wind loads (2400Pa) and snow loads (5400Pa)
- High salt and ammonia resistance certified by TÜV NORD

## Reliable Quality

- Positive power tolerance: 0~+5W
- 100% EL double-inspection ensures modules are defects free
- Modules binned by current to improve system performance
- Potential Induced Degradation (PID) Resistant

## Comprehensive Certificates

- IEC 61215, IEC 61730, UL1703, CEC Listed, MCS and CE
- ISO 9001: 2008: Quality management systems
- ISO 14001: 2004: Environmental management systems
- BS OHSAS 18001: 2007: Occupational health and safety management systems
- Environmental policy: The first solar company in China to complete Intertek's carbon footprint evaluation program and receive green leaf mark verification for our products



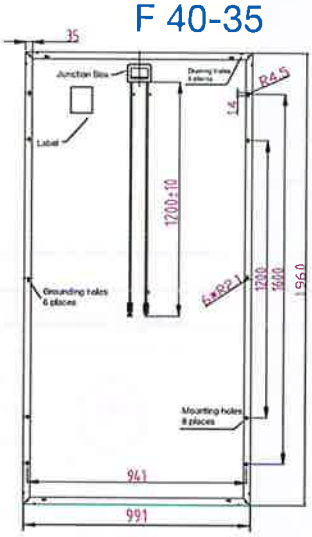
www.jasolar.com

# JAP6(K)-72/310-330/4BB

JA SOLAR

## Engineering Drawings

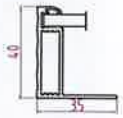
F 40-35





Units: mm

A-A




■ customized cable length available upon request

## MECHANICAL PARAMETERS

| | |
|---|---|
| Cell (mm) | Poly 156.75x156.75 |
| Weight (kg) | 23 (approx) |
| Dimensions (LxWxH) (mm) | 1960x991x40 |
| Cable Cross Section Size ($mm^2$) | 4 |
| No. of Cells and Connections | 72 (6x12) |
| Junction Box | IP67, 3 diodes |
| Connector | MC4 Compatible |
| Packaging Configuration | 27 Per Pallet |

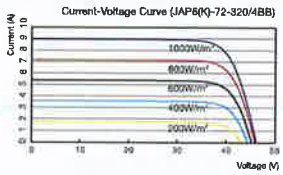
## WORKING CONDITIONS

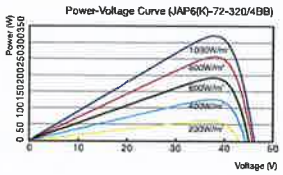
| | |
|---|---|
| Maximum System Voltage | DC 1000V (IEC) |
| Operating Temperature | -40°C~+85°C |
| Maximum Series Fuse | 15A |
| Maximum Static Load, Front (e.g., snow and wind)<br>Maximum Static Load, Back (e.g., wind) | 5400Pa (112 lb/ft²)<br>2400Pa (50 lb/ft²) |
| NOCT | 45±2°C |
| Application Class | Class A |

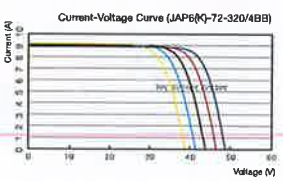
## ELECTRICAL PARAMETERS

| TYPE | JAP6(K)-72-310/4BB | JAP6(K)-72-315/4BB | JAP6(K)-72-320/4BB | JAP6(K)-72-325/4BB | JAP6(K)-72-330/4BB |
|---|---|---|---|---|---|
| Rated Maximum Power at STC (W) | 310 | 315 | 320 | 325 | 330 |
| Open Circuit Voltage (Voc/V) | 45.56 | 45.85 | 46.12 | 46.38 | 46.40 |
| Maximum Power Voltage (Vmp/V) | 36.89 | 37.09 | 37.28 | 37.39 | 37.65 |
| Short Circuit Current (Isc/A) | 8.92 | 9.01 | 9.09 | 9.17 | 9.28 |
| Maximum Power Current (Imp/A) | 8.40 | 8.49 | 8.58 | 8.69 | 8.77 |
| Module Efficiency [%] | 15.96 | 16.22 | 16.48 | 16.73 | 16.99 |
| Power Tolerance (W) | -0~+5W | | | | |
| Temperature Coefficient of Isc (αIsc) | +0.058%/°C | | | | |
| Temperature Coefficient of Voc (βVoc) | -0.330%/°C | | | | |
| Temperature Coefficient of Pmax (γPmp) | -0.410%/°C | | | | |
| STC | Irradiance 1000W/$m^2$, Cell Temperature 25°C, Air Mass 1.5 | | | | |

## I-V CURVE




## NOCT

| TYPE | JAP6(K)-72-310/4BB | JAP6(K)-72-315/4BB | JAP6(K)-72-320/4BB | JAP6(K)-72-325/4BB | JAP6(K)-72-330/4BB |
|---|---|---|---|---|---|
| Max Power (Pmax) [W] | 225.06 | 228.69 | 232.32 | 235.95 | 239.58 |
| Open Circuit Voltage (Voc) [V] | 41.63 | 41.84 | 42.04 | 42.24 | 42.41 |
| Max Power Voltage (Vmp) [V] | 33.87 | 34.00 | 34.19 | 34.37 | 34.58 |
| Short Circuit Current (Isc) [A] | 7.03 | 7.08 | 7.14 | 7.20 | 7.25 |
| Max Power Current (Imp) [A] | 6.65 | 6.73 | 6.80 | 6.87 | 6.93 |
| Condition | Under Normal Operating Cell Temperature, Irradiance of 800 W/$m^2$, spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s | | | | |

Electrical data in this catalog do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

# SUNNY ISLAND 4.4M / 6.0H / 8.0H
# FOR ON-GRID AND OFF-GRID APPLICATIONS

SMA


**Communicative**

- Communication via Ethernet and WLAN
- Webconnect
- Optimized data logging

**Reliable**

- 10-year warranty
- Particularly high overload capability
- IP54 for reliable operation in extreme environments

**Flexible**

- Works with self-consumption systems, battery backup systems and off-grid systems
- Ideal for retrofits or modular expansions of single-phase and three-phase systems

- All lead-acid batteries and over 20 different lithium-ion batteries can be used

## SUNNY ISLAND 4.4M / 6.0H / 8.0H

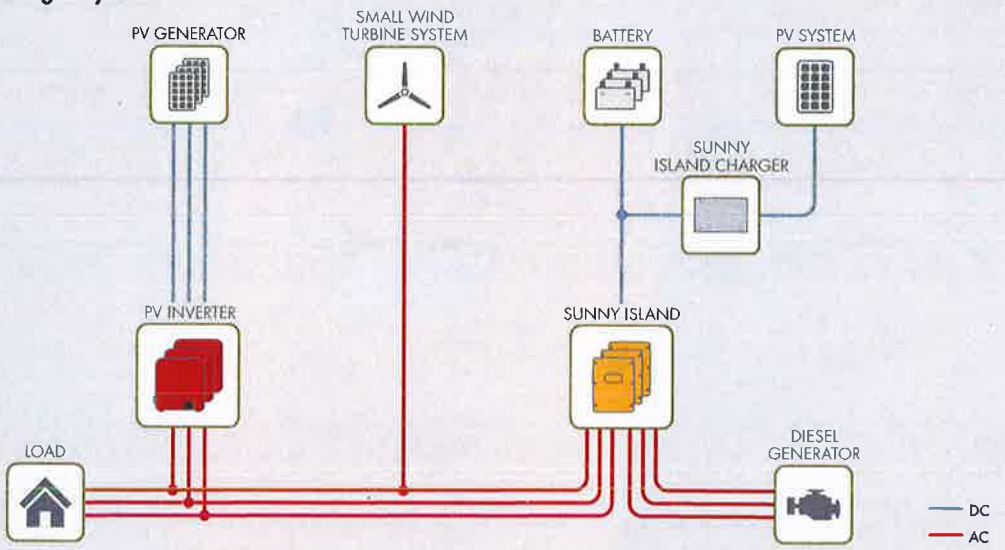
The most reliable all-purpose solution—easier than ever

The Sunny Island battery inverter supports a wide range of on- and off-grid installations with compelling product features—from operation in off-grid areas to home energy management. Users can benefit from SMA's experience in having more than 70,000 Sunny Island inverters installed worldwide. Thanks to its integrated web interface and standard interfaces WLAN and Ethernet, the Sunny Island 4.4M/6.0H/8.0H can be easily configured and monitored via smartphone or tablet. And being a core element in the SMA Flexible Storage System, the Sunny Island temporarily stores self-generated power thus making it possible to use solar power around-the-clock.

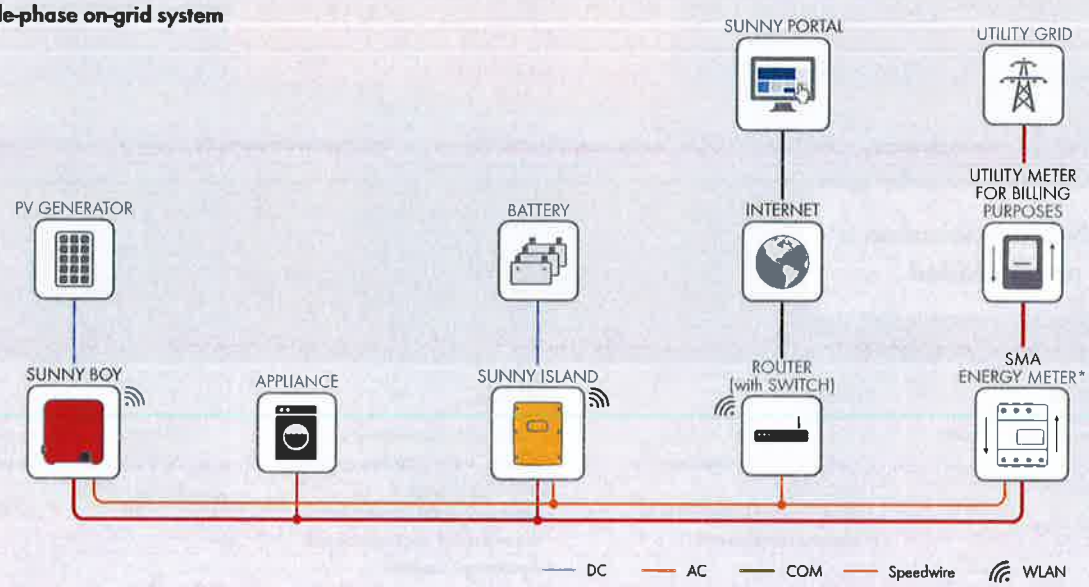
Its high protection class, wide temperature range and exceptional overload capacity always provide the kind of reliability needed for off-grid use. Intelligent load and energy management keeps the system running even in critical situations.

The Sunny Island is the ultimate all-purpose solution—and includes a 10-year warranty.

