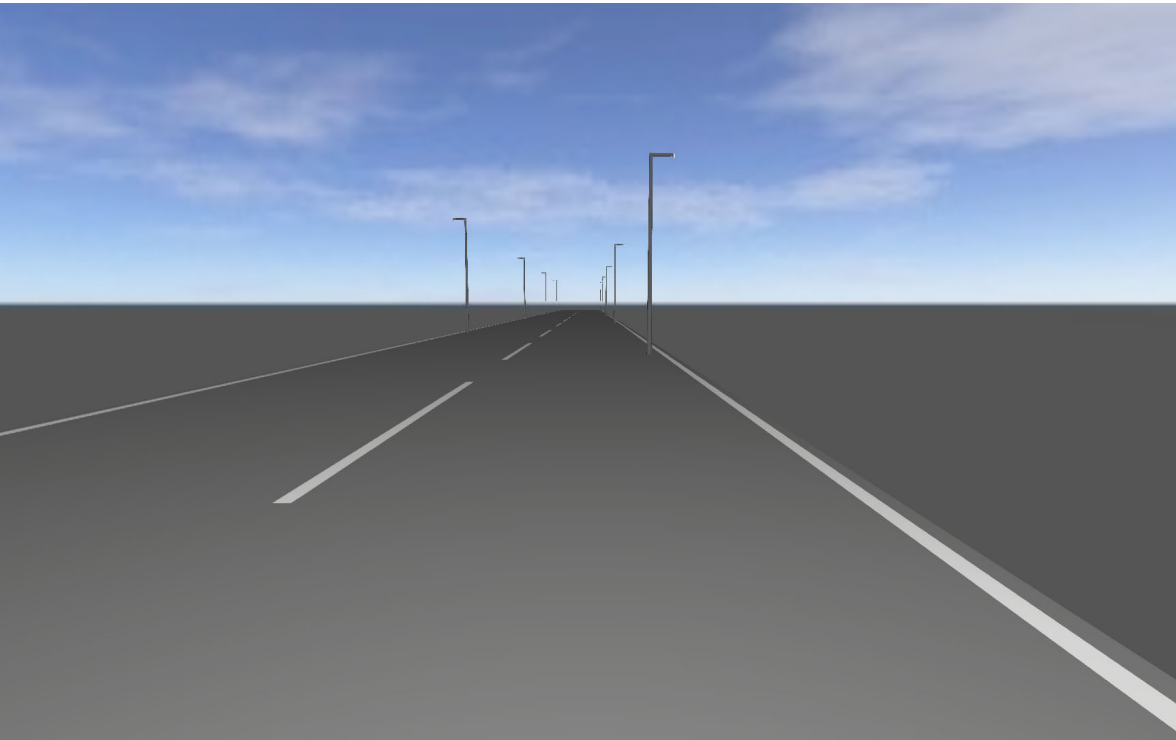


Wadi Mousa

Maan – Jordan

Lighting Calculation Report

JAN.2021



SITE

Content

| | |
|---------------------------|---|
| Cover page | 1 |
| Preliminary remarks | 2 |
| Content | 3 |
| Description | 4 |
| Luminaire list | 5 |

Product data sheets

| | |
|---|---|
| Not yet a DIALux member - EU XSPM Type 4ME 4K (1x 3MDA1400M586) | 6 |
|---|---|

Street 1 · Alternative 1

| | |
|--|----|
| Description | 7 |
| Summary (according to EN 13201:2015) | 8 |
| Roadway 1 (C4) | 12 |

| | |
|----------------|----|
| Glossary | 14 |
|----------------|----|



Description

Luminaire list

 Φ_{total}

70200 lm

 P_{total}

580.0 W

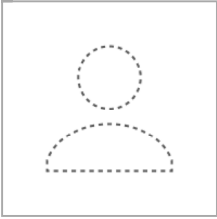
Luminous efficacy

121.0 lm/W

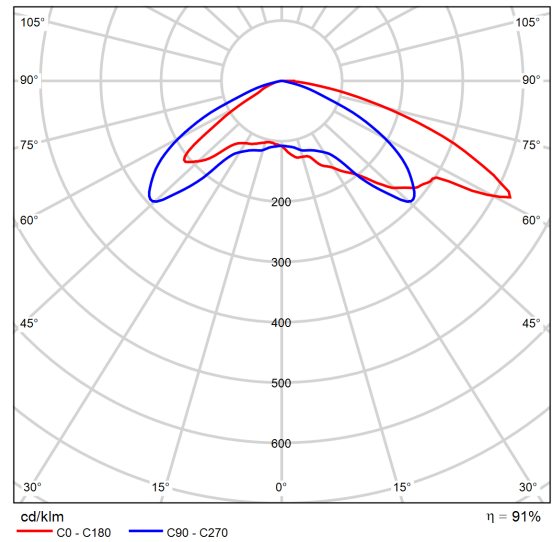
| pcs. | Manufacturer | Article No. | Article name | P | Φ | Luminous efficacy |
|------|-------------------------------|----------------------------|---------------------|--------|---------|-------------------|
| 10 | Not yet a DIALux member | XSPME024 MEA57K_5 8W | EU XSPM Type 4ME 4K | 58.0 W | 7020 lm | 121.0 lm/W |

Product data sheet

Not yet a DIALux member - EU XSPM Type 4ME 4K



| | |
|---------------------------|------------------------|
| Article No. | XSPME024MEA57K_5 8W |
| P | 58.0 W |
| Φ_{Lamp} | 7687 lm |
| $\Phi_{\text{Luminaire}}$ | 7020 lm |
| η | 91.33 % |
| Luminous efficacy | 121.0 lm/W |
| CCT | 3000 K |
| CRI | 100 |



Polar LDC

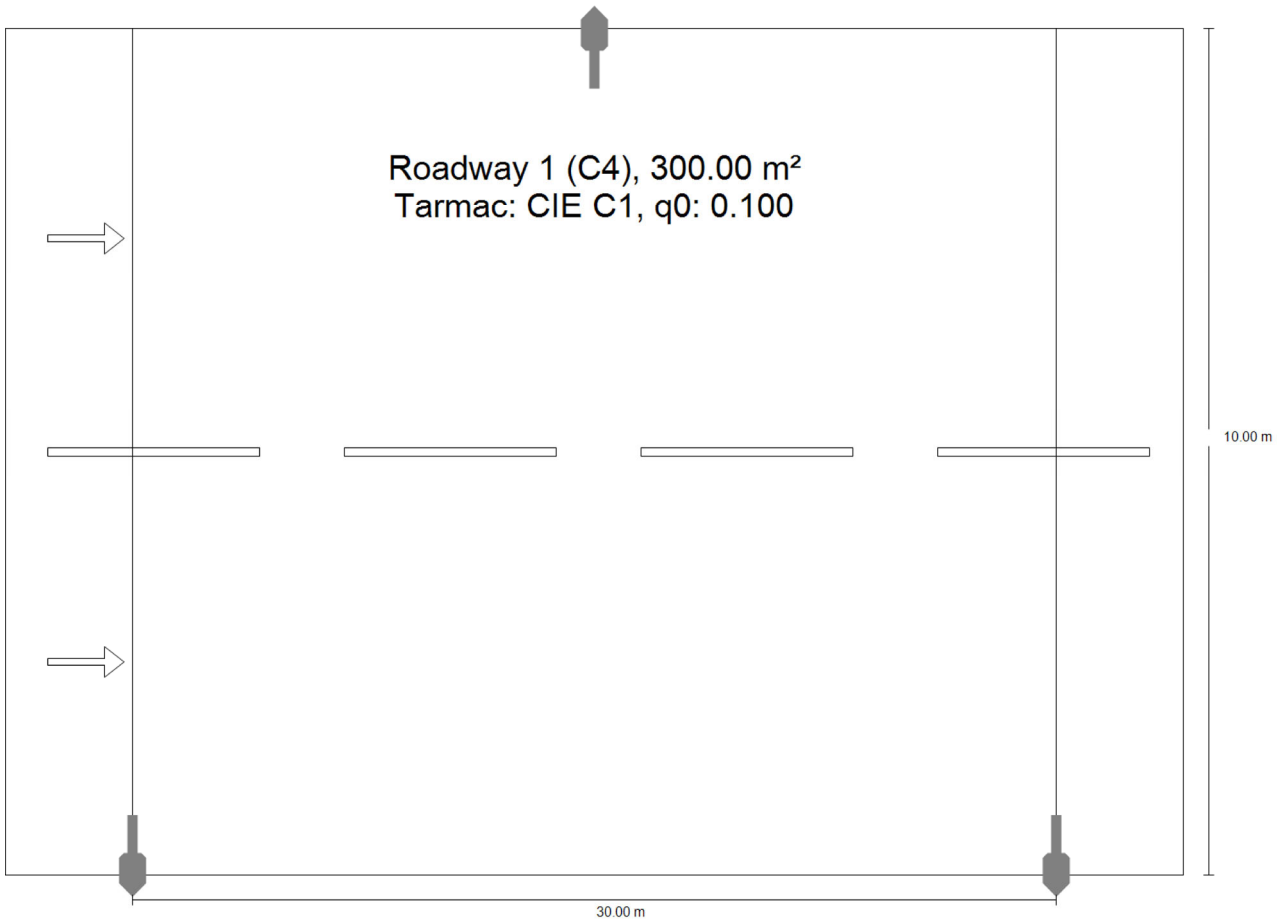


Street 1

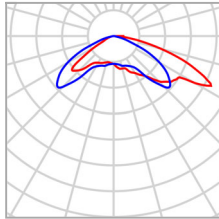
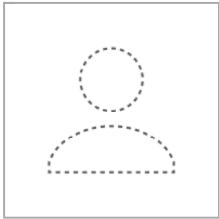
Description