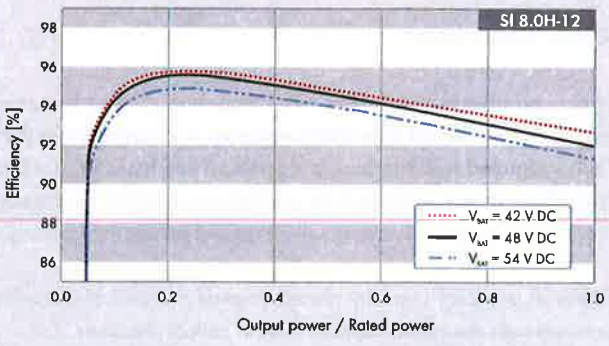
## Three-phase off-grid system



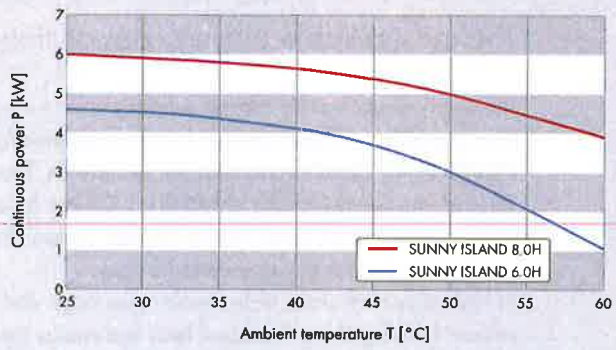

## Single-phase on-grid system




## Efficiency curve




## Power-temperature curve



| Technical Data | Sunny Island 4.4M | Sunny Island 6.0H | Sunny Island 8.0H |
|---|---|---|---|
| **Operation on the utility grid or generator** | | | |
| Rated grid voltage / AC voltage range | | 230 V / 172.5 V to 264.5 V | |
| Rated grid frequency / permitted frequency range | | 50 Hz / 40 Hz to 70 Hz | |
| Maximum AC current for increased self-consumption (grid operation) | 14.5 A | 20 A | 26 A |
| Maximum AC power for increased self-consumption (grid operation) | 3.3 kVA | 4.6 kVA | 6 kVA |
| Maximum AC input current | 50 A | 50 A | 50 A |
| Maximum AC input power | 11500 W | 11500 W | 11500 W |
| **Stand-alone or emergency power operation** | | | |
| Rated grid voltage / AC voltage range | | 230 V / 202 V to 253 V | |
| Rated frequency / frequency range (adjustable) | | 50 Hz / 45 Hz to 65 Hz | |
| Rated power (at Unom, fnom / 25°C / cos φ = 1) | 3300 W | 4600 W | 6000 W |
| AC power at 25°C for 30 min / 5 min / 3 sec | 4400 W / 4600 W / 5500 W | 6000 W / 6800 W / 11000 W | 8000 W / 9100 W / 11000 W |
| AC power at 45°C continuously | 3000 W | 3700 W | 5430 W |
| Rated current / maximum output current (peak) | 14.5 A / 60 A | 20 A / 120 A | 26 A / 120 A |
| Total harmonic distortion output voltage / power factor at rated power | < 5% / −1 to +1 | < 1.5% / −1 to +1 | < 1.5% / −1 to +1 |
| **Battery DC input** | | | |
| Rated input voltage / DC voltage range | 48 V / 41 V to 63 V | 48 V / 41 V to 63 V | 48 V / 41 V to 63 V |
| Maximum battery charging current / rated DC charging current / DC discharging current | 75 A / 63 A /75 A | 110 A / 90 A / 103 A | 140 A / 115 A /130 A |
| Battery type / battery capacity (range) | | Li-Ion[1], FLA, VRLA / 100 Ah to 10000 Ah (lead-acid) 50 Ah to 10000 Ah (li-Ion) | |
| Charge control | | IUoU charge procedure with automatic full charge and equalization charge | |
| **Efficiency / self-consumption of the device** | | | |
| Maximum efficiency | 95.5% | 95.8% | 95.8% |
| No-load consumption / standby | 18 W / 6.8 W | 25.8 W / 6.5 W | 25.8 W / 6.5 W |
| **Protective devices (equipment)** | | | |
| AC short-circuit / AC overload | | ● / ● | |
| DC reverse polarity protection / DC fuse | | – / – | |
| Overtemperature / battery deep discharge | | ● / ● | |
| Overvoltage category as per IEC 60664-1 | | III | |
| **General Data** | | | |
| Dimensions (W / H / D) | | 467 mm / 612 mm / 242 mm (18.4 inches / 21.1 inches / 9.5 inches) | |
| Weight | 44 kg (97 lbs) | 63 kg (138.9 lbs) | 63 kg (138.9 lbs) |
| Operating temperature range | | −25°C to +60°C (−13°F to +140°F) | |
| Protection class in accordance with IEC 62103 | | I | |
| Climatic category as per IEC 60721 | | 3K6 | |
| Degree of protection according to IEC 60529 | | IP54 | |
| **Features/function** | | | |
| WLAN, Speedwire / Webconnect / SI-SYSCAN (Multicluster) | ● / ● / – | ● / ● / ○ | ● / ● / ○ |
| Micro SD memory card for extended data logging | | ○ | |
| Display via smartphone, tablet, laptop / multifunction relay | | ● / 2 | |
| Three-phase systems (including rotating magnetic field) / battery-backup function | | ● / ● | |
| State of charge calculation / full charge / equalization charge | | ● / ● / ● | |
| Battery temperature sensor / data cables | | ○ / ● | |
| Certificates and approvals | | www.SMA-Solar.com | |
| Cover color yellow / aluminum white | | ○ / ○ | |
| Warranty 5/10 years | | ● / ●[3] | |
| **For off-grid applications** | | | |
| Automatic rotating magnetic field detection / generator support | | ● / ● | |
| Parallel connection / Multicluster | – / – | ● / ● | ● / ● |
| Integrated soft start | | ● | |
| **Accessory** | | | |
| **For off-grid applications** | | | |
| Battery fuse[2] | | ○ | |
| Sunny Island Charger SIC50-MPT[2] / SMA Cluster Controller | | ○ / ○ | |
| **For on-grid applications** | | | |
| Sunny Home Manager / SMA Energy Meter / automatic transfer switch for battery backup[2] | | ○ / ○ / ○ | |
| ● Standard feature ○ Optional feature – Not available<br>1) see "List of Approved Batteries" at www.SMA-Solar.com<br>2) Procurement via external supplier<br>3) with registration via the information sheet provided<br>All specifications, last updated: July 2017 | | | |
| Type designation | SI4.4M-12 | SI6.0H-12 | SI8.0H-12 |

# SUNNY DESIGN

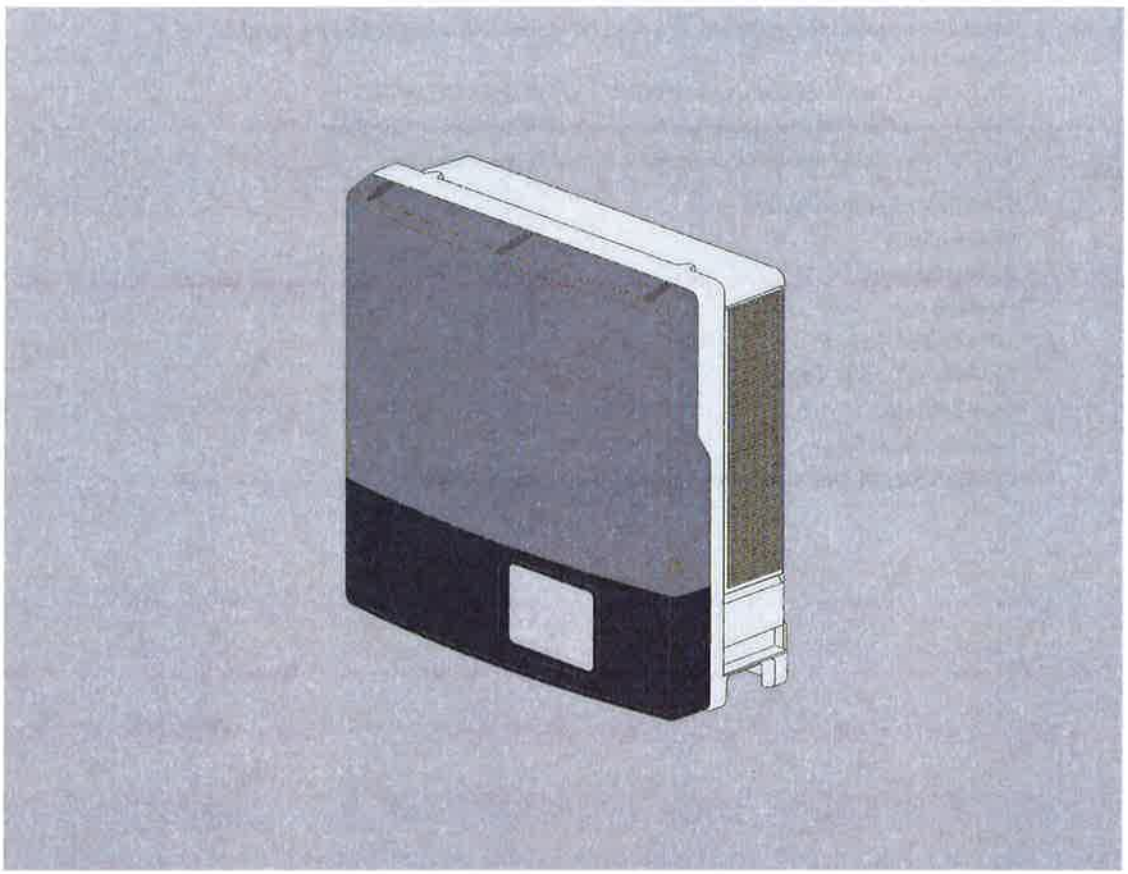
## System Design Made Easy


**www.SMA-Solar.com**

**SMA Solar Technology**

Operating Manual

# SUNNY TRIPOWER 20000TL / 25000TL



STP20-25TL-BE-en-11 | Version 1.1

AMERICAN ENGLISH

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34266 Niestetal

Germany

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Fax +49 561 9522-100

www.SMA.de

E-mail: info@SMA.de

# Table of Contents

# 1 Information on this Document

## 1.1 Validity

This document is valid for the following device types:

- STP 20000TL-30 (Sunny Tripower 20000TL)
- STP 25000TL-30 (Sunny Tripower 25000TL)

## 1.2 Target Group

This document is intended for qualified persons and end users. Only qualified persons are allowed to perform the activities marked in this document with a warning symbol and the caption "Qualified person". Tasks that do not require any particular qualification are not marked and can also be performed by end users. Qualified persons must have the following skills:

- Knowledge of how an inverter works and is operated
- Training in how to deal with the dangers and risks associated with installing and using electrical devices and installations
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of the applicable standards and directives
- Knowledge of and compliance with this document and all safety information

## 1.3 Additional Information

Links to additional information can be found at www.SMA-Solar.com:

| Document title and content | Document type |
|---|---|
| "Service Manual STP 20000TL / 25000TL"<br>Troubleshooting, cleaning, replacement of varistors and surge arresters type II and decommissioning | Service Manual |
| "SMA Speedwire/Webconnect data module"<br>Connection to the Speedwire/Webconnect data module | Installation Manual |
| "Webconnect Systems in Sunny Portal"<br>Registration in Sunny Portal and setting or changing operating parameters of the inverter | User Manual |
| "Overview of the Rotary Switch Settings"<br>Overview of the rotary switch settings for configuring the country data set and display language | Technical Information |
| "Efficiency and Derating"<br>Efficiency and derating behavior of the Sunny Boy, Sunny Tripower and Sunny Mini Central inverters | Technical Information |
| "Criteria for Selecting a Residual-Current Device" | Technical Information |

| Document title and content | Document type |
|---|---|
| "Circuit Breaker"<br>Dimensioning and selection of a suitable AC circuit breaker for inverters under PV-specific influences | Technical Information |
| "Insulation Resistance (Riso) of Non-Galvanically Isolated PV Systems"<br>Calculating the insulation resistance for troubleshooting | Technical Information |
| "Shade Management"<br>Efficient operation of partly shaded PV systems with OptiTrac Global Peak | Technical Information |
| "Leading Leakage Currents"<br>Information on the design of transformerless inverters | Technical Information |
| "Firmware Update with SD Card" | Technical Description |
| "Parameter List"<br>Overview of all inverter operating parameters and their configuration options | Technical Information |

## 1.4 Symbols

| Symbol | Explanation |
|---|---|
| ⚠ DANGER | Indicates a hazardous situation which, if not avoided, will result in death or serious injury |
| ⚠ WARNING | Indicates a hazardous situation which, if not avoided, can result in death or serious injury |
| ⚠ CAUTION | Indicates a hazardous situation which, if not avoided, can result in minor or moderate injury |
| *NOTICE* | Indicates a situation which, if not avoided, can result in property damage |
| ⚠ QUALIFIED PERSON | Sections describing activities to be performed by qualified persons only |
| 🛈 | Information that is important for a specific topic or goal, but is not safety-relevant |
| ☐ | Indicates a requirement for meeting a specific goal |
| ☑ | Desired result |
| ✖ | A problem that might occur |

## 1.5 Nomenclature

| Complete designation | Designation in this document |
|---|---|
| Sunny Tripower | Inverter, product |

# 2 Safety

## 2.1 Intended Use

The Sunny Tripower is a transformerless PV inverter with two MPP trackers which converts the direct current of the PV array to grid-compliant three-phase current and feeds it into the utility grid.

The product is suitable for indoor and outdoor use.

The product must only be operated with PV arrays of protection class II in accordance with IEC 61730, application class A. The PV modules must be compatible with this product.

PV modules with a high capacity to ground must only be used if their coupling capacity does not exceed 3.5 µF (for information on how to calculate the coupling capacity, see the Technical Information "Leading Leakage Currents" at www.SMA-Solar.com).

All components must remain within their permitted operating ranges at all times.

The product must only be used in countries for which it is approved or released by SMA Solar Technology AG and the grid operator.

Use this product only in accordance with the information provided in the enclosed documentation and with the locally applicable standards and directives. Any other application may cause personal injury or property damage.

Alterations to the product, e.g. changes or modifications, are only permitted with the express written permission of SMA Solar Technology AG. Unauthorized alterations will void guarantee and warranty claims and usually void the operation permit. SMA Solar Technology AG shall not be held liable for any damage caused by such changes.

Any use of the product other than that described in the Intended Use section does not qualify as appropriate.

The enclosed documentation is an integral part of this product. Keep the documentation in a convenient place for future reference and observe all instructions contained therein.

The type label must remain permanently attached to the product.

## 2.2 Safety Information

This section contains safety information that must be observed at all times when working on or with the product.

To prevent personal injury and property damage and to ensure long-term operation of the product, read this section carefully and observe all safety information at all times.

**⚠ DANGER**

**Danger to life due to high voltages of the PV array**

When exposed to sunlight, the PV array generates dangerous DC voltage which is present in the DC conductors and the live components of the inverter. Touching the DC conductors or the live components can lead to lethal electric shocks. If you disconnect the DC connectors from the inverter under load, an electric arc may occur leading to electric shock and burns.

- Do not touch uninsulated cable ends.
- Do not touch the DC conductors.
- Do not touch any live components of the inverter.
- Have the inverter mounted, installed and commissioned only by qualified persons with the appropriate skills.
- If an error occurs, have it rectified by qualified persons only.
- Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this document (see Section 9 "Disconnecting the Inverter from Voltage Sources", page 38).

**⚠ DANGER**

**Danger to life due to electric shock**

Touching an ungrounded PV module or array frame can cause a fatal electric shock.

- Connect and ground the PV modules, array frame and electrically conductive surfaces so that there is continuous conduction. Observe the applicable local regulations.

**⚠ CAUTION**

**Risk of burns due to hot enclosure parts**

Some parts of the enclosure can get hot during operation.

- Do not touch any parts other than the lower enclosure lid of the inverter during operation.

***NOTICE***

**Damage to the seal of the enclosure lids in subfreezing conditions**

If you open the upper and lower enclosure lids in subfreezing conditions, the seals on the enclosure lids can be damaged. This can lead to moisture entering the inverter.

- Do not open the inverter at ambient temperatures lower than -5 °C.
- If a layer of ice has formed on the seal of the lid in subfreezing conditions, remove it prior to opening the enclosure lids of the inverter (e.g. by melting the ice with warm air). Observe the applicable safety regulations.

# 3 Scope of Delivery

Check the scope of delivery for completeness and any externally visible damage. Contact your distributor if the scope of delivery is incomplete or damaged.

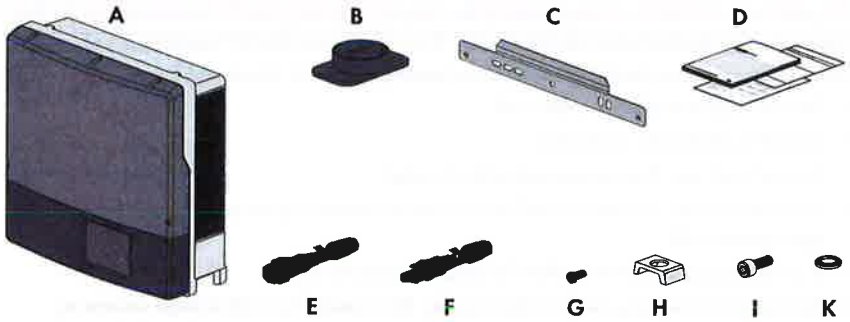



Figure 1: Components included in the scope of delivery

| Position | Quantity | Designation |
|---|---|---|
| A | 1 | Inverter |
| B | 1 | DC load-break switch |
| C | 1 | Wall mounting bracket |
| D | 1 | Operating manual, supplementary sheet with default settings, installation manual of the DC connector |
| E | 6 | Negative DC connector |
| F | 6 | Positive DC connector |
| G | 6 | Sealing plug |
| H | 1 | Clamping bracket |
| I | 1 | Cylindrical screw M6 x 16 |
| K | 1 | Conical spring washer M6 |

# 4 Product Description

## 4.1 Sunny Tripower

The Sunny Tripower is a transformerless PV inverter with two MPP trackers which converts the direct current of the PV array to grid-compliant three-phase current and feeds it into the utility grid.

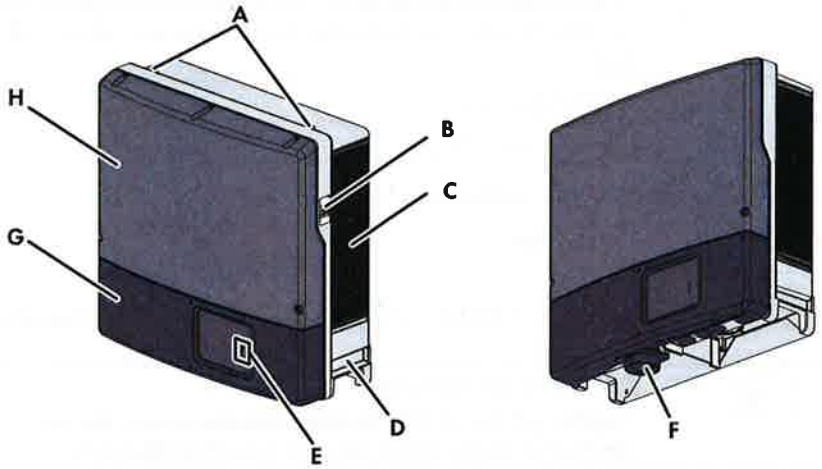



Figure 2: Design of the Sunny Tripower

| Position | Designation |
|---|---|
| A | Thread for screwing in two eye bolts for transport |
| B | Type label<br>The type label uniquely identifies the inverter. You will require the information on the type label to use the product safely and when seeking customer support from the SMA Service Line. You will find the following information on the type label:<br>• Device type (Model)<br>• Serial number (Serial No.)<br>• Date of manufacture<br>• Device-specific characteristics |
| C | Ventilation grid |
| D | Recessed grip |
| E | LEDs<br>The LEDs indicate the operating state of the inverter (see Section 4.2 "LED Signals", page 13). |

| Position | Designation |
|---|---|
| F | DC load-break switch<br>The inverter is equipped with a DC load-break switch. If the DC load-break switch is set to the position **I**, it establishes a conductive connection between the PV array and the inverter. Setting the DC load-break switch to the **O** position interrupts the DC electric circuit and completely disconnects the PV array from the inverter. Disconnection takes place at all poles. |
| G | Lower enclosure lid |
| H | Upper enclosure lid |

## Symbols on the Inverter and on the Type Label

| Symbol | Explanation |
|---|---|
|  | Inverter<br>Together with the green LED, this symbol indicates the operating state of the inverter. |
|  | Observe the documentation.<br>Together with the red LED, this symbol indicates an error (for troubleshooting, see the service manual at www.SMA-Solar.com). |
|  | Data transmission |
|  | Danger<br>This symbol indicates that the inverter must be additionally grounded if a second grounding conductor or equipotential bonding is required locally . |
|  | QR Code<br>Links to additional information on the inverter can be found at www.SMA-Solar.com. |
|  | Danger to life due to electric shock<br>The product operates at high voltages. All work on the product must be carried out by qualified persons only. |
|  | Risk of burns due to hot surfaces<br>The product can get hot during operation. Avoid contact during operation. Allow the product to cool down sufficiently before carrying out any work. |

| Symbol | Explanation |
|---|---|
|  | Observe the documentation.<br>Observe all documentation supplied with the product. |
| DC | Direct current |
|  | The product does not have a transformer. |
| AC<br>3N | Three-phase alternating current with neutral conductor |
|  | WEEE designation<br>Do not dispose of the product together with the household waste but in accordance with the locally applicable disposal regulations for electronic waste. |
| CE | CE marking<br>The product complies with the requirements of the applicable EU directives. |
| IP65 | Degree of protection IP65<br>The product is protected against dust intrusion and water jets from any angle. |
|  | The product is suitable for outdoor installation. |
|  | Certified safety<br>The product is VDE-tested and complies with the requirements of the German Equipment and Product Safety Act. |
|  | RCM (Regulatory Compliance Mark)<br>The product complies with the requirements of the applicable Australian standards. |

## 4.2 LED Signals

The LEDs indicate the operating state of the inverter.

| LED | Status | Explanation |
|---|---|---|
| Green LED | glowing | Feed-in operation<br>If an event occurs during feed-in operation, an event message will be shown in the communication product (for event messages see the service manual at www.SMA-Solar.com). |
| | flashing | The conditions for feed-in operation are not yet met. As soon as the conditions are met, the inverter will start feed-in operation. |
| Red LED | glowing | Error<br>An error has occurred. The error must be rectified by a qualified person (for troubleshooting, see the service manual at www.SMA-Solar.com). |
| Blue LED | - | No function |

## 4.3 Interfaces and Functions

The inverter can be equipped or retrofitted with the following interfaces and functions:

### SMA Speedwire/Webconnect

The inverter is equipped with SMA Speedwire/Webconnect as standard. SMA Speedwire/Webconnect is a type of communication based on the Ethernet standard. This enables inverter-optimized 10/100 Mbit data transmission between Speedwire devices in PV systems and the software Sunny Explorer. The Webconnect function enables direct data transmission between the inverters of a small-scale system and the Internet portal Sunny Portal without any additional communication device and for a maximum of four inverters per Sunny Portal system. In large-scale PV power plants, data transmission to the Internet portal Sunny Portal is carried out via the SMA Cluster Controller. You can access your Sunny Portal system from any computer with an Internet connection.

SMA Speedwire/Webconnect enables, for PV systems operated in Italy, the connection to or disconnection of the inverter from the utility grid and definition of the frequency limits to be used with IEC61850-GOOSE messages.

### RS485 interface

The inverter can communicate via cables with special SMA communication products via the RS485 interface (information on supported SMA products at www.SMA-Solar.com). The RS485 interface can be retrofitted.

### Grid Management Services

The inverter is equipped with service functions for grid management.

Depending on the requirements of the grid operator, you can activate and configure the functions (e.g. active power limitation) via operating parameters.

### SMA Power Control Module

The SMA Power Control Module enables the inverter to implement grid management services and is equipped with an additional multifunction relay (for information on installation and configuration, see the installation manual of the SMA Power Control Module). The SMA Power Control Module can be retrofitted.

### Multifunction Relay

You can configure the multifunction relay for various operating modes. The multifunction relay is used, for example, to switch fault indicators on or off (for information on installation and configuration, see the installation manual of the multifunction relay). The multifunction relay can be retrofitted.

### SMA OptiTrac Global Peak

SMA OptiTrac Global Peak is an advancement of SMA OptiTrac and allows the operating point of the inverter to follow the MPP precisely at all times. In addition, with the aid of SMA OptiTrac Global Peak, the inverter can detect the presence of several maximum power points in the available operating range, such as may occur particularly with partially shaded strings. SMA OptiTrac Global Peak is enabled by default.

### Surge Arrester Type II

The surge arresters monitor the PV modules and limit dangerous overvoltages. Surge arresters of type II can be retrofitted.

# 5 Mounting

## 5.1 Requirements for Mounting

**Requirements for the mounting location:**

**⚠ WARNING**

**Danger to life due to fire or explosion**

Despite careful construction, electrical devices can cause fires.

- Do not mount the inverter in areas containing highly flammable materials or gases.
- Do not mount the inverter in a potentially explosive atmosphere.

- ☐ Do not mount the inverter on a pillar.
- ☐ The mounting location must be inaccessible to children.
- ☐ A solid support surface must be available for mounting, e.g. concrete or masonry. When mounted on drywall or similar materials, the inverter emits audible vibrations during operation which could be perceived as annoying.
- ☐ The mounting location must be suitable for the weight and dimensions of the inverter (see Section 10 "Technical Data", page 41).
- ☐ To ensure optimum operation, the ambient temperature should be between -25 °C and 40 °C.
- ☐ The mounting location should not be exposed to direct solar irradiation. Direct solar irradiation can cause the inverter to overheat. As a result, the inverter reduces its power output.
- ☐ Climatic conditions must be met (see Section 10 "Technical Data", page 41).
- ☐ The mounting location should be freely and safely accessible at all times without the need for any auxiliary equipment (such as scaffolding or lifting platforms). Non-fulfillment of these criteria may restrict servicing.

## Dimensions for mounting:

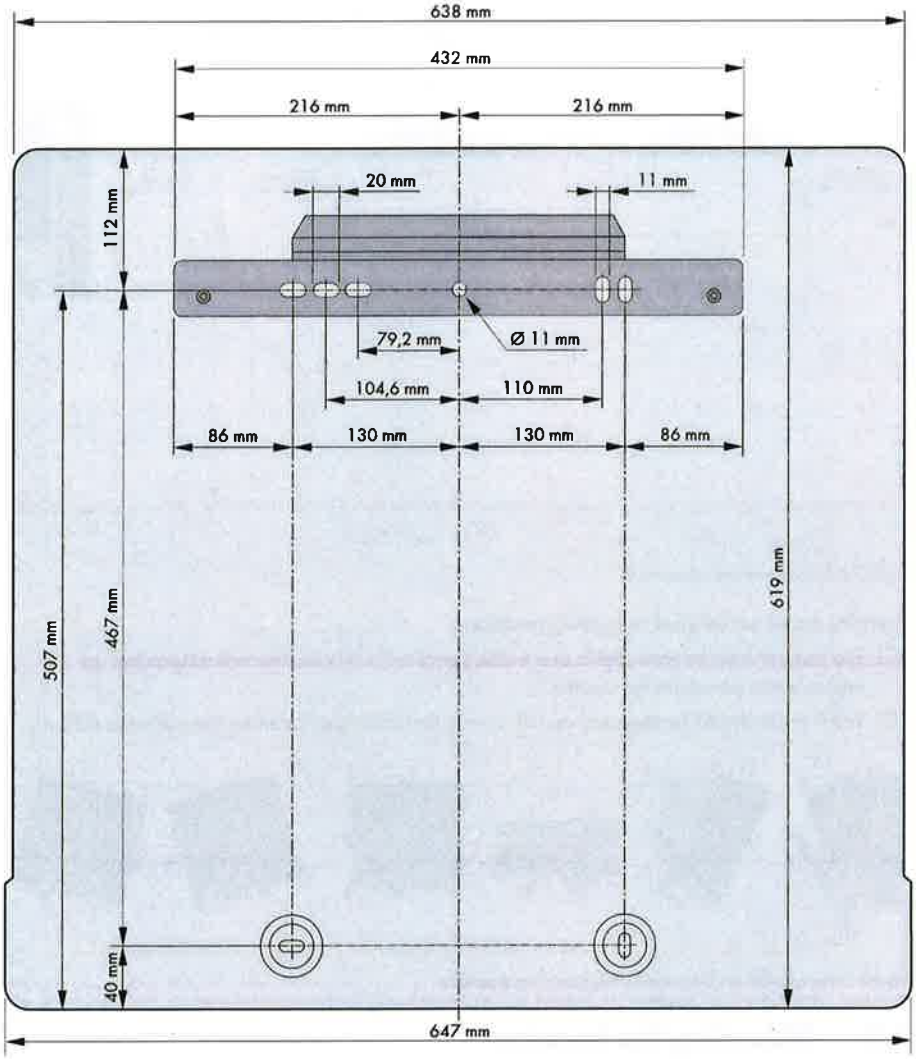



Figure 3: Position of the anchoring points

### Recommended clearances:

If you maintain the recommended clearances, adequate heat dissipation will be ensured. Thus, you will prevent power reduction due to excessive temperature.

- ☐ Maintain the recommended clearances to walls as well as to other inverters or objects.
- ☐ If multiple inverters are mounted in areas with high ambient temperatures, increase the clearances between the inverters and ensure sufficient fresh-air supply.

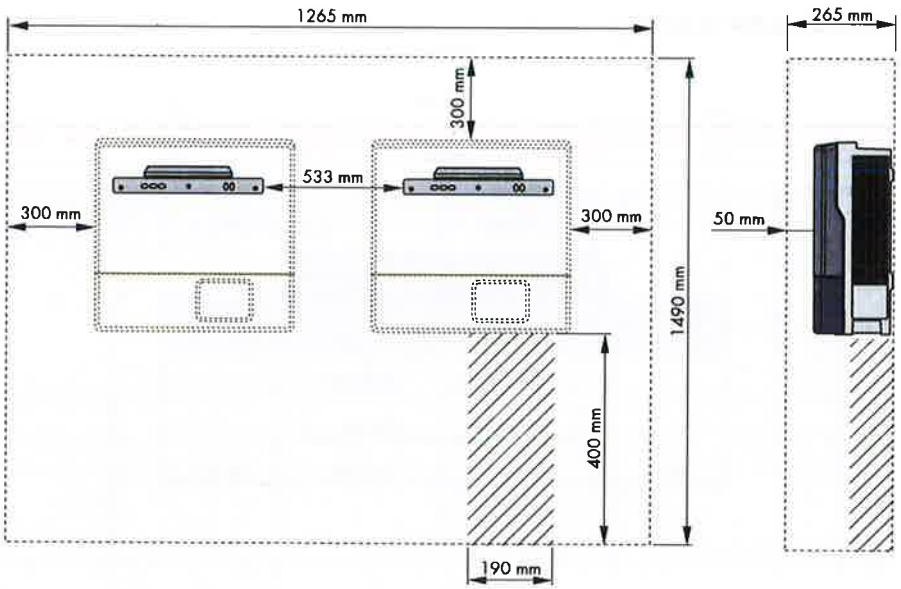



Figure 4: Recommended clearances

**Permitted and prohibited mounting positions:**

- ☐ The inverter must be mounted in one of the permitted positions. This will ensure that no moisture can penetrate the inverter.
- ☐ The inverter should be mounted in such a way that LED signals can be read without difficulty.