Street 1

Summary (according to EN 13201:2015)



Street 1

Summary (according to EN 13201:2015)

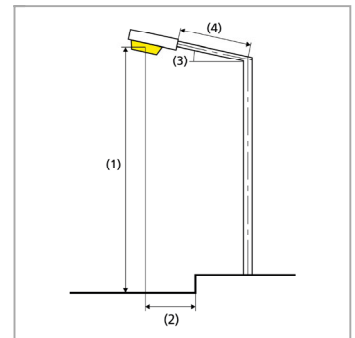
| | | | |
|--------------|-------------------------|---------------------------|---------|
| Manufacturer | Not yet a DIALux member | P | 58.0 W |
| Article No. | XSPME024MEA57K_5 8W | Φ_{Lamp} | 7687 lm |
| Article name | EU XSPM Type 4ME 4K | $\Phi_{\text{Luminaire}}$ | 7020 lm |
| Fitting | 1x 3MDA1400M586 | η | 91.33 % |

Street 1

Summary (according to EN 13201:2015)

EU XSPM Type 4ME 4K (both sides offset)

| | |
|--|--|
| Pole distance | 30.000 m |
| (1) Light spot height | 6.000 m |
| (2) Light point overhang | 0.000 m |
| (3) Boom inclination | 0.0° |
| (4) Boom length | -0.700 m |
| Annual operating hours | 4000 h: 100.0 %, 58.0 W |
| Consumption | 3828.0 W/km |
| ULR / ULOR | 0.00 / 0.00 |
| Max. luminous intensities Any direction forming the specified angle from the downward vertical, with the luminaire installed for use. | ≥ 70°: 405 cd/klm ≥ 80°: 161 cd/klm ≥ 90°: 0.00 cd/klm |
| Luminous intensity class The luminous intensity values in [cd/klm] for calculation of the luminous intensity class refer to the luminaire luminous flux according to EN 13201:2015. | G*1 |
| Glare index class | D.0 |
| MF | 0.67 |



Results for valuation fields

A maintenance factor of 0.67 was used for calculating for the installation.

| | Symbol | Calculated | Target | Check |
|----------------|-------------|------------|------------|-------|
| Roadway 1 (C4) | E_{av} | 13.42 lx | ≥ 10.00 lx | ✓ |
| | $U_o^{(1)}$ | 0.35 | - | |

(1) Informative, not part of the valuation

Street 1

Summary (according to EN 13201:2015)

Results for energy efficiency indicators

| | Symbol | Calculated | Consumption |
|---|--------|---------------------------|--------------|
| Street 1 | D_p | 0.029 W/lx*m ² | – |
| EU XSPM Type 4ME 4K (both sides offset) | D_e | 1.5 kWh/m ² yr | 464.0 kWh/yr |

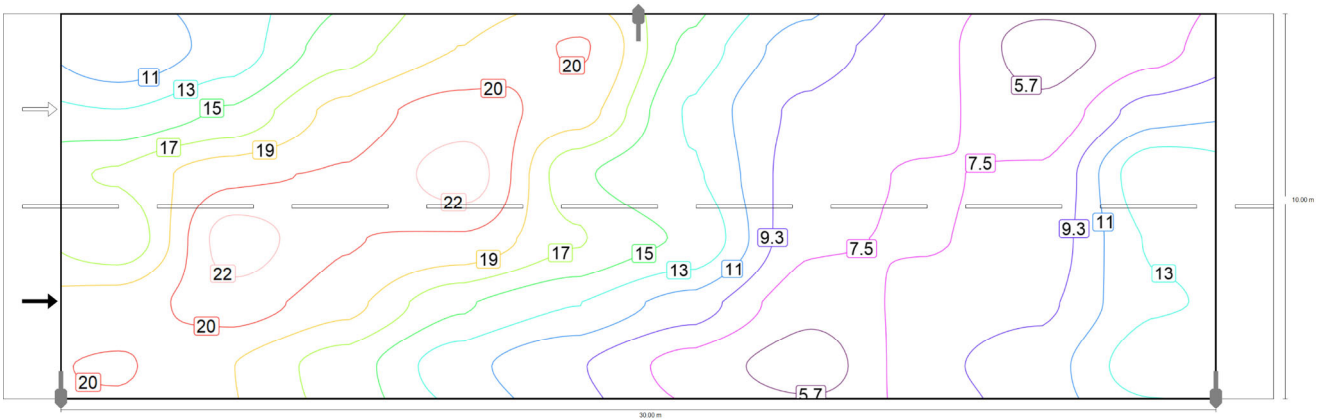
Street 1

Roadway 1 (C4)

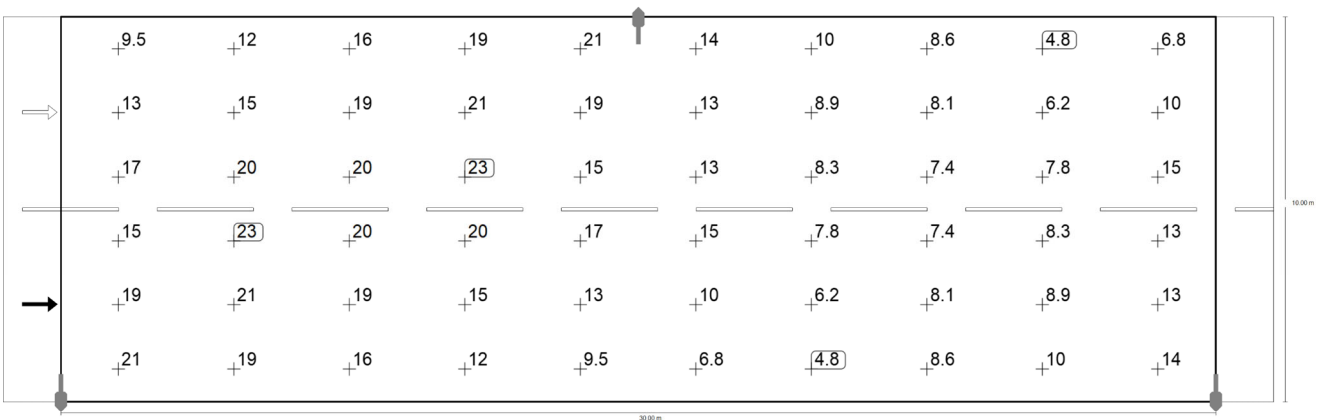
Results for valuation field

| | Symbol | Calculated | Target | Check |
|----------------|-------------|------------|-----------------|-------|
| Roadway 1 (C4) | E_{av} | 13.42 lx | ≥ 10.00 lx | ✓ |
| | $U_0^{(1)}$ | 0.35 | - | |

(1) Informative, not part of the valuation



Maintenance value, horizontal illuminance [lx] (Iso-illuminance curves)



Maintenance value, horizontal illuminance [lx] (Value grid)

| m | 1.500 | 4.500 | 7.500 | 10.500 | 13.500 | 16.500 | 19.500 | 22.500 | 25.500 | 28.500 |
|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|
| 9.167 | 9.50 | 11.92 | 15.84 | 18.55 | 20.51 | 14.35 | 10.24 | 8.58 | 4.75 | 6.83 |
| 7.500 | 13.06 | 15.15 | 19.15 | 21.30 | 19.45 | 12.78 | 8.94 | 8.06 | 6.24 | 10.34 |
| 5.833 | 16.85 | 19.98 | 20.49 | 23.12 | 15.25 | 13.26 | 8.25 | 7.41 | 7.79 | 14.64 |
| 4.167 | 15.25 | 23.12 | 20.49 | 19.98 | 16.85 | 14.64 | 7.79 | 7.41 | 8.25 | 13.26 |

Street 1

Roadway 1 (C4)

| | | | | | | | | | | |
|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|
| m | 1.500 | 4.500 | 7.500 | 10.500 | 13.500 | 16.500 | 19.500 | 22.500 | 25.500 | 28.500 |
| 2.500 | 19.45 | 21.30 | 19.15 | 15.15 | 13.06 | 10.34 | 6.24 | 8.06 | 8.94 | 12.78 |
| 0.833 | 20.51 | 18.55 | 15.84 | 11.92 | 9.50 | 6.83 | 4.75 | 8.58 | 10.24 | 14.35 |

Maintenance value, horizontal illuminance [lx] (Value chart)

| | E_{av} | E_{min} | E_{max} | g_1 | g_2 |
|---|----------|-----------|-----------|-------|-------|
| Maintenance value, horizontal illuminance | 13.4 lx | 4.75 lx | 23.1 lx | 0.35 | 0.21 |

Glossary

A

A Formula symbol for a surface in the geometry

B

Background area The background area borders the direct ambient area according to DIN EN 12464-1 and reaches up to the borders of the room. In larger rooms, the background area is at least 3 m wide. It is located horizontally at floor level.

C

CCT (correlated color temperature)
 Body temperature of a thermal radiator that serves to describe its light color. Unit: Kelvin [K]. The lesser the numerical value the redder; the greater the numerical value the bluer the light color. The color temperature of gas-discharge lamps and semi-conductors are termed "correlated color temperature" in contrast to the color temperature of thermal radiators.

Allocation of the light colors to the color temperature ranges acc. to EN 12464-1:

Light color - color temperature [K]
 warm white (ww) < 3,300 K
 neutral white (nw) ≥ 3,300 – 5,300 K
 daylight white (dw) > 5,300 K

Clearance height The designation for the distance between upper edge of the floor and bottom edge of the ceiling (in the completely furnished status of room).

Control group A group of luminaires that are dimmed and controlled together. For each lighting scene, a control group provides its own dimming value. All luminaires within a control group share this dimming value. The control groups with their luminaires are automatically determined by DIALux on the basis of the created light scenes and their luminaire groups.

CRI (color rendering index)
 Designation for the color rendering index of a luminaire or a lamp acc. to DIN 6169: 1976 or CIE 13.3: 1995.

The general color rendering index Ra (or CRI) is a dimensionless figure that describes the quality of a white light source in regards to its similarity with the remission spectra of defined 8 test colors (see DIN 6169 or CIE 1974) to a reference light source.

Glossary

D

| | |
|---|---|
| Daylight autonomy | Describes what percentage of the daily working time the required illuminance is met by daylight. The nominal illuminance is used from the room profile, unlike described in EN 17037. The calculation is not done in the centre of the room but at the placed sensor measuring point. A room is considered sufficiently supplied with daylight if it achieves at least 50% daylight autonomy. |
| Daylight factor | Ratio of the illuminance achieved solely by daylight incidence at a point in the inside to the horizontal illuminance in the outer area under an unobstructed sky. Formula symbol: D (daylight factor) Unit: % |
| Daylight quotient effective area | A calculation surface within which the daylight quotient is calculated. |

E

| | |
|--------------------------------|---|
| Energy evaluation | <p>Based on an hourly calculation procedure for daylight in indoor spaces, considering the project geometry and any existing daylight control systems. Orientation and location of the project are also considered. The calculation uses the specified system power of the luminaires to determine the energy demand. A linear relationship between power and luminous flux in the dimmed state is assumed for daylight-controlled luminaires. Times of use and nominal illuminance are determined from the usage profiles of the spaces. Switched-on luminaires that are explicitly excluded from control also consider the specified times-of-use. The daylight control systems use a simplified control logic that closes them at an outdoor horizontal illuminance of 27,500lx.</p> <p>The calendar year 2022 is used as a reference only. It is not a simulation of this year. The reference year is only used to assign the days of the week to the calculated results. The changeover to summer time is not considered. The reference sky type used is the average sky described in CIE 110 without direct sunlight.</p> <p>The method was developed together with the Fraunhofer Institute for Building Physics and is available for review by the Joint Working Group 1 ISO TC 274 as an extension of the previous annual regression-based method.</p> |
| Eta (η) | <p>(light output ratio) The light output ratio describes what percentage of the luminous flux of a free radiating lamp (or LED module) is emitted by the luminaire when installed.</p> <p>Unit: %</p> |

Glossary

G

| | |
|-------|--|
| g_1 | Often also U_o (overall uniformity) Designates the overall uniformity of the illuminance on a surface. It is the quotient from E_{min} to \bar{E} and is required, for instance, in standards for illumination of workstations. |
| g_2 | Actually it designates the "non-uniformity" of the illuminance on a surface. It is the quotient of E_{min} to E_{max} and is generally only relevant for certifying the emergency lighting acc. to EN 1838. |

I

| | |
|-----------------------------------|---|
| Illuminance | Describes the ratio of the luminous flux that strikes a certain surface to the size of this surface ($lm/m^2 = lx$). The illuminance is not tied to an object surface. It can be determined anywhere in space (inside or outside). The illuminance is not a product feature because it is a recipient value. Luxometers are used for measuring. Unit: Lux Abbreviation: lx Formula symbol: E |
| Illuminance, adaptive | For the determining of the middle adaptive illuminance on a surface, this is rastered "adaptively". In the area of large illuminance differences within the surface, the raster is subdivided finer; within lesser differences, a rougher classification is made. |
| Illuminance, horizontal | Illuminance that is calculated or measured on a horizontal (level) surface (this can be for example a table top or the floor). The horizontal illuminance is usually identified by the formula letter E_h . |
| Illuminance, perpendicular | Illuminance that is calculated or measured plumb-vertical to a surface. This needs to be taken into account for tilted surfaces. If the surface is horizontal or vertical, then there is no difference between the perpendicular and the horizontal or vertical illuminance. |
| Illuminance, vertical | Illuminance that is calculated or measured on a vertical surface (this can be for example the front of some shelves). The vertical illuminance is usually identified by the formula letter E_v . |

L

| | |
|--------------------------|--|
| LENI | (lighting energy numeric indicator) Lighting energy numeric indicator acc. to EN 15193 Unit: kWh/m ² year |
| Light loss factor | See MF |

Glossary

| | |
|--------------------|---|
| LLMF | (lamp lumen maintenance factor)/acc. to CIE 97: 2005 Lamp flux maintenance factor that takes the luminous flux reduction into account of a luminaire or an LED module in the course of the operating time. The lamp flux maintenance factor is specified as a decimal digit and can have a maximum value of 1 (no luminous flux reduction existing). |
| LMF | (luminaire maintenance factor)/acc. to CIE 97: 2005 Luminaire maintenance factor that takes the soiling into account of the luminaire in the course of the operating time. The luminaire maintenance factor is specified as a decimal digit and can have a maximum value of 1 (no soiling existing). |
| LSF | (lamp survival factor)/acc. to CIE 97: 2005 Lamp survival factor that takes the total failure into account of a luminaire in the course of the operating time. The lamp survival factor is specified as a decimal digit and can have a maximum value of 1 (no failures existing within the time concerned or prompt replacement after the failure). |
| Luminance | Dimension for the "brightness impression" that the human eye has of a surface. The surface itself can emit light thereby or light striking it can be reflected (emitter value). It is the only photometric value that the human eye can perceive. Unit: Candela per square meter Abbreviation: cd/m ² Formula symbol: L |
| Luminous efficacy | Ratio of the emitted luminous flux Φ [lm] to the absorbed electrical power P [W] Unit: lm/W. This ratio can be formed for the lamp or LED module (lamp or module light output), the lamp or module with control gear (system light output) and the complete luminaire (luminaire light output). |
| Luminous flux | Dimension for the total light output that is emitted from one light source in all directions. It is thus an "emitter value" that specifies the entire emitting output. The luminous flux of a light source can only be determined in a laboratory. A difference is made between the lamp or LED module luminous flux and the luminaire luminous flux. Unit: Lumen Abbreviation: lm Formula symbol: Φ |
| Luminous intensity | Describes the intensity of the light in a certain direction (emitter value). The luminous intensity is a matter of the luminous flux Φ that is emitted in a certain spherical angle Ω . The radiation characteristics of a light source are presented graphically in a light distribution curve (LDC). The luminous intensity is an SI base unit. Unit: Candela Abbreviation: cd Formula symbol: I |

Glossary

M

| | |
|-----------|--|
| MF | (maintenance factor)/acc. to CIE 97: 2005 Maintenance factor as decimal number between 0 and 1 that describes the ratio of the new value of a photometric planning parameter (e.g. of the illuminance) to a maintenance value after a certain time. The maintenance factor takes into account the soiling of luminaires and rooms as well as the luminous flux reduction and the failure of light sources. The maintenance factor is taken into account either overall or determined in detail acc. to CIE 97: 2005 by the formula $RMF \times LMF \times LLMF \times LSF$. |
|-----------|--|

P

| | |
|----------|--|
| P | (power) Electric power consumption Unit: watt Abbreviation: W |
|----------|--|

R

| | |
|-----------------------------------|---|
| $R_{(UG)} \max$ | Measure of the psychological glare in indoor spaces. In addition to the luminance of luminaires, the level of the $R_{(UG)}$ value also depends on the observer position, the viewing direction and the ambient luminance. The calculation is made according to the table method, see CIE 117. Among other things, EN 12464-1:2021 specifies maximum permissible $R_{(UG)}$ -values $R_{(UGL)}$ for various indoor workplaces. |
|-----------------------------------|---|

| | |
|--------------------------|--|
| Reflection factor | The reflection factor of a surface describes how much of the striking light is reflected back. The reflection factor is defined by the color of the surface. |
|--------------------------|--|

| | |
|------------|--|
| RMF | (room maintenance factor)/acc. to CIE 97: 2005 Room maintenance factor that takes the soiling into account of the space encompassing surfaces in the course of the operating time. The room maintenance factor is specified as a decimal digit and can have a maximum value of 1 (no soiling existing). |
|------------|--|

S

| | |
|-------------------------|--|
| Surrounding area | The ambient area directly borders the area of the visual task and should be planned with a width of at least 0.5 m according to DIN EN 12464-1. It is at the same height as the area of the visual task. |
|-------------------------|--|

Glossary

U

| | |
|-----------|---|
| UGR (max) | (unified glare rating) Measure for the psychological glare effect in interiors. In addition to luminaire luminance, the UGR value also depends on the position of the observer, the viewing direction and the ambient luminance. Among other things, EN 12464-1 specifies maximum permissible UGR values for various indoor workplaces. |
|-----------|---|

| | |
|--------------|--|
| UGR observer | Calculation point in the room, for the DIALux the UGR value is determined. The location and height of the calculation point should correspond to the typical observer position (position and eye level of the user). |
|--------------|--|