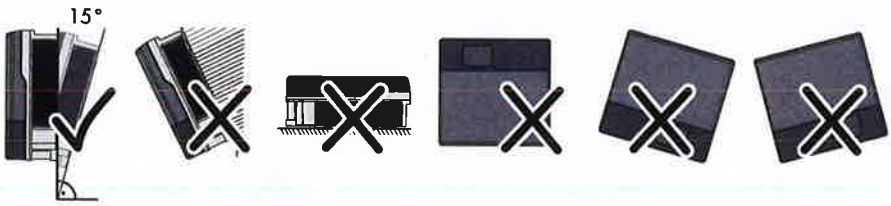



Figure 5: Permissible and impermissible mounting positions

## 5.2 Mounting the Inverter

**⚠ QUALIFIED PERSON**

**Additionally required mounting material (not included in the scope of delivery):**

- ☐ At least two screws that are suitable for the support surface (size: M10 at maximum)
- ☐ At least two washers that are suitable for the screws (diameter: 30 mm at maximum)
- ☐ If necessary, two screw anchors suitable for the support surface and the screws

☐ For transporting the inverter with a crane: two eye bolts suitable for the weight of the inverter (size: M10)

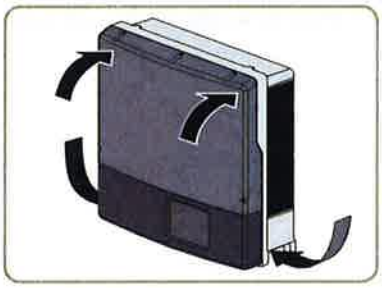
☐ To secure the inverter from being lifted off: two screws, washers and screw anchors that are suitable for the support surface

**⚠ CAUTION**

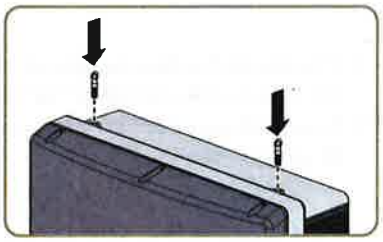
**Risk of injury when lifting the inverter, or if it is dropped**

The inverter weighs 61 kg. There is risk of injury if the inverter is lifted incorrectly or dropped while being transported or when attaching it to or removing it from the wall mounting bracket.

- Carry and lift the inverter in an upright position with several people without tilting it. With one hand grasp the recessed grip, and with the other hand support the top part of the enclosure. This will prevent the inverter tipping forward.



- If the inverter is to be transported and lifted with a crane, remove the filler plugs on the top of the inverter and screw the eye bolts into the threads.



**⚠ CAUTION**

**Risk of burns due to hot enclosure parts**

Some parts of the enclosure can get hot during operation.

- Mount the inverter in such a way that it cannot be touched inadvertently during operation.

**Procedure:**

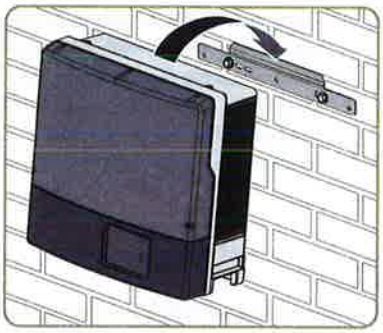
1. **⚠ CAUTION**

   **Risk of injury due to damaged cables**

   There may be power lines or other supply lines (e.g. gas or water) routed in the wall.

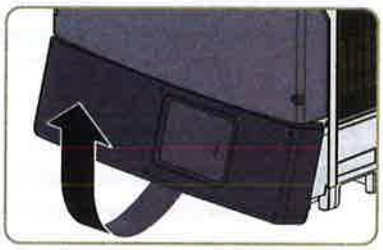
   - Ensure that no lines are laid in the wall which could be damaged when drilling holes.

2. Align the wall mounting bracket horizontally on the wall and use it to mark the position of the drill holes. Use at least one hole on the right-hand and left-hand side in the wall mounting bracket.
3. If the inverter is to be secured from being lifted off of the wall mounting bracket, mark the position of the drill holes for the screw that attaches the inverter to the wall mounting bracket. Observe the dimensions of the two anchoring points at the bottom of the inverter rear panel.
4. Set the wall mounting bracket aside and drill the marked holes.
5. Insert screw anchors into the drill holes if the support surface requires them.
6. Secure the wall mounting bracket horizontally using screws and washers.
7. Hook the inverter into the wall mounting bracket.

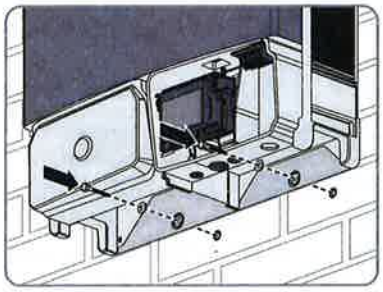


8. If the inverter has been transported with a crane, remove the eye bolts from the threads on the top of the inverter and reinsert the filler plugs.
9. Remove all six screws from the lower enclosure lid using an Allen key (AF 3).

10. Flip the lower enclosure lid up and remove it.



11. In order to secure the inverter from being lifted off the wall accidentally, attach it to the wall with suitable mounting material. Use both of the lower drill holes on the rear panel of the inverter.



12. Ensure that the inverter is securely in place.

# 6 Electrical Connection

## 6.1 Safety during Electrical Connection

**⚠ DANGER**

**Danger to life due to high voltages of the PV array**

When exposed to sunlight, the PV array generates dangerous DC voltage which is present in the DC conductors and the live components of the inverter. Touching the DC conductors or the live components can lead to lethal electric shocks. If you disconnect the DC connectors from the inverter under load, an electric arc may occur leading to electric shock and burns.

- Do not touch uninsulated cable ends.
- Do not touch the DC conductors.
- Do not touch any live components of the inverter.
- Have the inverter mounted, installed and commissioned only by qualified persons with the appropriate skills.
- If an error occurs, have it rectified by qualified persons only.
- Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this document (see Section 9 "Disconnecting the Inverter from Voltage Sources", page 38).

***NOTICE***

**Damage to the seal of the enclosure lids in subfreezing conditions**

If you open the upper and lower enclosure lids in subfreezing conditions, the seals on the enclosure lids can be damaged. This can lead to moisture entering the inverter.

- Do not open the inverter at ambient temperatures lower than -5 °C.
- If a layer of ice has formed on the seal of the lid in subfreezing conditions, remove it prior to opening the enclosure lids of the inverter (e.g. by melting the ice with warm air). Observe the applicable safety regulations.

***NOTICE***

**Damage to the inverter due to electrostatic discharge**

Touching electronic components can cause damage to or destroy the inverter through electrostatic discharge.

- Ground yourself before touching any component.

## 6.2 Overview of the Connection Area

### 6.2.1 View from Below

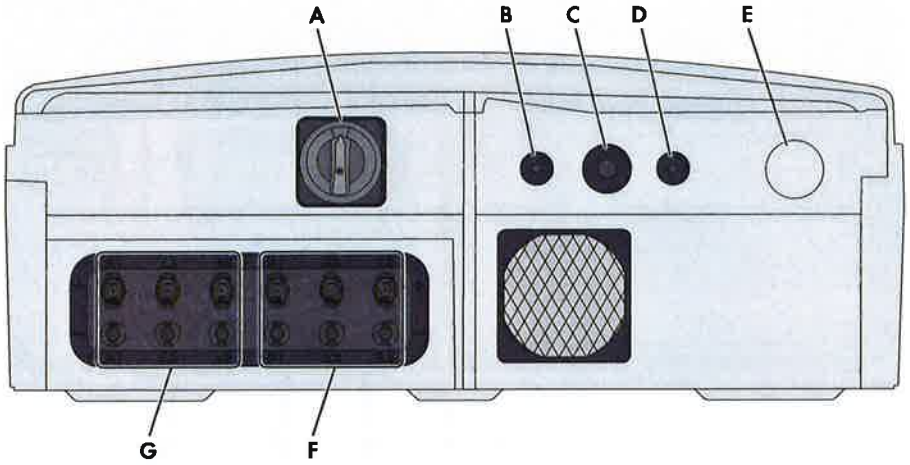



Figure 6: Enclosure openings at the bottom of the inverter

| Position | Designation |
|---|---|
| A | DC load-break switch |
| B | Enclosure opening M20 with filler plug for the connection cable of the multi-function relay or SMA Power Control Module |
| C | Enclosure opening M32 with filler plug for the data cables or network cables |
| D | Enclosure opening M20 with filler plug for the data cables or network cables |
| E | Enclosure opening for the AC connection |
| F | Positive and negative DC connectors, input B |
| G | Positive and negative DC connectors, input A |

### 6.2.2 Interior View

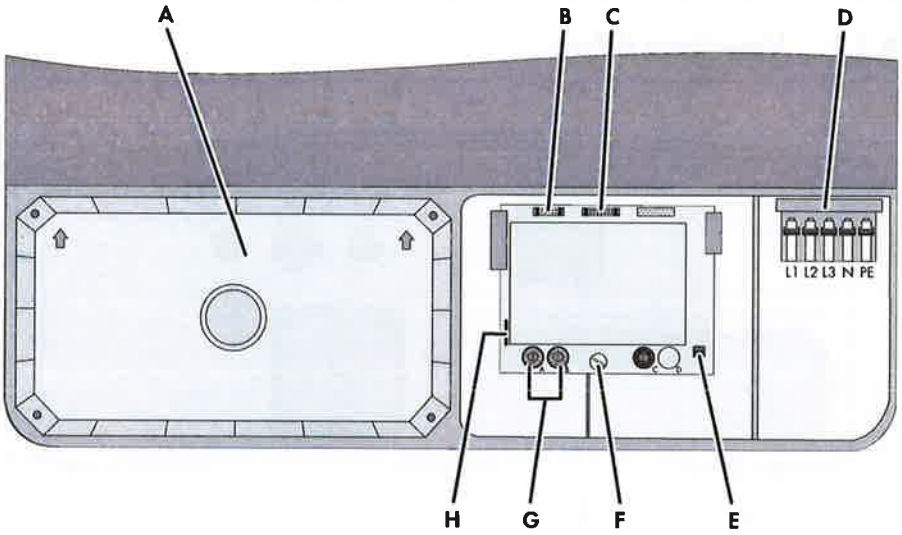



Figure 7: Connection areas in the interior of the inverter

| Position | Designation |
|---|---|
| A | DC protective cover |
| B | Pin connector for connecting the multifunction relay or the SMA Power Control Module |
| C | Pin connector for connecting the communication interface for RS485 |
| D | Connecting terminal plate for connecting the AC cable |
| E | Jumper slot for temporarily changing the display language to English (for service purposes) |
| F | Screw to release and attach the communication board |
| G | Rotary switch A and B for setting the country data set and the display language |
| H | Slot for the SD memory card (for service purposes) |

## 6.3 AC Connection

### 6.3.1 Requirements for the AC Connection

**Cable requirements:**

- ☐ External diameter: 14 mm to 25 mm
- ☐ Conductor cross-section: 6 mm² to 16 mm²

- ☐ Maximum conductor cross-section with bootlace ferrule: 10 mm²
- ☐ Insulation stripping length: 12 mm
- ☐ The cable must be dimensioned in accordance with the local and national directives for the dimensioning of cables. The requirements for the minimum wire size derive from these directives. Examples of factors influencing cable dimensioning are: nominal AC current, type of cable, routing method, cable bundling, ambient temperature and maximum desired line losses (for calculation of line losses, see the design software "Sunny Design" from software version 2.0 at www.SMA-Solar.com).

**Load-break switch and cable protection:**

***NOTICE***

**Damage to the inverter due to the use of screw-type fuses as load-break switches**

Screw-type fuses (e.g. DIAZED fuse or NEOZED fuse) are not load-break switches.

- Do not use screw-type fuses as load-break switches.
- Use a load-break switch or circuit breaker as a load disconnection unit (for information and design examples, see the Technical Information "Circuit Breaker" at www.SMA-Solar.com).

- ☐ In PV systems with multiple inverters, protect each inverter with a separate three-phase circuit breaker. Make sure to observe the maximum permissible fuse protection (see Section 10 "Technical Data", page 41). This will prevent residual voltage being present at the corresponding cable after disconnection.
- ☐ Loads installed between the inverter and the circuit breaker must be fused separately.

**Residual-current monitoring unit:**

- ☐ If an external residual-current device is required, install a residual-current device which trips at a residual current of 100 mA or higher (for details on selecting a residual-current device, see the Technical Information "Criteria for Selecting a Residual-Current Device" at www.SMA-Solar.com).

**Overvoltage category:**

The inverter can be used in grids of installation category III or lower in accordance with IEC 60664-1. That means that the inverter can be permanently connected to the grid-connection point of a building. In case of installations with long outdoor cabling routes, additional measures to reduce overvoltage category IV to overvoltage category III are required (see the Technical Information "Overvoltage protection" at www.SMA-Solar.com).

**i Safety in accordance with IEC 62109**

The inverter is not equipped with a grounding conductor monitoring device. In order to guarantee safety in accordance with IEC 62109, take one of the following measures:

- Connect a grounding conductor made of copper wire with a cross-section of at least 10 mm² to the connecting terminal plate for the AC cable.
- Connect additional grounding with the same cross-section as the connected grounding conductor to the connecting terminal plate for the AC cable (see Section 6.3.3 "Connecting Additional Grounding", page 27). This prevents touch current if the grounding conductor at the connecting terminal plate for the AC cable fails.

**Connection of additional grounding**

In some countries, additional grounding is generally required. In each case, observe the locally applicable regulations.

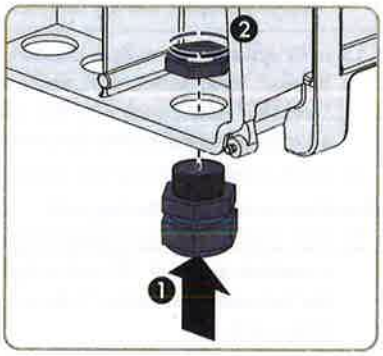
### 6.3.2 Connecting the Inverter to the Utility Grid

**QUALIFIED PERSON**

- ☐ The connection requirements of the grid operator must be met.
- ☐ The grid voltage must be in the permissible range. The exact operating range of the inverter is specified in the operating parameters.

**Procedure:**

1. Disconnect the circuit breaker from all three line conductors and secure against reconnection.
2. If the lower enclosure lid is mounted, loosen all screws of the lower enclosure lid using an Allen key (AF 3) and lift the enclosure lid from below and remove it.
3. Remove the adhesive tape from the enclosure opening for the AC cable.
4. Insert the cable gland from the outside into the enclosure opening and tighten it from the inside with the counter nut.




5. Route the AC cable into the inverter through the cable gland. If necessary, slightly loosen the swivel nut of the cable gland.
6. Remove the sheath from the AC cable.
7. Shorten L1, L2, L3 and N by 5 mm each.
8. Strip off the insulation of L1, L2, L3, N and PE by 12 mm.
9. Push the safety levers of the AC connecting terminal plate right up to the stop.
10. **CAUTION**

    **Risk of fire if two conductors are connected to one terminal**

    If you connect two conductors to a terminal, a fire can occur due to a bad electrical connection.

    - Never connect more than one conductor per terminal.

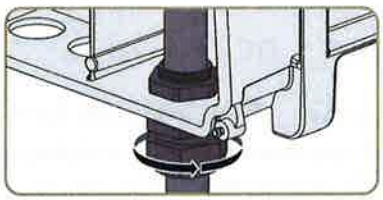
11. ⚠ CAUTION

**Danger of crushing when locking levers snap shut**

The locking levers close by snapping down fast and hard.

- Press the locking levers of the connecting terminal plate for the AC cable down with your thumb only.
- Do not grip the entire connecting terminal plate for the AC cable.
- Do not place your fingers under the locking levers.

12. Connect PE, N, L1, L2 and L3 according to the labeling to the connecting terminal plate for the AC cable and push the safety levers down. The direction of the rotating magnetic field of L1, L2 and L3 is not relevant.
13. Make sure that all conductors are securely in place.
14. Tighten the swivel nut of the cable gland.



## 6.3.3 Connecting Additional Grounding

⚠ QUALIFIED PERSON

If additional grounding or equipotential bonding is required locally, you can connect additional grounding to the inverter. This prevents touch current if the grounding conductor at the connecting terminal plate for the AC cable fails. The required clamping bracket, the screw and the conical spring washer are part of the scope of delivery of the inverter.

**Cable requirement:**

**Use of fine-stranded conductors**

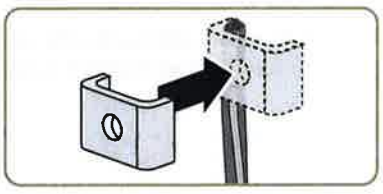
You can use an inflexible or a flexible, fine-stranded conductor.

- When using a fine-stranded conductor, it has to be double crimped by a ring terminal lug. Make sure that no insulated conductor is visible when pulling or bending. This will ensure sufficient strain relief by means of the ring terminal lug.

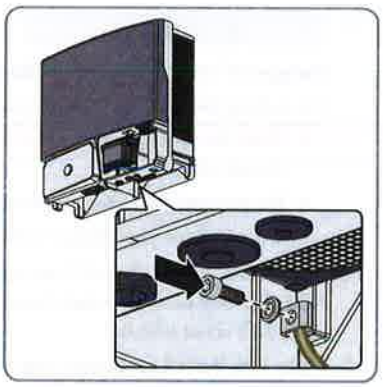
☐ Grounding cable cross-section: max. 16 mm²

**Procedure:**

1. Strip the grounding cable insulation.
2. Lead the clamping bracket over the grounding cable. Arrange the grounding cable on the left-hand side.



3. Screw the clamping bracket tight using the M6x16 cylindrical screw and the conical spring washer M6 (torque: 6 Nm). The teeth of the conical spring washer must face the clamping bracket.



## 6.4 DC Connection

### 6.4.1 Requirements for the DC Connection

**Requirements for the PV modules per input:**

- ☐ All PV modules must be of the same type.
- ☐ All PV modules must be aligned and tilted identically.
- ☐ On the coldest day based on statistical records, the open-circuit voltage of the PV array must never exceed the maximum input voltage of the inverter.
- ☐ The same number of series-connected PV modules must be connected to each string.
- ☐ The maximum input current per string must be maintained and must not exceed the through-fault current of the DC connectors (see Section 10 "Technical Data", page 41).
- ☐ The thresholds for the input voltage and the input current of the inverter must be adhered to (see Section 10 "Technical Data", page 41).
- ☐ The positive connection cables of the PV modules must be fitted with the positive DC connectors (for information on assembling DC connectors, see the DC connector installation manual).
- ☐ The negative connection cables of the PV modules must be fitted with the negative DC connectors (for information on assembling DC connectors, see the DC connector installation manual).

**i Use of Y adapters for parallel connection of strings**

The Y adapters must not be used to interrupt the DC circuit.

- Do not use the Y adapters in the immediate vicinity of the inverter. The adapters must not be visible or freely accessible.
- In order to interrupt the DC circuit, always disconnect the inverter as described in this document (see Section 9, page 38).

## 6.4.2 Connecting the PV Array

**⚠ QUALIFIED PERSON**

***NOTICE***

**Damage to the DC connectors due the use of contact cleaner of other cleaning agents**

Some contact cleaners or other cleaning agents may contain substances that decompose the plastic of the DC connectors.

- Do not use contact cleaners or other cleaning agents for cleaning the DC connectors.

**Procedure:**

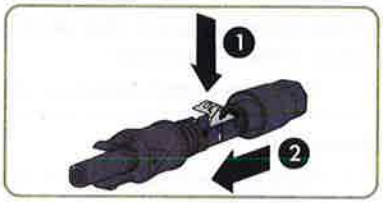
1. Ensure that the circuit breaker is switched off from all three line conductors and that it cannot be reconnected.
2. Ensure that there is no ground fault in the PV array (see service manual at www.SMA-Solar.com).
3. Check whether the DC connectors have the correct polarity.
   If the DC connector is equipped with a DC cable of the wrong polarity, the DC connector must be configured again. The DC cable must always have the same polarity as the DC connector.
4. Ensure that the open-circuit voltage of the PV array does not exceed the maximum input voltage of the inverter.
5. Connect the assembled DC connectors to the inverter.
   ☑ The DC connectors snap audibly into place.

6. **NOTICE**

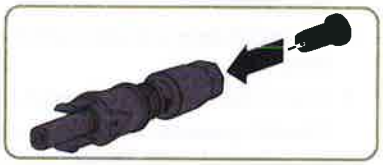
**Damage to the inverter due to moisture ingress**

The inverter is only properly sealed when all unused DC inputs are closed with DC connectors and sealing plugs.

- Do not insert the sealing plugs directly into the DC inputs on the inverter.
- For unused DC connectors, push down the clamping bracket and push the swivel nut up to the thread.

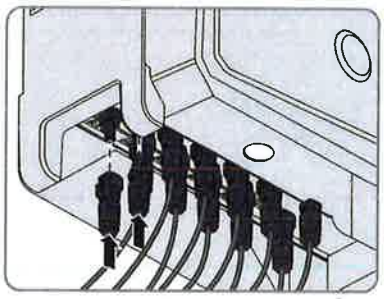



- Insert the sealing plug into the DC connector.



- Tighten the DC connector (torque: 2 Nm).

- Insert the DC connectors with sealing plugs into the corresponding DC inputs on the inverter.



☑ The DC connectors snap audibly into place.

7. Ensure that all DC connectors are securely in place.

# 7 Commissioning

## 7.1 Commissioning Procedure

**⚠ QUALIFIED PERSON**

Before you can commission the inverter, you must check various settings and make changes if necessary. This section describes the procedure and gives an overview of the steps, which must always be performed in the prescribed sequence.

| Procedure | | See |
|---|---|---|
| 1. | Connection to the SMA Speedwire/Webconnect data module | Installation manual of the SMA Speedwire/Webconnect data module |
| 2. | Check which country data set the inverter is set to. | Supplementary sheet with the default settings, type label or display |
| 3. | If the country data set is not set correctly for your country or your purpose, adjust to the required country data set. | Section 7.2, page 31 |
| 4. | Commission the inverter. | Section 7.3, page 33 |

## 7.2 Configuring the Country Data Set

**⚠ QUALIFIED PERSON**

**i The country data set must be set correctly.**

If you select a country data set which is not valid for your country and purpose, it can cause a disturbance in the PV system and lead to problems with the grid operator. When selecting the country data set, you must always observe the locally applicable standards and directives as well as the properties of the PV system (e.g. PV system size, grid-connection point).

- If you are not sure which country data set is valid for your country or purpose, contact your grid operator for information on which country data set is to be configured.

**i Country data set for operation with external decoupling protection**

When operating the PV system with external decoupling protection, the inverter has the additional country data set **Medium-Voltage Directive (Germany)** or **MVtgDirective**. This country data set allows you to extend the operating range of the inverter for voltage and frequency. This country data set should only be selected if the PV system is disconnected via external decoupling.

- If the country data set for operation is set with external decoupling protection, only operate the inverter with an external three-phase decoupling protection. Without external three-phase decoupling protection, the inverter will not disconnect from the utility grid when the country-specific standard requirement is exceeded.

**Procedure:**

**Rotary switch positions:**

This overview is only an extract at the time of printing. You can find a current, detailed list in the Technical Information ""Overview of the Rotary Switch Settings"" at www.SMA-Solar.com.

| Rotary switch A | Rotary switch B | Country data set |
|---|---|---|
| 0 | 0 | Default setting |
| 1 | 0 | VDE0126-1-1 |
| 1 | 2 | VDE-AR-N4105* |
| 1 | 6 | VDE-AR-N4105-HP** |
| 1 | B | VFR2014 |
| 2 | 8 | AS4777.3 |
| 3 | 2 | CEI 0-21 external*** |
| 4 | 0 | RD1699 |
| 4 | 1 | RD1663/661-A |
| 4 | 8 | PPC |
| 5 | A | G59/3 |
| 6 | 0 | EN50438 |
| 6 | E | NEN-EN50438 |
| 7 | 8 | C10/11/2012 |
| A | 0 | Medium-Voltage Directive (Germany) |
| A | C | SI4777_HS131_Pf |
| B | 0 | MVtgDirective Internal |
| B | 8 | IEC61727/MEA |
| B | C | IEC61727/PEA |
| D | 0 | Island mode 60 Hz |
| E | 0 | Island mode 50 Hz |

* Setting in accordance with VDE-AR-N 4105 for PV systems ≤ 3.86 kVA (Germany)
** Setting in accordance with VDE-AR-N 4105 for PV systems ≤ 13.8 kVA (Germany)
*** Setting in accordance with CEI 0-21 for PV systems with external grid and PV system protection > 6 kW (Italy)

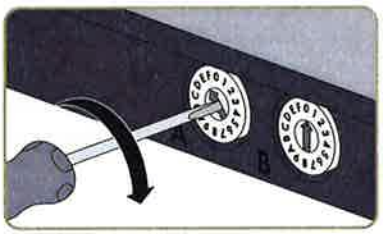
**Procedure:**

1. **⚠ DANGER**

   **Danger to life due to high voltages**

   - Ensure that the inverter is disconnected from all voltage sources and that the enclosure lid is removed (see Section 9, page 38).

2. Set the rotary switches **A** and **B** to the required position using a flat-blade screwdriver (blade width: 2.5 mm).



☑ The inverter will adopt the setting after commissioning. This can take up to five minutes.

## 7.3 Commissioning the Inverter

**⚠ QUALIFIED PERSON**

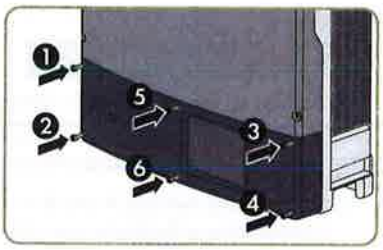
**Requirements:**

☐ The inverter must be correctly mounted.
☐ The circuit breaker must be correctly rated and mounted.
☐ All cables must be correctly connected.
☐ Unused DC inputs must be sealed using the corresponding DC connectors and sealing plugs.
☐ The country data set must be set correctly for the country or the purpose.
☐ Unused enclosure openings must be sealed tightly. The factory-mounted filler plugs can be used for that purpose.

**Procedure:**

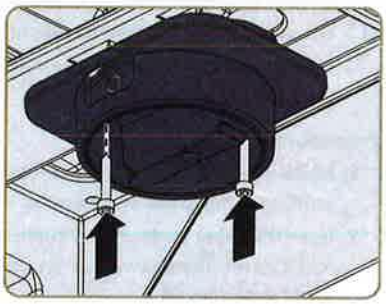
1. Make sure that the AC cable is routed in a such way that it cannot be damaged by the partition in the lower enclosure lid.
2. Insert the lower enclosure lid from above and fold it down. The screws must protrude from the lower enclosure lid.

3. Tighten all six screws with an Allen key (AF 3) in the order 1 to 6 (torque: 2.0 Nm ± 0.3 Nm). By tightening the screws in the prescribed order, you avoid warping the enclosure lid, which would keep it from sealing correctly.
   Useful hint: If the screws fall out of the lower enclosure lid, insert the long screw into the lower middle hole and the five short screws into the other holes.

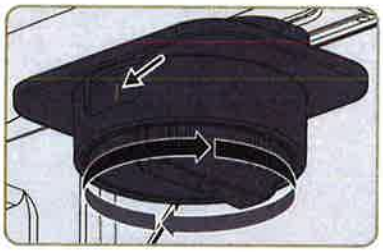



4. Set the DC load-break switch to the position **O** so that both mounting screws are visible.

5. Insert the DC load-break switch firmly into the recess on the inverter. During this process, the DC load-break switch must still be in the position **O** and aligned so that the screws are positioned over the threads.
6. Fasten the two screws using an Allen key (AF 3) (torque: 2 Nm ± 0.2 Nm).