V

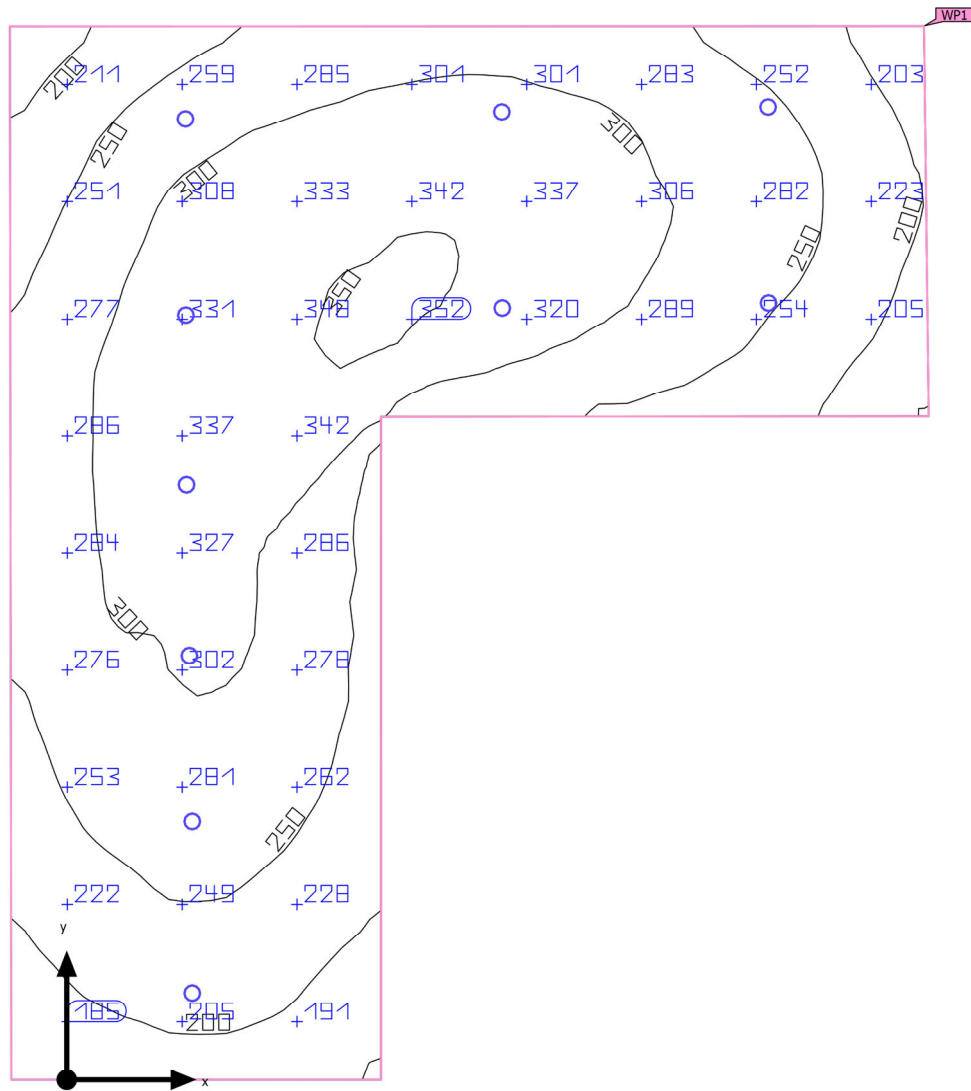
| | |
|------------------|---|
| Visual task area | The area that is needed for carrying out the visual task in accordance with DIN EN 12464 -1. The height corresponds with the height at which the visual task is executed. |
|------------------|---|

W

| | |
|-----------|--|
| Wall zone | Circumferential area between working plane and walls that is not taken into account for the calculation. |
|-----------|--|

| | |
|---------------|---|
| Working plane | Virtual measuring or calculation surface at the height of the visual task that generally follows the room geometry. The working plane may also feature a wall zone. |
|---------------|---|

Building 1 · Story 1 · Toilet Lobby (Light scene 1)

Summary

| | | | |
|--------------------|---|------------------------------------|---------|
| Ground area | 23.44 m ² | Clearance height | 3.500 m |
| Reflection factors | Ceiling: 70.0 %, Walls: 50.0 %, Floor: 20.0 % | Mounting height | 3.500 m |
| Light loss factor | 0.80 (fixed) | Height _{Working plane} | 0.000 m |
| | | Wall zone _{Working plane} | 0.000 m |

Building 1 · Story 1 · Toilet Lobby (Light scene 1)

Summary

Results

| | Symbol | Calculated | Target | Check | Index |
|-----------------------------------|----------------------------------|-------------------------------|----------------|-------|-------|
| Working plane | $\bar{E}_{\text{perpendicular}}$ | 272 lx | ≥ 200 lx | ✓ | WP1 |
| | g_1 | 0.54 | ≥ 0.40 | ✓ | WP1 |
| Glare valuation ⁽¹⁾ | $R_{UG, \text{max}}$ | 24 | ≤ 25 | ✓ | |
| Consumption values ⁽²⁾ | Consumption | 106 kWh/a | max. 850 kWh/a | ✓ | |
| Room | Lighting power density | 5.50 W/m ² | - | | |
| | | 2.02 W/m ² /100 lx | - | | |

(1) Based on a rectangular space of 6.575 m x 5.719 m and SHR of 0.25.

(2) Calculated using DIN:18599-4.

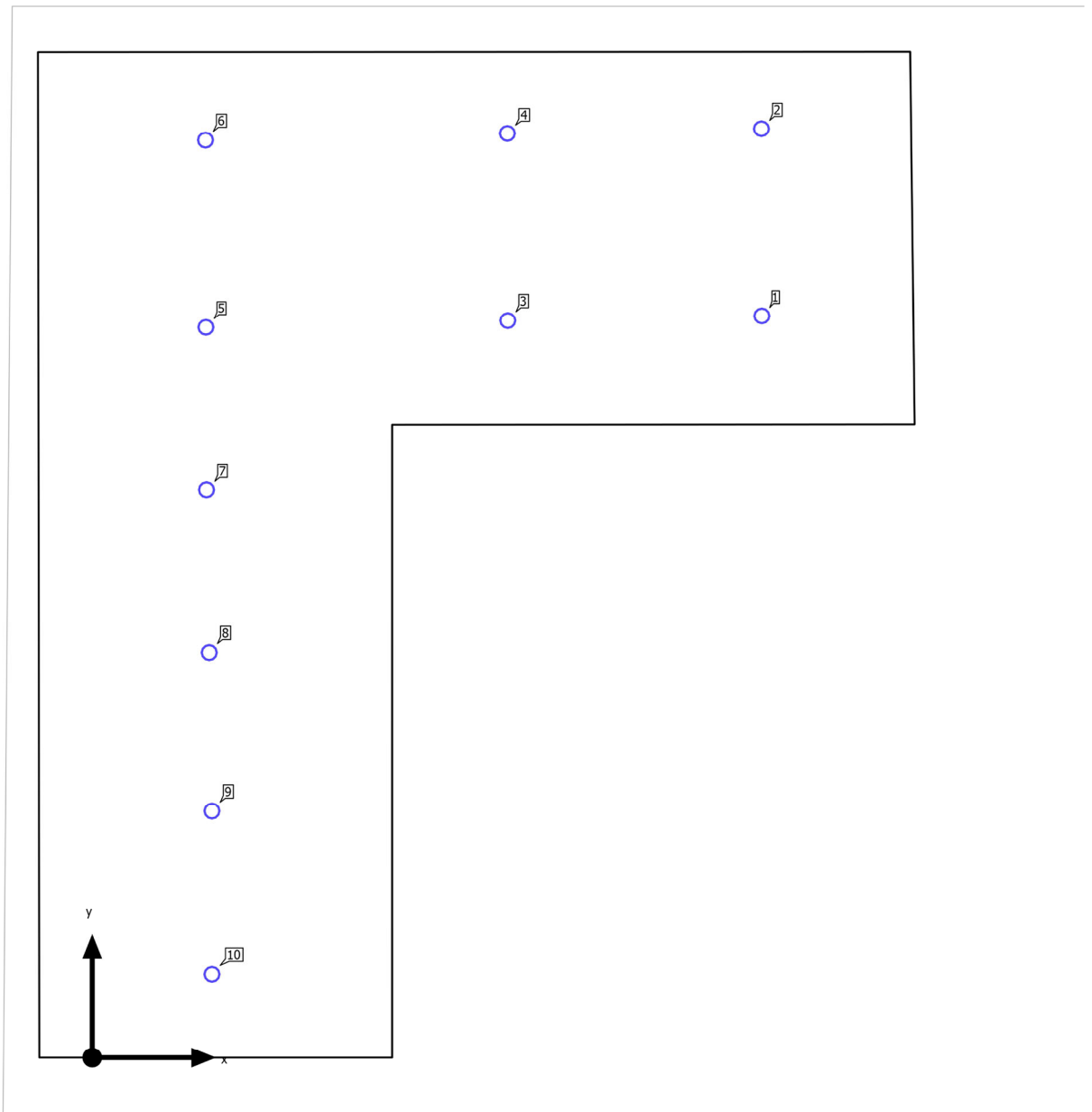
Utilization profile: General areas inside buildings - Rest, sanitation and first aid rooms (10.4 Cloakrooms, washrooms, bathrooms, toilets)

Luminaire list

| pcs. | Manufacturer | Article No. | Article name | R_{UG} | P | Φ | Luminous efficacy |
|------|------------------------------------|------------------|---|----------|--------|---------|-------------------|
| 10 | iGuzzini illuminazione S.p.A | QF50.01_B 80R | Easy LED: Ø 96 mm - warm white - electronic - 11W 1800lm - 3000K | 24 | 12.9 W | 1476 lm | 114.4 lm/W |

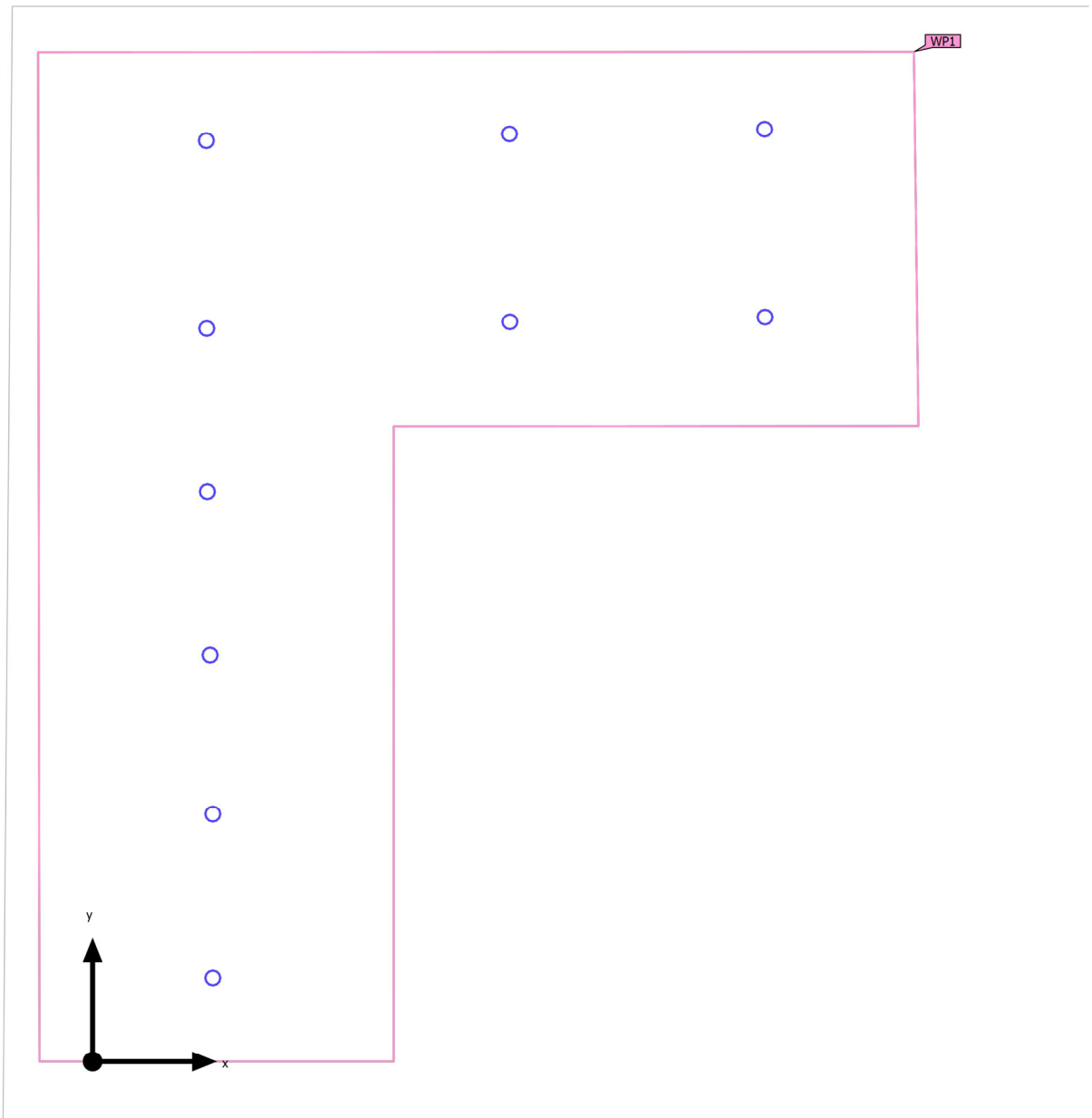
Building 1 · Story 1 · Toilet Lobby

Luminaire layout plan



Building 1 · Story 1 · Toilet Lobby (Light scene 1)

Calculation objects



Building 1 · Story 1 · Toilet Lobby (Light scene 1)

Calculation objects

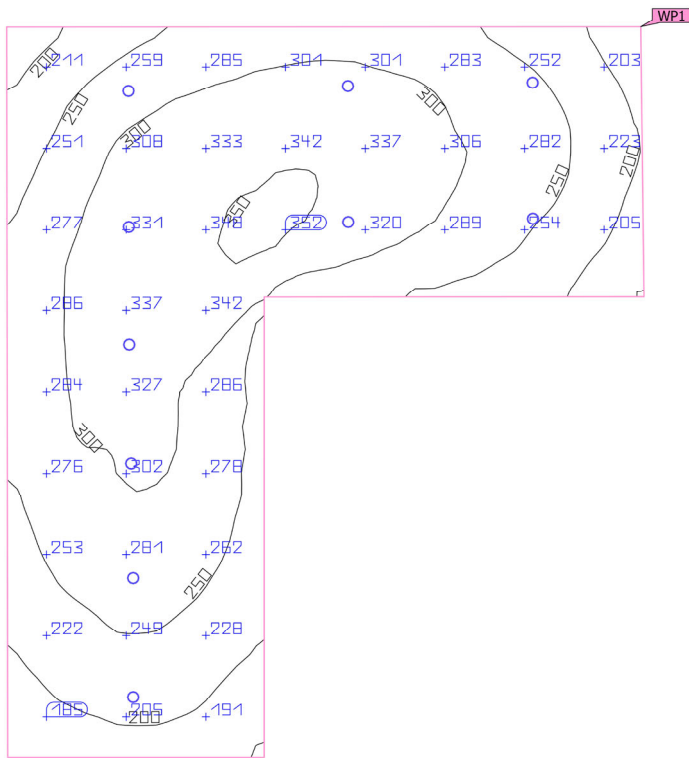
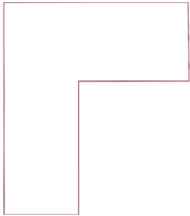
Working planes

| Properties | \bar{E} (Target) | E_{min} | E_{max} | g_1 (Target) | g_2 | Index |
|---|---------------------------------|-----------|-----------|------------------------------|-------|-------|
| Working plane (Toilet Lobby) Perpendicular illuminance (adaptive) Height: 0.000 m, Wall zone: 0.000 m | 272 lx (≥ 200 lx) ✓ | 148 lx | 355 lx | 0.54 (≥ 0.40) ✓ | 0.42 | WP1 |

Utilization profile: General areas inside buildings - Rest, sanitation and first aid rooms (10.4 Cloakrooms, washrooms, bathrooms, toilets)

Building 1 · Story 1 · Toilet Lobby (Light scene 1)

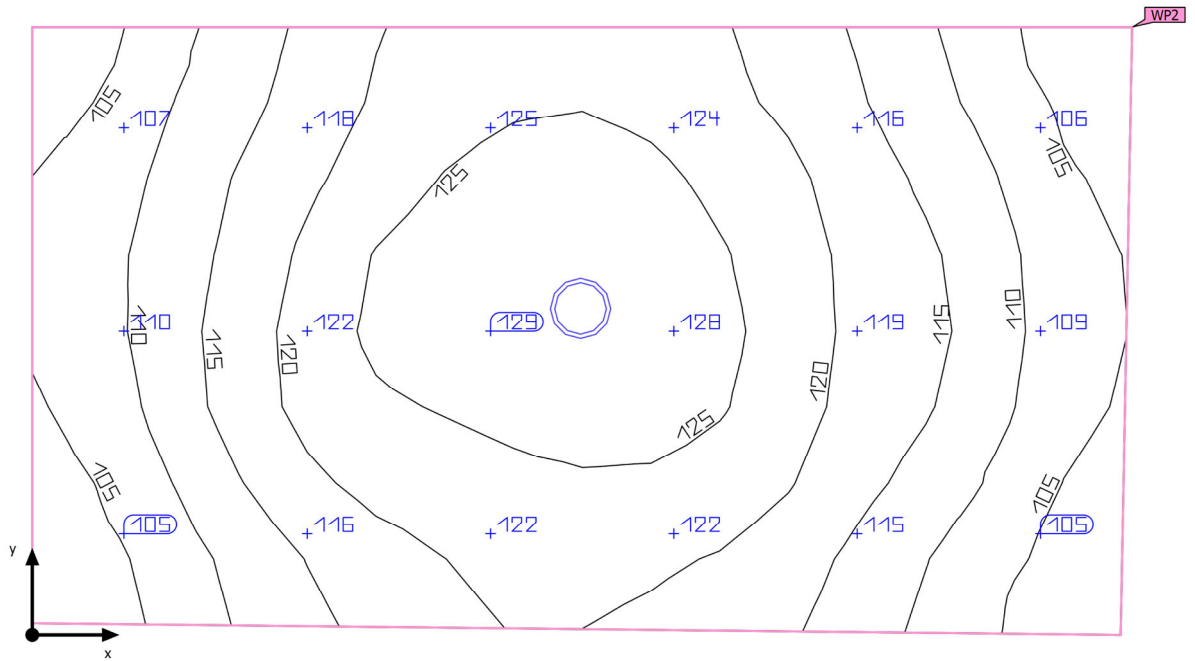
Working plane (Toilet Lobby)



| Properties | \bar{E} (Target) | E_{min} | E_{max} | g_1 (Target) | g_2 | Index |
|--------------------------------------|-----------------------|-----------|-----------|-------------------|-------|-------|
| Working plane (Toilet Lobby) | 272 lx | 148 lx | 355 lx | 0.54 | 0.42 | WP1 |
| Perpendicular illuminance (adaptive) | (≥ 200 lx) | | | (≥ 0.40) | | |
| Height: 0.000 m, Wall zone: 0.000 m | ✓ | | | ✓ | | |