7. Turn the DC load-break switch to the position **I**.



8. Switch on the circuit breaker of all three line conductors.

☑ All three LEDs start to glow and the start-up phase begins. The start-up phase may take several minutes.

☑ The green LED is glowing. Feed-in operation begins.

✖ The green LED is flashing?

Possible cause of error: the DC input voltage is still too low or the inverter is monitoring the utility grid.

- Once the DC input voltage is sufficiently high and the grid connection conditions are met, the inverter will start operation.

✖ The red LED is glowing and an error message and event number appear in the display?

- Rectify the error (see the service manual at www.SMA-Solar.com).

# 8 Configuration

## 8.1 Configuration Procedure

Once you have commissioned the inverter, you may have to adjust various settings via the rotary switches in the inverter or via a communication product. This section describes the procedure for configuration and gives an overview of the steps you must perform in the prescribed order.

| Procedure | | See |
|---|---|---|
| 1. | In order to use the Webconnect function, integrate the inverter into the network. | Section 8.2, page 36 |
| 2. | To manage the PV system data or to set the inverter parameters, capture the inverter in a communication product. | Manual of the communication product at www.SMA-Solar.com |
| 3. | In order to receive control commands of the grid operator via SMA Speedwire/Webconnect for PV systems in Italy, set the parameters. | Manual of the SMA Speedwire/Webconnect data module |
| 4. | Change the PV system time and PV system password. | Manual of the communication product at www.SMA-Solar.com |
| 5. | For partially shaded PV modules and depending on the given shading situation, you should set the interval at which the inverter optimizes the MPP of the PV system. | Section 8.4, page 37 |

## 8.2 Integrating the Inverter into the Network

If the router supports DHCP and DHCP is enabled, the inverter will automatically be integrated into the network. You will not need to carry out network configuration.

If the router does not support DHCP, automatic network configuration will not be possible and you will need to use SMA Connection Assist to integrate the inverter into the network.

**Requirements:**

☐ The inverter must be in operation.

☐ There must be a router with Internet connection in the local network of the system.

☐ The inverter must be connected to the router.

**Procedure:**

- Integrate the inverter into the network by means of the SMA Connection Assist. Download the SMA Connection Assist and install it on the computer (see www.SMA-Solar.com).

## 8.3 Changing Operating Parameters

**⚠ QUALIFIED PERSON**

This section describes the basic procedure for changing operating parameters. Always change operating parameters as described in this section. Some parameters that have sensitive functions can only be viewed and changed by qualified persons (for further information on changing parameters, refer to the manual of the communication product).

The operating parameters of the inverter are set to certain values by default. To optimize inverter operation, you can change the operating parameters using a communication product.

**Requirements:**

☐ Depending on the type of communication, a computer with Ethernet interface must be available.

☐ A communication product corresponding to the type of communication used must be available.

☐ The inverter must be registered in the communication product.

☐ The changes to the grid-relevant parameters must be approved by the responsible grid operator.

☐ When changing grid-relevant parameters, the SMA Grid Guard code must be available (see the Certificate "Order Form for the SMA Grid Guard Code" at www.SMA-Solar.com).

**Procedure:**

1. Call up the user interface of the communication product or software and log in as **Installer** or **User**.
2. If required, enter the SMA Grid Guard code.
3. Select and set the required parameter.
4. Save settings.

## 8.4 Setting SMA OptiTrac Global Peak

**⚠ QUALIFIED PERSON**

For partially shaded PV modules, you should set the interval at which the inverter is to optimize the MPP of the PV system.

The basic procedure for changing operating parameters is explained in another section (see Section 8.3 "Changing Operating Parameters", page 37).

**Procedure:**

- Select the parameter **Cycle time of the OptiTrac Global Peak algorithm** or **MPPShdw.CycTms** and set the required time interval. The ideal time interval is usually six minutes. This value should only be increased if the shading situation changes extremely slowly.

☑ The inverter optimizes the MPP of the PV system at the predetermined time interval.

# 9 Disconnecting the Inverter from Voltage Sources

**⚠ QUALIFIED PERSON**

Prior to performing any work on the inverter, always disconnect it from all voltage sources as described in this section. Always adhere to the prescribed sequence.

***NOTICE***

**Damage to the seal of the enclosure lids in subfreezing conditions**

If you open the upper and lower enclosure lids in subfreezing conditions, the seals on the enclosure lids can be damaged. This can lead to moisture entering the inverter.

- Do not open the inverter at ambient temperatures lower than -5 °C.
- If a layer of ice has formed on the seal of the lid in subfreezing conditions, remove it prior to opening the enclosure lids of the inverter (e.g. by melting the ice with warm air). Observe the applicable safety regulations.

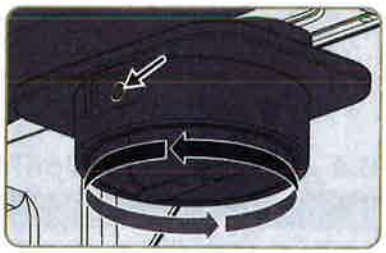
***NOTICE***

**Destruction of the measuring device due to overvoltage**

- Only use measuring devices with a DC input voltage range of 1,000 V or higher.

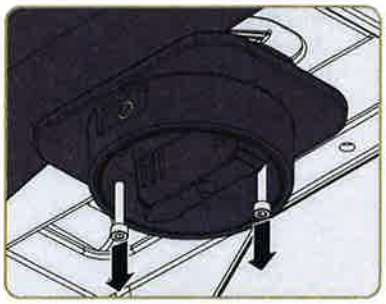
**Procedure:**

1. Disconnect the circuit breaker from all three line conductors and secure it against reconnection.
2. Turn the DC load-break switch to the position **O**.

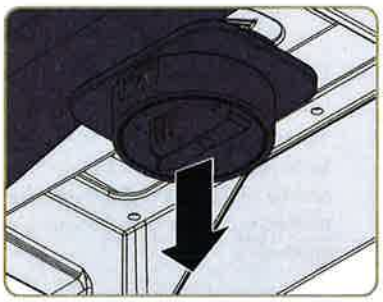


3. If the multifunction relay is used, switch off any supply voltage to the load.
4. Wait until the LEDs have gone out and, if necessary, the load connected to the multifunction relay has been switched off.
5. Use a current clamp to ensure that no current is present in the DC cables.

6. Unscrew the two screws on the DC load-break switch using an Allen key (AF 3).



7. Pull the DC load-break switch down and out of the recess.



8. Remove all six screws from the lower enclosure lid using an Allen key (AF 3).

9. Lift and remove the lower enclosure lid from below.

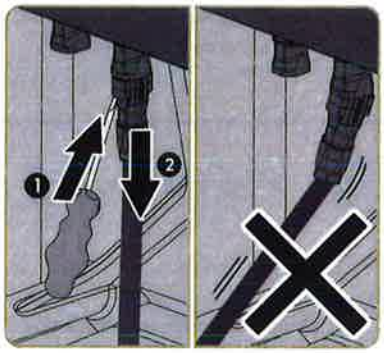
10. **⚠ CAUTION**

**Risk of burns when touching the DC protective cover**

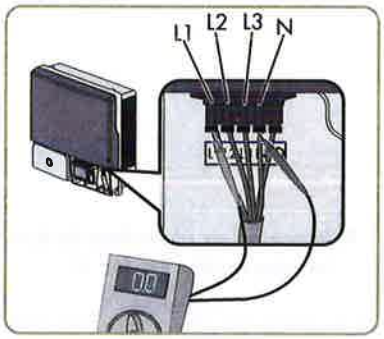
The DC protective cover can get hot during operation.

- Do not touch the DC protective cover.

11. Release and remove all DC connectors. Insert a slotted screwdriver or an angled screwdriver (blade width 3.5 mm) into one of the slide slots and pull the DC connectors out downwards. Do not pull on the cable.




12. Ensure that no voltage is present at the DC inputs of the inverter.
13. Use an appropriate measuring device to ensure that no voltage is present at the AC connecting terminal plate between **L1** and **N**, **L2** and **N**, and **L3** and **N**. Insert the test probe of the multimeter into the round opening of the terminal.




14. Use an appropriate measuring device to ensure that no voltage is present at the AC connecting terminal plate between **L1** and **PE**, **L2** and **PE**, and **L3** and **PE**. Insert the test probe into the round opening of each terminal.
15. Ensure that no voltage is present between any terminal of the multifunction relay and **PE** of the AC connecting terminal plate.
16. **⚠ DANGER**

    **Danger to life due to high voltages in the inverter**

    The capacitors in the inverter take 20 minutes to discharge.

    - Wait 20 minutes before opening the upper enclosure lid.
    - Do not open the DC protective cover.

17. ***NOTICE***

    **Damage to the inverter due to electrostatic discharge**

    Touching electronic components can cause damage to or destroy the inverter through electrostatic discharge.

    - Ground yourself before touching any component.

# 10 Technical Data

## DC Input

| | STP 20000TL-30 | STP 25000TL-30 |
|---|---|---|
| Maximum DC power at cos φ = 1 | 20,440 W | 25,550 W |
| Maximum input voltage | 1,000 V | 1,000 V |
| MPP voltage range | 320 V to 800 V | 390 V to 800 V |
| Rated input voltage | 600 V | 600 V |
| Minimum input voltage | 150 V | 150 V |
| Initial input voltage | 188 V | 188 V |
| Maximum input current, input A | 33 A | 33 A |
| Maximum input current, input B | 33 A | 33 A |
| Maximum short-circuit current per string* | 43 A | 43 A |
| Number of independent MPP inputs | 2 | 2 |
| Strings per MPP input | 3 | 3 |
| Overvoltage category in accordance with IEC 60664-1 | II | II |

* In accordance with IEC 62109-2: ISC PV

## AC Output

| | STP 20000TL-30 | STP 25000TL-30 |
|---|---|---|
| Rated power at 230 V, 50 Hz | 20,000 W | 25,000 W |
| Maximum apparent AC power | 20,000 VA | 25,000 VA |
| Rated grid voltage | 230 V | 230 V |
| Nominal AC voltage | 220 V / 230 V / 240 V | 220 V / 230 V / 240 V |
| AC voltage range* | 180 V to 280 V | 180 V to 280 V |
| Nominal AC current at 220 V / 230 V / 240 V | 29 A | 36.2 A |
| Maximum output current | 29 A | 36.2 A |
| Maximum output current under fault conditions | 50 A | 50 A |
| Total harmonic distortion of the output current with total harmonic distortion of the AC voltage < 2%, and AC power > 50% of the rated power | ≤3% | ≤3% |

| | STP 20000TL-30 | STP 25000TL-30 |
|---|---|---|
| Rated power frequency | 50 Hz | 50 Hz |
| AC power frequency* | 50 Hz / 60 Hz | 50 Hz / 60 Hz |
| Operating range at AC power frequency 50 Hz | 44 Hz to 55 Hz | 44 Hz to 55 Hz |
| Operating range at AC power frequency 60 Hz | 54 Hz to 65 Hz | 54 Hz to 65 Hz |
| Power factor at rated power | 1 | 1 |
| Displacement power factor, adjustable | $0_{overexcited}$ to $0_{underexcited}$ | $0_{overexcited}$ to $0_{underexcited}$ |
| Feed-in phases | 3 | 3 |
| Connection phases | 3 | 3 |
| Overvoltage category in accordance with IEC 60664-1 | III | III |

* depending on the configured country data set

## Efficiency

| | STP 20000TL-30 | STP 25000TL-30 |
|---|---|---|
| Maximum efficiency, $\eta_{max}$ | 98.4% | 98.3% |
| European efficiency, $\eta_{EU}$ | 98.0% | 98.1% |

## Protective Devices

| | |
|---|---|
| DC reverse polarity protection | Short-circuit diode |
| Input-side disconnection point | DC load-break switch |
| DC overvoltage protection | Thermally monitored varistors or surge arresters type II (optional) |
| AC short-circuit current capability | Current control |
| Grid monitoring | SMA Grid Guard 3 |
| Maximum permissible fuse protection | 50 A |
| Ground fault monitoring | Insulation monitoring: $R_{iso} > 250\ k\Omega$ |
| All-pole sensitive residual-current monitoring unit | Available |

## General Data

| | |
|---|---|
| Width x height x depth | 665 mm x 690 mm x 265 mm |
| Weight | 61 kg |
| Length x width x height of the packaging | 780 mm x 380 mm x 790 mm |
| Transport weight | 68 kg |

| | |
|---|---|
| Climatic category in accordance with IEC 60721-3-4 | 4K4H |
| Environmental category | outdoors |
| Pollution degree outside the enclosure | 3 |
| Pollution degree inside the enclosure | 2 |
| Operating temperature range | -25°C to +60°C |
| Maximum permissible value for relative humidity, non-condensing | 100% |
| Maximum operating altitude above mean sea level (MSL) | 3,000 m |
| Typical noise emission | 51 dB(A) |
| Power loss in night mode | 1 W |
| Topology | transformerless |
| Cooling method | SMA OptiCool |
| Degree of protection for electronics in accordance with IEC 60529 | IP65 |
| Protection class in accordance with IEC 61140 | I |
| Grid configurations | TN-C, TN-S, TN-C-S, TT (when $V_{N\_PE}$ < 20 V) |
| National standards and approvals, as per 10/2014* | AS 4777, BDEW 2008, C10/11:2012, CE, CEI 0-16, CEI 0-21, DIN EN 62109-1, EN 50438, G59/3, IEC 61727/MEA, IEC 61727/PEA, IEC 62109-2, NEN EN 50438, NRS 097-2-1, PPC, RD 661/2007, RD 1699:2011, SI 4777, VDE-AR-N4105, VDE 0126-1-1, VFR 2014, UTE C15-712-1 |

* **BDEW 2008:** in preparation
**EN 50438:** Does not apply to all country standard deviations of EN 50438
**IEC 62109-2:** In order to meet the requirements of this standard, the inverter must either be equipped with a multifunction relay used as a fault indicator contact or there must be a connection to Sunny Portal with the fault alarm in Sunny Portal activated.
**NRS 97-1-2:** This standard requires a separate label attached to the AC distribution board which indicates the AC-side disconnection of the inverter in case of a grid failure (for further details, see NRS 97-1-2, Sect. 4.2.7.1 and 4.2.7.2).
**RD 1699 and RD 661/2007:** Contact the SMA Service Line for restrictions in specific regions.