Utilization profile: General areas inside buildings - Rest, sanitation and first aid rooms (10.4 Cloakrooms, washrooms, bathrooms, toilets)

Building 1 · Story 1 · WC (Light scene 1)

Summary

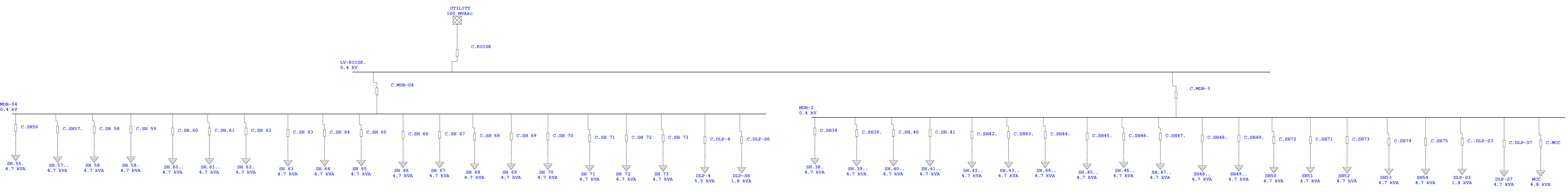
| | | | |
|--------------------|---|------------------------------------|---------|
| Ground area | 2.00 m ² | Clearance height | 3.000 m |
| Reflection factors | Ceiling: 70.0 %, Walls: 50.0 %, Floor: 20.0 % | Mounting height | 3.000 m |
| Light loss factor | 0.80 (fixed) | Height _{Working plane} | 0.000 m |
| | | Wall zone _{Working plane} | 0.000 m |

Wadi Mousa

Maan – Jordan

Voltage Drop Calculation Report

JAN.2021



| | | | |
|-----------|----------------|-----------|------------|
| Project: | ETAP | Page: | 1 |
| Location: | 12.6.0H | Date: | 27-07-2023 |
| Contract: | | SN: | |
| Engineer: | Study Case: LF | Revision: | Base |
| Filename: | Wadi Mosa | Config.: | Normal |

Electrical Transient Analyzer Program

Load Flow Analysis

Loading Category (1): Design
 Generation Category (1): Design
 Load Diversity Factor: None

| | <u>Swing</u> | <u>V-Control</u> | <u>Load</u> | <u>Total</u> |
|------------------|--------------|------------------|-------------|--------------|
| Number of Buses: | 1 | 0 | 43 | 44 |

| | <u>XEMR2</u> | <u>XEMR3</u> | <u>Reactor</u> | <u>Line/Cable</u> | <u>Impedance</u> | <u>Tie PD</u> | <u>Total</u> |
|---------------------|--------------|--------------|----------------|-------------------|------------------|---------------|--------------|
| Number of Branches: | 0 | 0 | 0 | 43 | 0 | 0 | 43 |

| | |
|---------------------------|---|
| Method of Solution: | Adaptive Newton-Raphson Method |
| Maximum No. of Iteration: | 99 |
| Precision of Solution: | 0.0001000 |
| System Frequency: | 50.00 Hz |
| Unit System: | Metric |
| Project Filename: | Wadi Mosa |
| Output Filename: | M:\Projects\P012-612 - (Wadi Mosa)\1. Design\2. Elec\2. Calcs\VD\Wadi Mosa\Untitled.lfr |

Project:
Location:
Contract:
Engineer:
Filename: Wadi Mosa

ETAP
12.6.0H

Study Case: LF

Page: 2
Date: 27-07-2023
SN:
Revision: Base
Config.: Normal

Adjustments

| <u>Tolerance</u> | <u>Apply Adjustments</u> | <u>Individual /Global</u> | <u>Percent</u> |
|-----------------------------|--------------------------|---------------------------|----------------|
| Transformer Impedance: | Yes | Individual | |
| Reactor Impedance: | Yes | Individual | |
| Overload Heater Resistance: | No | | |
| Transmission Line Length: | No | | |
| Cable Length: | No | | |

| <u>Temperature Correction</u> | <u>Apply Adjustments</u> | <u>Individual /Global</u> | <u>Degree C</u> |
|-------------------------------|--------------------------|---------------------------|-----------------|
| Transmission Line Resistance: | Yes | Individual | |
| Cable Resistance: | Yes | Individual | |

Project:
 Location:
 Contract:
 Engineer:
 Filename: Wadi Mosa

ETAP
 12.6.0H

Study Case: LF

Page: 3
 Date: 27-07-2023
 SN:
 Revision: Base
 Config.: Normal

Bus Input Data

| Bus | | | Initial Voltage | | Load | | | | | | | |
|-----------|-------|---------|-----------------|------|--------------|------|------------|-------|------------|------|---------|------|
| | | | | | Constant kVA | | Constant Z | | Constant I | | Generic | |
| ID | kV | Sub-sys | % Mag. | Ang. | MW | Mvar | MW | Mvar | MW | Mvar | MW | Mvar |
| LV-KOISK | 0.400 | 1 | 100.0 | 0.0 | | | | | | | | |
| LV-KOISK. | 0.400 | 1 | 100.0 | 0.0 | | | | | | | | |
| MDB-2 | 0.400 | 1 | 100.0 | 0.0 | | | | | | | | |
| MDB-04 | 0.400 | 1 | 100.0 | 0.0 | | | | | | | | |
| SH.2 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.4 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.8 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.9 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.10 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.17 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.18 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.19 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.20 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.21 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.22 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.31 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.32 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.33 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.34 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.35 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.36 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.37 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.38 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.56 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.60 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.61 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.62 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.63 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.64 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.65 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.66 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.67 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.68 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |

Project:
 Location:
 Contract:
 Engineer:
 Filename: Wadi Mosa

ETAP
 12.6.0H

Study Case: LF

Page: 4
 Date: 27-07-2023
 SN:
 Revision: Base
 Config.: Normal

| Bus | | | | | Load | | | | | | | |
|---------------------------|-------|---------|--------|------|-----------------|-------|--------------|-------|------------|-------|------------|-------|
| | | | | | Initial Voltage | | Constant kVA | | Constant Z | | Constant I | |
| ID | kV | Sub-sys | % Mag. | Ang. | MW | Mvar | MW | Mvar | MW | Mvar | MW | Mvar |
| SH.69 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.70 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.71 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.72 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.73 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.74 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.75 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.76 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.77 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.78 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| SH.79 | 0.400 | 1 | 100.0 | 0.0 | | | 0.004 | 0.002 | | | | |
| Total Number of Buses: 44 | | | | | 0.000 | 0.000 | 0.160 | 0.099 | 0.000 | 0.000 | 0.000 | 0.000 |

| Generation Bus | | | | Voltage | | Generation | | | Mvar Limits | |
|----------------|-------|-------|---------|---------|-------|------------|-------|------|-------------|-----|
| ID | kV | Type | Sub-sys | % Mag. | Angle | MW | Mvar | % PF | Max | Min |
| LV-KOISK | 0.400 | Swing | 1 | 100.0 | 0.0 | | | | | |
| | | | | | | 0.000 | 0.000 | | | |

Project:
 Location:
 Contract:
 Engineer:
 Filename: Wadi Mosa

ETAP
 12.6.0H

Study Case: LF

Page: 5
 Date: 27-07-2023
 SN:
 Revision: Base
 Config.: Normal

Line/Cable Input Data

Ohms or Siemens/1000 m per Conductor (Cable) or per Phase (Line)

| Line/Cable ID | Library | Size | Length | | #/Phase | T (°C) | R | X | Y |
|------------------|----------|------|----------|--------|---------|--------|----------|----------|---|
| | | | Adj. (m) | % Tol. | | | | | |
| C.KOISK | 1.0NCUN1 | 240 | 10.0 | 0.0 | 2 | 75 | 0.162142 | 0.165000 | |
| C.MDB-3 | 1.0NCUN4 | 120 | 150.0 | 0.0 | 1 | 75 | 0.187321 | 0.072000 | |
| C.MDB-04 | 1.0NCUN4 | 120 | 150.0 | 0.0 | 1 | 75 | 0.187321 | 0.072000 | |
| C.SH2 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH4 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH8 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH9 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH10 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH17 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH18 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH19 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH20 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH21 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH22 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH31 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH32 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH33 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH34 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH35 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH36 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH37 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH38 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH56 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH60 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH61 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH62 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH63 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH64 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH65 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH66 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH67 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH68 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH69 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH70 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |

Project:
 Location:
 Contract:
 Engineer:
 Filename: Wadi Mosa

ETAP
 12.6.0H

Study Case: LF

Page: 6
 Date: 27-07-2023
 SN:
 Revision: Base
 Config.: Normal

Ohms or Siemens/1000 m per Conductor (Cable) or per Phase (Line)

| Line/Cable ID | Library | Size | Length | | #/Phase | T (°C) | R | X | Y |
|------------------|----------|------|----------|--------|---------|--------|----------|----------|---|
| | | | Adj. (m) | % Tol. | | | | | |
| C.SH71 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH72 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH73 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH74 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH75 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH76 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH77 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH78 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |
| C.SH79 | 1.0NCUN3 | 6 | 50.0 | 0.0 | 1 | 75 | 3.745475 | 0.094000 | |

Line / Cable resistances are listed at the specified temperatures.

Project:
 Location:
 Contract:
 Engineer:
 Filename: Wadi Mosa

ETAP
 12.6.0H

Study Case: LF

Page: 7
 Date: 27-07-2023
 SN:
 Revision: Base
 Config.: Normal

Branch Connections

| CKT/Branch | | Connected Bus ID | | % Impedance, Pos. Seq., 100 MVA Base | | | |
|------------|-------|------------------|-----------|--------------------------------------|--------|----------|---|
| ID | Type | From Bus | To Bus | R | X | Z | Y |
| C.KOISK | Cable | LV-KOISK | LV-KOISK. | 50.67 | 51.56 | 72.29 | |
| C.MDB-3 | Cable | LV-KOISK. | MDB-2 | 1756.14 | 675.00 | 1881.40 | |
| C.MDB-04 | Cable | LV-KOISK. | MDB-04 | 1756.14 | 675.00 | 1881.40 | |
| C.SH2 | Cable | MDB-04 | SH.2 | 11704.61 | 293.75 | 11708.29 | |
| C.SH4 | Cable | MDB-04 | SH.4 | 11704.61 | 293.75 | 11708.29 | |
| C.SH8 | Cable | MDB-04 | SH.8 | 11704.61 | 293.75 | 11708.29 | |
| C.SH9 | Cable | MDB-04 | SH.9 | 11704.61 | 293.75 | 11708.29 | |
| C.SH10 | Cable | MDB-04 | SH.10 | 11704.61 | 293.75 | 11708.29 | |
| C.SH17 | Cable | MDB-04 | SH.17 | 11704.61 | 293.75 | 11708.29 | |
| C.SH18 | Cable | MDB-04 | SH.18 | 11704.61 | 293.75 | 11708.29 | |
| C.SH19 | Cable | MDB-04 | SH.19 | 11704.61 | 293.75 | 11708.29 | |
| C.SH20 | Cable | MDB-04 | SH.20 | 11704.61 | 293.75 | 11708.29 | |
| C.SH21 | Cable | MDB-04 | SH.21 | 11704.61 | 293.75 | 11708.29 | |
| C.SH22 | Cable | MDB-04 | SH.22 | 11704.61 | 293.75 | 11708.29 | |
| C.SH31 | Cable | MDB-04 | SH.31 | 11704.61 | 293.75 | 11708.29 | |
| C.SH32 | Cable | MDB-04 | SH.32 | 11704.61 | 293.75 | 11708.29 | |
| C.SH33 | Cable | MDB-04 | SH.33 | 11704.61 | 293.75 | 11708.29 | |
| C.SH34 | Cable | MDB-04 | SH.34 | 11704.61 | 293.75 | 11708.29 | |
| C.SH35 | Cable | MDB-04 | SH.35 | 11704.61 | 293.75 | 11708.29 | |
| C.SH36 | Cable | MDB-04 | SH.36 | 11704.61 | 293.75 | 11708.29 | |
| C.SH37 | Cable | MDB-04 | SH.37 | 11704.61 | 293.75 | 11708.29 | |
| C.SH38 | Cable | MDB-04 | SH.38 | 11704.61 | 293.75 | 11708.29 | |
| C.SH56 | Cable | MDB-04 | SH.56 | 11704.61 | 293.75 | 11708.29 | |
| C.SH60 | Cable | MDB-2 | SH.60 | 11704.61 | 293.75 | 11708.29 | |
| C.SH61 | Cable | MDB-2 | SH.61 | 11704.61 | 293.75 | 11708.29 | |
| C.SH62 | Cable | MDB-2 | SH.62 | 11704.61 | 293.75 | 11708.29 | |
| C.SH63 | Cable | MDB-2 | SH.63 | 11704.61 | 293.75 | 11708.29 | |
| C.SH64 | Cable | MDB-2 | SH.64 | 11704.61 | 293.75 | 11708.29 | |
| C.SH65 | Cable | MDB-2 | SH.65 | 11704.61 | 293.75 | 11708.29 | |
| C.SH66 | Cable | MDB-2 | SH.66 | 11704.61 | 293.75 | 11708.29 | |
| C.SH67 | Cable | MDB-2 | SH.67 | 11704.61 | 293.75 | 11708.29 | |
| C.SH68 | Cable | MDB-2 | SH.68 | 11704.61 | 293.75 | 11708.29 | |
| C.SH69 | Cable | MDB-2 | SH.69 | 11704.61 | 293.75 | 11708.29 | |
| C.SH70 | Cable | MDB-2 | SH.70 | 11704.61 | 293.75 | 11708.29 | |
| C.SH71 | Cable | MDB-2 | SH.71 | 11704.61 | 293.75 | 11708.29 | |
| C.SH72 | Cable | MDB-2 | SH.72 | 11704.61 | 293.75 | 11708.29 | |
| C.SH73 | Cable | MDB-2 | SH.73 | 11704.61 | 293.75 | 11708.29 | |

Project:
Location:
Contract:
Engineer:
Filename: Wadi Mosa

ETAP
12.6.0H

Study Case: LF

Page: 8
Date: 27-07-2023
SN:
Revision: Base
Config.: Normal

| CKT/Branch | | Connected Bus ID | | % Impedance, Pos. Seq., 100 MVA Base | | | |
|------------|-------|------------------|--------|--------------------------------------|--------|----------|---|
| ID | Type | From Bus | To Bus | R | X | Z | Y |
| C.SH74 | Cable | MDB-2 | SH.74 | 11704.61 | 293.75 | 11708.29 | |
| C.SH75 | Cable | MDB-2 | SH.75 | 11704.61 | 293.75 | 11708.29 | |
| C.SH76 | Cable | MDB-2 | SH.76 | 11704.61 | 293.75 | 11708.29 | |
| C.SH77 | Cable | MDB-2 | SH.77 | 11704.61 | 293.75 | 11708.29 | |
| C.SH78 | Cable | MDB-2 | SH.78 | 11704.61 | 293.75 | 11708.29 | |
| C.SH79 | Cable | MDB-2 | SH.79 | 11704.61 | 293.75 | 11708.29 | |

Project:
 Location:
 Contract:
 Engineer:
 Filename: Wadi Mosa

ETAP
 12.6.0H

Study Case: LF

Page: 9
 Date: 27-07-2023
 SN:
 Revision: Base
 Config.: Normal

LOAD FLOW REPORT

| Bus | | Voltage | | Generation | | Load | | Load Flow | | | | | XFMR |
|------------|-------|---------|------|------------|-------|------|------|-----------|--------|--------|-------|------|------|
| ID | kV | % Mag. | Ang. | MW | Mvar | MW | Mvar | ID | MW | Mvar | Amp | %PF | %Tap |
| * LV-KOISK | 0.400 | 100.000 | 0.0 | 0.157 | 0.096 | 0 | 0 | LV-KOISK. | 0.157 | 0.096 | 265.5 | 85.3 | |
| LV-KOISK. | 0.400 | 99.871 | 0.0 | 0 | 0 | 0 | 0 | LV-KOISK | -0.157 | -0.096 | 265.5 | 85.3 | |
| | | | | | | | | MDB-2 | 0.078 | 0.048 | 132.7 | 85.3 | |
| | | | | | | | | MDB-04 | 0.078 | 0.048 | 132.7 | 85.3 | |
| MDB-2 | 0.400 | 98.170 | 0.2 | 0 | 0 | 0 | 0 | LV-KOISK. | -0.077 | -0.047 | 132.7 | 85.1 | |
| | | | | | | | | SH.60 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.61 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.62 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.63 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.64 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.65 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.66 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.67 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.68 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.69 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.70 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.71 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.72 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.73 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.74 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.75 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.76 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.77 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.78 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.79 | 0.004 | 0.002 | 6.6 | 85.1 | |
| MDB-04 | 0.400 | 98.170 | 0.2 | 0 | 0 | 0 | 0 | LV-KOISK. | -0.077 | -0.047 | 132.7 | 85.1 | |
| | | | | | | | | SH.2 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.4 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.8 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.9 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.10 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.17 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.18 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.19 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.20 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.21 | 0.004 | 0.002 | 6.6 | 85.1 | |

Project:
 Location:
 Contract:
 Engineer:
 Filename: Wadi Mosa

ETAP
 12.6.0H

Study Case: LF

Page: 10
 Date: 27-07-2023
 SN:
 Revision: Base
 Config.: Normal

| Bus | | Voltage | | Generation | | Load | | Load Flow | | | | XFMR | |
|-------|-------|---------|------|------------|------|-------|-------|-----------|--------|--------|-----|------|------|
| ID | kV | % Mag. | Ang. | MW | Mvar | MW | Mvar | ID | MW | Mvar | Amp | %PF | %Tap |
| | | | | | | | | SH.22 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.31 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.32 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.33 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.34 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.35 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.36 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.37 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.38 | 0.004 | 0.002 | 6.6 | 85.1 | |
| | | | | | | | | SH.56 | 0.004 | 0.002 | 6.6 | 85.1 | |
| SH.2 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.4 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.8 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.9 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.10 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.17 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.18 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.19 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.20 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.21 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.22 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.31 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.32 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.33 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.34 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.35 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.36 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.37 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.38 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.56 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-04 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.60 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.61 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.62 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.63 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.64 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.65 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.66 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.67 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.68 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |

Project:
 Location:
 Contract:
 Engineer:
 Filename: Wadi Mosa

ETAP
 12.6.0H

Study Case: LF

Page: 11
 Date: 27-07-2023
 SN:
 Revision: Base
 Config.: Normal

| Bus | | Voltage | | Generation | | Load | | Load Flow | | | | | XFMR |
|-------|-------|---------|------|------------|------|-------|-------|-----------|--------|--------|-----|------|------|
| ID | kV | % Mag. | Ang. | MW | Mvar | MW | Mvar | ID | MW | Mvar | Amp | %PF | %Tap |
| SH.69 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.70 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.71 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.72 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.73 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.74 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.75 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.76 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.77 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.78 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |
| SH.79 | 0.400 | 97.705 | 0.3 | 0 | 0 | 0.004 | 0.002 | MDB-2 | -0.004 | -0.002 | 6.6 | 85.0 | |