## Climatic Conditions

### Installation in accordance with IEC 60721-3-4, Class 4K4H

| | |
|---|---|
| Extended temperature range | -25°C to +60°C |

| | |
|---|---|
| Extended humidity range | 0% to 100% |
| Threshold for relative humidity, non-condensing | 100% |
| Extended air pressure range | 79.5 kPa to 106 kPa |

**Transport in accordance with IEC 60721-3-4, Class 2K3**

| | |
|---|---|
| Temperature range | -25 °C to +70 °C |

## Features

| | |
|---|---|
| DC Connection | SUNCLIX DC connector |
| AC connection | Spring-cage terminal |
| Speedwire/Webconnect data module | As standard |
| RS485, galvanically isolated | Optional |
| Multifunction Relay | Optional |
| SMA Power Control Module | Optional |
| Surge arrester type II | Optional |

## Fans

| | |
|---|---|
| Width x height x depth | 60 mm x 60 mm x 25.4 mm |
| Noise emission, typical | ≤ 29 dB(A) |
| Maximum operating altitude | 3,000 m |
| Air flow rate | ≥ 40 m³/h |

## Torques

| | |
|---|---|
| Upper lid screws | 6 Nm ± 0.3 Nm |
| Screws lower lid | 2 Nm ± 0.3 Nm |
| Screws for DC protective cover | 3.5 Nm |
| Screw for additional grounding | 5.8 Nm |
| SUNCLIX swivel nut | 2 Nm |

## Data Storage Capacity

| | |
|---|---|
| Daily energy yields | 63 days |
| Daily yields | 30 years |
| Event messages for users | 250 events |
| Event messages for installers | 250 events |

# 11 Accessories

You will find the accessories for your product in the following overview. If required, these can be ordered from SMA Solar Technology AG or your distributor.

| Designation | Short description | SMA order number |
|---|---|---|
| RS485 data module | RS458 interface as retrofit kit | DM-485CB-10 |
| SMA Power Control Module | Multifunction interface for implementing grid management systems for one inverter | PWCMOD-10 |
| Multifunction Relay | Multifunction relay as retrofit kit | MFR01-10 |
| Type II surge arrester | Type II surge arrester for input A and input B | DC_SPD_KIT3-10 |

# 12 Contact

If you have technical problems with our products, contact the SMA Service Line. We need the following information in order to provide you with the necessary assistance:

- Inverter device type
- Inverter serial number
- Inverter firmware version
- Special country-specific settings of the inverter (if applicable)
- Type and quantity of PV modules connected
- Mounting location and altitude of the inverter
- Inverter message
- Optional equipment, e.g. communication products
- Operating mode of the multifunction relay (if present)

| | | |
|---|---|---|
| Australia | SMA Australia Pty Ltd.<br>Sydney | Toll free for Australia: 1800 SMA AUS (1800 762 287)<br>International: +61 2 9491 4200 |
| Belgien/Belgique/België | SMA Benelux BVBA/SPRL<br>Mecheln | +32 15 286 730 |
| Brasil | Vide España (Espanha) | |
| Česko | SMA Central & Eastern Europe s.r.o.<br>Praha | +420 235 010 417 |
| Chile | Ver España | |
| Danmark | Se Deutschland (Tyskland) | |
| Deutschland | SMA Solar Technology AG<br>Niestetal | Medium Power Solutions<br>Wechselrichter: +49 561 9522-1499<br>Kommunikation: +49 561 9522-2499<br>SMA Online Service Center:<br>www.SMA.de/Service |
| | | Hybrid Energy Solutions<br>Sunny Island: +49 561 9522-399<br>PV-Diesel Hybridsysteme:<br>+49 561 9522-3199 |
| | | Power Plant Solutions<br>Sunny Central: +49 561 9522-299 |
| España | SMA Ibérica Tecnología Solar, S.L.U.<br>Barcelona | Llamada gratuita en España:<br>900 14 22 22<br>Internacional: +34 902 14 24 24 |

| | | |
|---|---|---|
| France | SMA France S.A.S.<br>Lyon | Medium Power Solutions<br>Onduleurs : +33 472 09 04 40<br>Communication : +33 472 09 04 41 |
| | | Hybrid Energy Solutions<br>Sunny Island : +33 472 09 04 42 |
| | | Power Plant Solutions<br>Sunny Central : +33 472 09 04 43 |
| India | SMA Solar India Pvt. Ltd.<br>Mumbai | +91 22 61713888 |
| Italia | SMA Italia S.r.l.<br>Milano | +39 02 8934-7299 |
| Κύπρος/Kıbrıs | Βλέπε Ελλάδα/ Bkz. Ελλάδα (Yunanistan) | |
| Luxemburg/<br>Luxembourg | Siehe Belgien<br>Voir Belgique | |
| Magyarország | lásd Česko (Csehország) | |
| Nederland | zie Belgien (België) | |
| Österreich | Siehe Deutschland | |
| Perú | Ver España | |
| Polska | Patrz Česko (Czechy) | |
| Portugal | SMA Solar Technology Portugal, Unipessoal Lda<br>Lisboa | Gratuito em Portugal: 800 20 89 87<br>Internacional: +351 212377860 |
| România | Vezi Česko (Cehia) | |
| Schweiz | Siehe Deutschland | |
| Slovensko | pozri Česko (Česká republika) | |
| South Africa | SMA Solar Technology South Africa Pty Ltd.<br>Centurion (Pretoria) | 08600 SUNNY (08600 78669)<br>International: +27 (12) 643 1785 |
| United Kingdom | SMA Solar UK Ltd.<br>Milton Keynes | +44 1908 304899 |
| Ελλάδα | SMA Hellas AE<br>Αθήνα | 801 222 9 222<br>International: +30 212 222 9 222 |
| България | Вижте Ελλάδα (Гърция) | |

| | | |
|---|---|---|
| ไทย | SMA Solar (Thailand) Co., Ltd.<br>กรุงเทพฯ | +66 2 670 6999 |
| 대한민국 | SMA Technology Korea Co., Ltd.<br>서울 | +82-2-520-2666 |
| +971 2 234-6177 | SMA Middle East LLC<br>أبو ظبي | الإمارات<br>العربية المتحدة |
| Other countries | International SMA Service Line<br>Niestetal | Toll free worldwide: 00800 SMA SERVICE<br>(+800 762 7378423) |

# 13 EC Declaration of Conformity

within the meaning of the EC directives

- 2004/108/EG (Electromagnetic compatibility, EMC)
- 2006/95/EG (Low voltage directive)

SMA Solar Technology AG confirms herewith that the inverters described in this document are in compliance with the fundamental requirements and other relevant provisions of the above-mentioned directives. The entire EC Declaration of Conformity can be found at www.SMA-Solar.com.

CE

SMA Solar Technology

# www.SMA-Solar.com


**Efficient**
- Maximum efficiency of 98.4%

**Safe**
- DC surge arrester (SPD type II) can be integrated

**Flexible**
- DC input voltage of up to 1000 V
- Multistring capability for optimum system design
- Optional display

**Innovative**
- Cutting-edge grid management functions with Integrated Plant Control
- Reactive power available 24/7 (Q on Demand 24/7)

# SUNNY TRIPOWER 15000TL / 20000TL / 25000TL

## The versatile specialist for large-scale commercial plants and solar power plants

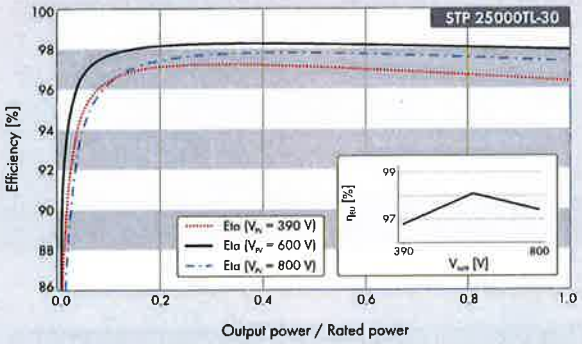
The Sunny Tripower is the ideal inverter for large-scale commercial and industrial plants. Not only does it deliver extraordinary high yields with an efficiency of 98.4%, but it also offers enormous design flexibility and compatibility with many PV modules thanks to its multistring capabilities and wide input voltage range.

The future is now: the Sunny Tripower comes with cutting-edge grid management functions such as Integrated Plant Control, which allows the inverter to regulate reactive power at the point of common coupling. Separate controllers are no longer needed, lowering system costs. Another new feature—reactive power provision on demand (Q on Demand 24/7).

# SUNNY TRIPOWER
# 15000TL / 20000TL / 25000TL

| Technical Data | Sunny Tripower 15000TL |
|---|---|
| **Input (DC)** | |
| Max. DC power (at cos φ = 1) / DC rated power | 15330 W / 15330 W |
| Max. input voltage | 1000 V |
| MPP voltage range / rated input voltage | 240 V to 800 V / 600 V |
| Min. input voltage / start input voltage | 150 V / 188 V |
| Max. input current input A / input B | 33 A / 33 A |
| Number of independent MPP inputs / strings per MPP input | 2 / A:3; B:3 |
| **Output (AC)** | |
| Rated power (at 230 V, 50 Hz) | 15000 W |
| Max. AC apparent power | 15000 VA |
| AC nominal voltage | 3 / N / PE, 230 V / 400 V |
| AC grid frequency / range | 50 Hz / 44 Hz to 55 Hz |
| Rated power frequency / rated grid voltage | 50 Hz / 230 V |
| Max. output current / Rated output current | 29 A / 21.7 A |
| Power factor at rated power / Adjustable displacement power factor | 1 / 0 overexcited to 0 underexcited |
| THD | ≤ 3% |
| Feed-in phases / connection phases | 3 / 3 |
| **Efficiency** | |
| Max. efficiency / European Efficiency | 98.4% / 98.0% |
| **Protective devices** | |
| DC-side disconnection device | ● |
| Ground fault monitoring / grid monitoring | ● / ● |
| DC surge arrester (Type II) can be integrated | ○ |
| DC reverse polarity protection / AC short-circuit current capability / galvanically isolated | ● / ● / – |
| All-pole sensitive residual-current monitoring unit | ● |
| Protection class (according to IEC 62109-1) / overvoltage category (according to IEC 62109-1) | I / AC: III; DC: II |
| **General data** | |
| Dimensions (W / H / D) | 661 / 682 / 264 mm (26.0 / 26.9 / 10.4 inch) |
| Weight | 61 kg (134.48 lb) |
| Operating temperature range | –25 °C to +60 °C (–13 °F to +140 °F) |
| Noise emission (typical) | 51 dB(A) |
| Self-consumption (at night) | 1 W |
| Topology / cooling concept | Transformerless / Opticool |
| Degree of protection (as per IEC 60529) | IP65 |
| Climatic category (according to IEC 60721-3-4) | 4K4H |
| Maximum permissible value for relative humidity (non-condensing) | 100% |
| **Features / function / Accessories** | |
| DC connection / AC connection | SUNCLIX / spring-cage terminal |
| Display | ○ |
| Interface: RS485, Speedwire/Webconnect | ○ / ● |
| Data interface: SMA Modbus / SunSpec Modbus | ● / ● |
| Multifunction relay / Power Control Module | ○ / ○ |
| OptiTrack Global Peak / Integrated Plant Control / Q on Demand 24/7 | ● / ● / ● |
| Off-Grid capable / SMA Fuel Save Controller compatible | ● / ● |
| Guarantee: 5 / 10 / 15 / 20 years | ● / ○ / ○ / ○ |
| Planned certificates and permits<br><br>* Does not apply to all national appendices of EN 50438 | ANRE 30, AS 4777, BDEW 2008, C10/11:2012, CE, CEI 0-16, CEI 0-21, EN 50438:2013*, G59/3, IEC 60068-2-x, IEC 61727, IEC 62109-1/2, IEC 62116, NBR 16149, NEN EN 50438, NRS 097-2-1, PPC, RD 1699/413, RD 661/2007, Res. n°7:2013, SI4777, TOR D4, TR 3.2.2, UTE C15-712-1, VDE 0126-1-1, VDE-AR-N 4105, VFR 2014 |
| | |
| Type designation | STP 15000TL-30 |