* Indicates a voltage regulated bus (voltage controlled or swing type machine connected to it)

Indicates a bus with a load mismatch of more than 0.1 MVA

Project:
 Location:
 Contract:
 Engineer:
 Filename: Wadi Mosa

ETAP
 12.6.0H

Study Case: LF

Page: 12
 Date: 27-07-2023
 SN:
 Revision: Base
 Config.: Normal

Bus Loading Summary Report

| Bus | | | Directly Connected Load | | | | | | | | Total Bus Load | | | |
|-----------|-------|-----------|-------------------------|------|------------|-------|------------|------|---------|------|----------------|------|-------|-----------------|
| | | | Constant kVA | | Constant Z | | Constant I | | Generic | | MVA | % PF | Amp | Percent Loading |
| ID | kV | Rated Amp | MW | Mvar | MW | Mvar | MW | Mvar | MW | Mvar | | | | |
| LV-KOISK | 0.400 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.184 | 85.3 | 265.5 | |
| LV-KOISK. | 0.400 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.184 | 85.3 | 265.5 | |
| MDB-2 | 0.400 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.090 | 85.1 | 132.7 | |
| MDB-04 | 0.400 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.090 | 85.1 | 132.7 | |
| SH.2 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.4 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.8 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.9 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.10 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.17 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.18 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.19 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.20 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.21 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.22 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.31 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.32 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.33 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.34 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.35 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.36 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.37 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.38 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.56 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.60 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.61 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.62 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.63 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.64 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.65 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.66 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.67 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.68 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.69 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.70 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.71 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |

Project:
 Location:
 Contract:
 Engineer:
 Filename: Wadi Mosa

ETAP
 12.6.0H

Study Case: LF

Page: 13
 Date: 27-07-2023
 SN:
 Revision: Base
 Config.: Normal

| Bus | | | Directly Connected Load | | | | | | | | Total Bus Load | | | |
|-------|-------|-----------|-------------------------|------|------------|-------|------------|------|---------|------|----------------|------|-----|-----------------|
| | | | Constant kVA | | Constant Z | | Constant I | | Generic | | MVA | % PF | Amp | Percent Loading |
| ID | kV | Rated Amp | MW | Mvar | MW | Mvar | MW | Mvar | MW | Mvar | | | | |
| SH.72 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.73 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.74 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.75 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.76 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.77 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.78 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |
| SH.79 | 0.400 | | 0 | 0 | 0.004 | 0.002 | 0 | 0 | 0 | 0 | 0.004 | 85.0 | 6.6 | |

* Indicates operating load of a bus exceeds the bus critical limit (100.0% of the Continuous Ampere rating).

Indicates operating load of a bus exceeds the bus marginal limit (95.0% of the Continuous Ampere rating).

Project:
Location:
Contract:
Engineer:
Filename: Wadi Mosa

ETAP
12.6.0H

Study Case: LF

Page: 14
Date: 27-07-2023
SN:
Revision: Base
Config.: Normal

Branch Loading Summary Report

| CKT / Branch | | Cable & Reactor | | | Transformer | | | | |
|---------------------|-------|----------------------------|-------------|-------|--------------------|-----------------|---|------------------|---|
| ID | Type | Ampacity (Amp) | Loading Amp | % | Capability (MVA) | Loading (input) | | Loading (output) | |
| | | | | | | MVA | % | MVA | % |
| C.KOISK | Cable | 960.00 | 265.47 | 27.65 | | | | | |

* Indicates a branch with operating load exceeding the branch capability.

Project:
 Location:
 Contract:
 Engineer:
 Filename: Wadi Mosa

ETAP
 12.6.0H

Study Case: LF

Page: 15
 Date: 27-07-2023
 SN:
 Revision: Base
 Config.: Normal

Branch Losses Summary Report

| CKT / Branch ID | From-To Bus Flow | | To-From Bus Flow | | Losses | | % Bus Voltage | | Vd % Drop in Vmag |
|--------------------|------------------|-------|------------------|--------|--------|------|---------------|------|-------------------------|
| | MW | Mvar | MW | Mvar | kW | kvar | From | To | |
| C.KOISK | 0.157 | 0.096 | -0.157 | -0.096 | 0.2 | 0.2 | 100.0 | 99.9 | 0.13 |
| C.MDB-3 | 0.078 | 0.048 | -0.077 | -0.047 | 1.5 | 0.6 | 99.9 | 98.2 | 1.70 |
| C.MDB-04 | 0.078 | 0.048 | -0.077 | -0.047 | 1.5 | 0.6 | 99.9 | 98.2 | 1.70 |
| C.SH60 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH61 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH62 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH63 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH64 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH65 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH66 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH67 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH68 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH69 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH70 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH71 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH72 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH73 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH74 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH75 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH76 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH77 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH78 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH79 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH2 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH4 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH8 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH9 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH10 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH17 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH18 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH19 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH20 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH21 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH22 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH31 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |

Project:
 Location:
 Contract:
 Engineer:
 Filename: Wadi Mosa

ETAP
 12.6.0H

Study Case: LF

Page: 16
 Date: 27-07-2023
 SN:
 Revision: Base
 Config.: Normal

| CKT / Branch ID | From-To Bus Flow | | To-From Bus Flow | | Losses | | % Bus Voltage | | Vd % Drop in Vmag |
|--------------------|------------------|-------|------------------|--------|--------|------|---------------|------|-------------------------|
| | MW | Mvar | MW | Mvar | kW | kvar | From | To | |
| C.SH32 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH33 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH34 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH35 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH36 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH37 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH38 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| C.SH56 | 0.004 | 0.002 | -0.004 | -0.002 | 0.0 | 0.0 | 98.2 | 97.7 | 0.46 |
| | | | | | 4.1 | 1.3 | | | |

Project:
 Location:
 Contract:
 Engineer:
 Filename: Wadi Mosa

ETAP
 12.6.0H

Study Case: LF

Page: 17
 Date: 27-07-2023
 SN:
 Revision: Base
 Config.: Normal

Alert Summary Report

% Alert Settings

| | <u>Critical</u> | <u>Marginal</u> |
|------------------------------------|------------------------|------------------------|
| <u>Loading</u> | | |
| Bus | 100.0 | 95.0 |
| Cable | 100.0 | 95.0 |
| Reactor | 100.0 | 95.0 |
| Line | 100.0 | 95.0 |
| Transformer | 100.0 | 95.0 |
| Panel | 100.0 | 95.0 |
| Protective Device | 100.0 | 95.0 |
| Generator | 100.0 | 95.0 |
| Inverter/Charger | 100.0 | 95.0 |
| <u>Bus Voltage</u> | | |
| OverVoltage | 105.0 | 102.0 |
| UnderVoltage | 95.0 | 98.0 |
| <u>Generator Excitation</u> | | |
| OverExcited (Q Max.) | 100.0 | 95.0 |
| UnderExcited (Q Min.) | 100.0 | |

Marginal Report

| Device ID | Type | Condition | Rating/Limit | Unit | Operating | % Operating | Phase Type |
|------------------|-------------|------------------|---------------------|-------------|------------------|--------------------|-------------------|
| SH.10 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.17 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.18 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.19 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.2 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.20 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.21 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.22 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.31 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.32 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.33 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.34 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.35 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.36 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.37 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |

Project:
Location:
Contract:
Engineer:
Filename: Wadi Mosa

ETAP
12.6.0H

Study Case: LF

Page: 18
Date: 27-07-2023
SN:
Revision: Base
Config.: Normal

Marginal Report

| <u>Device ID</u> | <u>Type</u> | <u>Condition</u> | <u>Rating/Limit</u> | <u>Unit</u> | <u>Operating</u> | <u>% Operating</u> | <u>Phase Type</u> |
|------------------|-------------|------------------|---------------------|-------------|------------------|--------------------|-------------------|
| SH.38 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.4 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.56 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.60 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.61 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.62 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.63 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.64 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.65 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.66 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.67 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.68 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.69 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.70 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.71 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.72 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.73 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.74 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.75 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.76 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.77 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.78 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.79 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.8 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |
| SH.9 | Bus | Under Voltage | 0.40 | kV | 0.39 | 97.7 | 3-Phase |

| | | | |
|-----------|----------------|-----------|------------|
| Project: | ETAP | Page: | 19 |
| Location: | 12.6.0H | Date: | 27-07-2023 |
| Contract: | | SN: | |
| Engineer: | Study Case: LF | Revision: | Base |
| Filename: | Wadi Mosa | Config.: | Normal |

SUMMARY OF TOTAL GENERATION, LOADING & DEMAND

| | <u>MW</u> | <u>Mvar</u> | <u>MVA</u> | <u>% PF</u> |
|---------------------------|-----------|-------------|------------|---------------|
| Source (Swing Buses): | 0.157 | 0.096 | 0.184 | 85.30 Lagging |
| Source (Non-Swing Buses): | 0.000 | 0.000 | 0.000 | |
| Total Demand: | 0.157 | 0.096 | 0.184 | 85.30 Lagging |
| Total Motor Load: | 0.000 | 0.000 | 0.000 | 92.88 Lagging |
| Total Static Load: | 0.153 | 0.095 | 0.180 | 85.00 Lagging |
| Total Constant I Load: | 0.000 | 0.000 | 0.000 | |
| Total Generic Load: | 0.000 | 0.000 | 0.000 | |
| Apparent Losses: | 0.004 | 0.001 | | |
| System Mismatch: | 0.000 | 0.000 | | |

Number of Iterations: 1