## Efficiency Curve




Output power / Rated power

## Accessory

RS485 interface
DM-485CB-10

Power Control Module
PWCMOD-10

DC surge arrester Typ II, inputs A and B
DCSPD KIT3-10

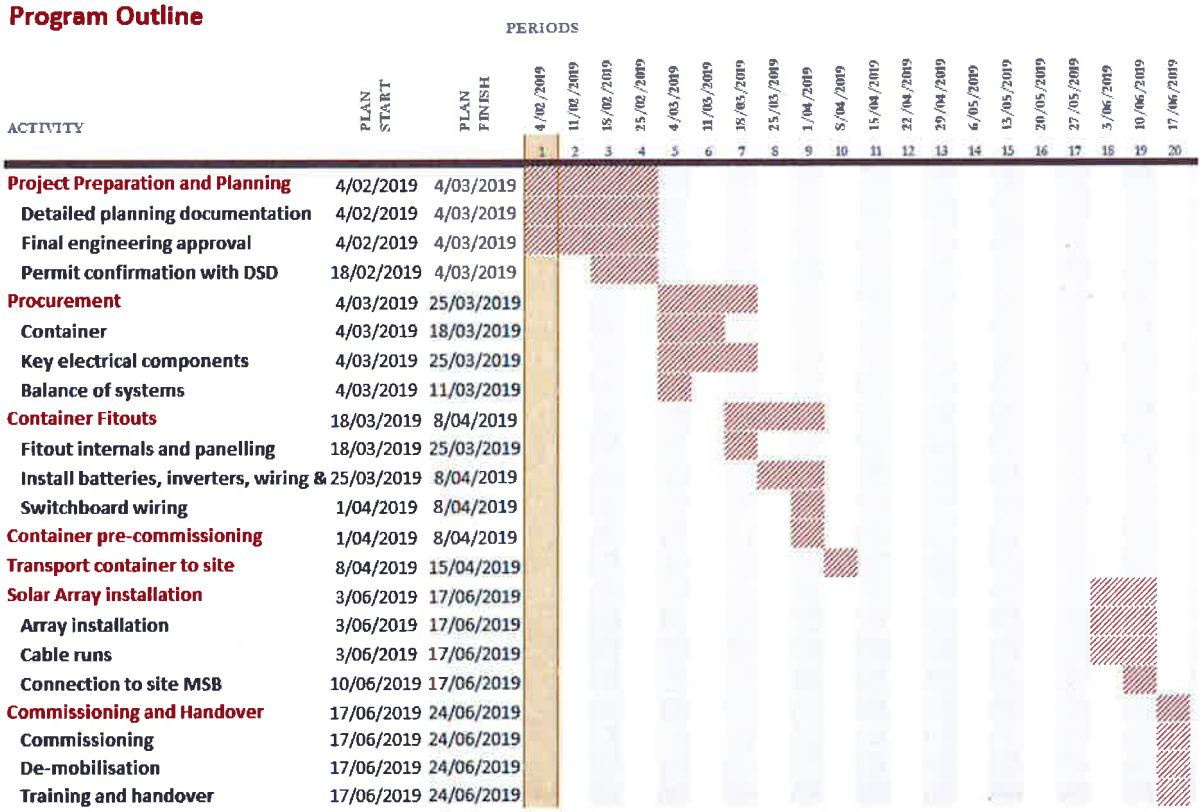
Multifunction relay
MFR01-10

● Standard features ○ Optional features – Not available
Data at nominal conditions
Status: May 2016

| Technical Data | Sunny Tripower 20000TL | Sunny Tripower 25000TL |
|---|---|---|
| **Input (DC)** | | |
| Max. DC power (at cos φ = 1) / DC rated power | 20440 W / 20440 W | 25550 W / 25550 W |
| Max. input voltage | 1000 V | 1000 V |
| MPP voltage range / rated input voltage | 320 V to 800 V / 600 V | 390 V to 800 V / 600 V |
| Min. input voltage / start input voltage | 150 V / 188 V | 150 V / 188 V |
| Max. input current input A / input B | 33 A / 33 A | 33 A / 33 A |
| Number of independent MPP inputs / strings per MPP input | 2 / A:3; B:3 | 2 / A:3; B:3 |
| **Output (AC)** | | |
| Rated power (at 230 V, 50 Hz) | 20000 W | 25000 W |
| Max. AC apparent power | 20000 VA | 25000 VA |
| AC nominal voltage | 3 / N / PE; 230 V / 400 V | |
| Rated power frequency / rated grid voltage | 50 Hz / 230 V | |
| Max. output current / Rated output current | 29 A / 29 A | 36.2 A / 36.2 A |
| Power factor at rated power / Adjustable displacement power factor | 1 / 0 overexcited to 0 underexcited | |
| THD | ≤ 3% | |
| Feed-in phases / connection phases | 3 / 3 | |
| **Efficiency** | | |
| Max. efficiency / European Efficiency | 98.4% / 98.0% | 98.3% / 98.1% |
| **Protective devices** | | |
| DC-side disconnection device | ● | |
| Ground fault monitoring / grid monitoring | ● / ● | |
| DC surge arrester (Type II) can be integrated | ○ | |
| DC reverse polarity protection / AC short-circuit current capability / galvanically isolated | ● / ● / – | |
| All-pole sensitive residual-current monitoring unit | ● | |
| Protection class (according to IEC 62109-1) / overvoltage category (according to IEC 62109-1) | I / AC: III; DC: II | |
| **General data** | | |
| Dimensions (W / H / D) | 661 / 682 / 264 mm (26.0 / 26.9 / 10.4 inch) | |
| Weight | 61 kg (134.48 lb) | |
| Operating temperature range | –25 °C to +60 °C (–13 °F to +140 °F) | |
| Noise emission (typical) | 51 dB(A) | |
| Self-consumption (at night) | 1 W | |
| Topology / cooling concept | Transformerless / Opticool | |
| Degree of protection (as per IEC 60529) | IP65 | |
| Climatic category (according to IEC 60721-3-4) | 4K4H | |
| Maximum permissible value for relative humidity (non-condensing) | 100% | |
| **Features / function / Accessories** | | |
| DC connection / AC connection | SUNCLIX / spring-cage terminal | |
| Display | ○ | |
| Interface: RS485, Speedwire/Webconnect | ○ / ● | |
| Data interface: SMA Modbus / SunSpec Modbus | ● / ● | |
| Multifunction relay / Power Control Module | ○ / ○ | |
| OptiTrack Global Peak / Integrated Plant Control / Q on Demand 24/7 | ● / ● / ● | |
| Off-Grid capable / SMA Fuel Save Controller compatible | ● / ● | |
| Guarantee: 5 / 10 / 15 / 20 years | ● / ○ / ○ / ○ | |
| Certificates and permits (more available on request)<br><br>* Does not apply to all national appendices of EN 50438 | ANRE 30, AS 4777, BDEW 2008, C10/11:2012, CE, CEI 0-16, CEI 0-21, EN 50438:2013*, G59/3, IEC 60068-2-x, IEC 61727, IEC 62109-1/2, IEC 62116, MEA 2013, NBR 16149, NEN EN 50438, NRS 097-2-1, PEA 2013, PPC, RD 1699/413, RD 661/2007, Res. n°7:2013, SI4777, TOR D4, TR 3.2.2, UTE C15-712-1, VDE 0126-1-1, VDE-AR-N 4105, VFR 2014 | |
| Type designation | STP 20000TL-30 | STP 25000TL-30 |

# APPENDIX C: PROGRAM GANNT CHART

## Program Outline



| ACTIVITY | PLAN START | PLAN FINISH |
|---|---|---|
| **Project Preparation and Planning** | 4/02/2019 | 4/03/2019 |
| Detailed planning documentation | 4/02/2019 | 4/03/2019 |
| Final engineering approval | 4/02/2019 | 4/03/2019 |
| Permit confirmation with DSD | 18/02/2019 | 4/03/2019 |
| **Procurement** | 4/03/2019 | 25/03/2019 |
| Container | 4/03/2019 | 18/03/2019 |
| Key electrical components | 4/03/2019 | 25/03/2019 |
| Balance of systems | 4/03/2019 | 11/03/2019 |
| **Container Fitouts** | 18/03/2019 | 8/04/2019 |
| Fitout internals and panelling | 18/03/2019 | 25/03/2019 |
| Install batteries, inverters, wiring & | 25/03/2019 | 8/04/2019 |
| Switchboard wiring | 1/04/2019 | 8/04/2019 |
| **Container pre-commissioning** | 1/04/2019 | 8/04/2019 |
| **Transport container to site** | 8/04/2019 | 15/04/2019 |
| **Solar Array installation** | 3/06/2019 | 17/06/2019 |
| Array installation | 3/06/2019 | 17/06/2019 |
| Cable runs | 3/06/2019 | 17/06/2019 |
| Connection to site MSB | 10/06/2019 | 17/06/2019 |
| **Commissioning and Handover** | 17/06/2019 | 24/06/2019 |
| Commissioning | 17/06/2019 | 24/06/2019 |
| De-mobilisation | 17/06/2019 | 24/06/2019 |
| Training and handover | 17/06/2019 | 24/06/2019 |

6 December 2018

To: Franz Lintl
SA Water

E- Mail: Franz.Lintl@sawater.com.au

**CPS Ref: Q0006.1**

**Subject: Solar Hybrid installation at Murputja SA Water site SA**

Dear Frank,

We would like to thank you for the opportunity to submit our offer to supply and install a 23.4kW hybrid solar system at SA Water site in Murputja SA

Overleaf you will find details of our offer in relation to your request. Please review this carefully to confirm that it satisfies your requirement.

Should you have any questions in reference to our offering then please do not hesitate to contact me for a prompt response.

Regards,
**CPS NATIONAL PTY LTD**

*R Slaghekke*

**Ron Slaghekke**
**Project Manager SA / NT**

**Phone:** 08 8234 1811
**Fax:** 08 8354 0456
**Mobile:** 0427 770 798
**E-Mail:** rslaghekke@cpsnational.com.au

## BACKGROUND

Provide a grid connected inverter system with battery storage to provide AC power to the Hut at Murputja SA.

## SCOPE OF WORKS

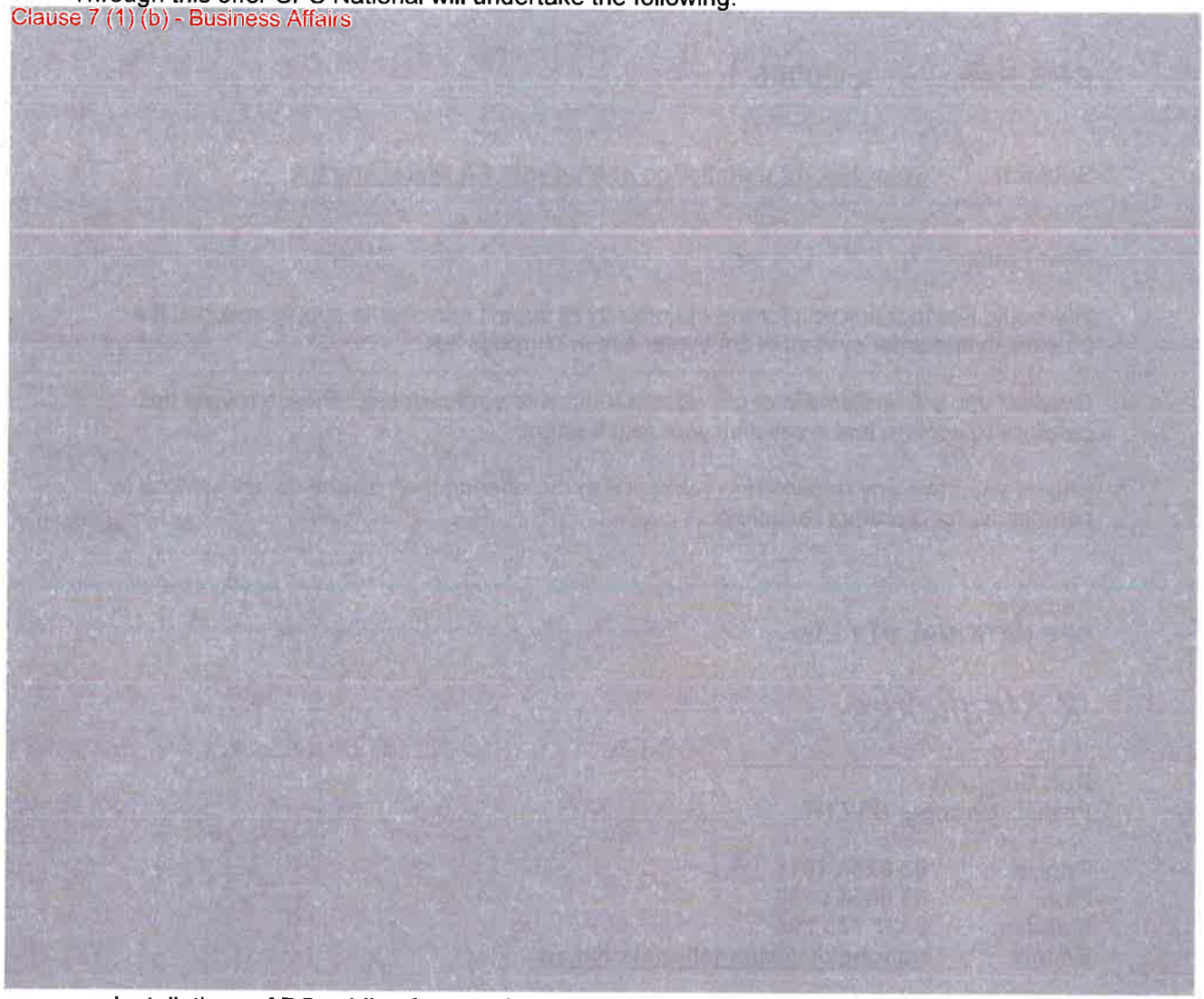
CPS National Offers to Supply the following materials in relation to our proposed solution: -

The scope of works for the Murputja renewable energy project are as follows:

1. Design and construct an airconditioned 6m containerised solar system including main switchboard, inverters and solar SCADA
2. Supply and install approximately 24kW of solar panels on a portal frame.
3. Works testing
4. Site commissioning
5. Operate plant for first 24 months (Insert dot point of major materials to be supplied)

Through this offer CPS National will undertake the following:

Clause 7 (1) (b) - Business Affairs



- Installations of DC cabling from roof top isolators to the grid tie inverters.
- Removal of installation generated rubbish by CPS from site



AMPCONTROL Group of Companies

CPS NATIONAL

- Test & commission system in accordance with CEC requirements and provide COC and test results.
- Provision of Operation & Maintenance Manual
- Provide 2 x 325W spare panels.

## PRICING SCHEDULE

| Item No. | Description | Qty | Price Excluding GST |
|---|---|---|---|
| 1 | Grid connected PV and battery storage system Design & Install as detailed above (including CITB levy) | 1 | Clause 7 (1) (b) - Business Affairs |
| 2 | Mobilisation, demobilisation, site establishment, accommodation and living expenses for the Murputja Project | 1 | |
| 3 | Monitor and maintain the Umuwa solar supply for the 24 months defects liability period | 1 | |
| | | Total | |

Clause 7 (1) (b) - Business Affairs

Clause 7 (1) (b) - Business Affairs

## TERMS & CONDITIONS

1. This offer is valid for 30 days.
2. Prices quoted exclude 10% GST.
3. CPS National payment terms are 30-days for approved account clients. Non account customers are required to finalise payment prior to delivery.
4. SA Water standard Terms and Conditions apply.