

INSTALLATION MANUAL & USER GUIDE

NORDICCO NORTHERN LIGHT® HVLS FAN

ENGLISH

Please note: this manual is not applicable for installations performed in Denmark. In this case, please see Danish manual.



IMPORTANT SAFETY WARNING

THIS SYSTEM USES INTEGRATED UVC LIGHT SOURCES. INCORRECT INSTALLATION AND/OR USAGE CAN CAUSE INJURY. WARNING: NEVER LOOK DIRECTLY INTO UVC LIGHT SOURCES.

PLEASE NOTE THAT SPECIFIC LOCAL OR NATIONAL REQUIREMENTS MAY APPLY TO THE INSTALLATION AND USAGE OF UVC EQUIPMENT. IT IS THE SOLE RESPONSIBILITY OF THE INSTALLER TO ENSURE FULL COMPLIANCE WITH ANY LOCAL AND/OR NATIONAL REQUIREMENTS, INCLUDING ANY REQUIRED AUTHORIZATIONS.

WE RECOMMEND THAT INSTALLED SYSTEMS ARE INSPECTED (BY A PROFESSIONAL UVC TECHNICIAN) EVERY SIX MONTHS.



BEFORE YOU BEGIN



TRANSPORT DAMAGE: THIS SYSTEM USES LIGHT SOURCES THAT CONTAIN MERCURY. IT IS VERY UNLIKELY THAT A BROKEN LIGHT SOURCE WILL AFFECT YOUR HEALTH. IF A LIGHT SOURCE BREAKS, THE ROOM MUST BE VENTILATED FOR A MINIMUM OF 30 MINUTES AND THE BROKEN COMPONENTS REMOVED (WE RECOMMEND THAT YOU WEAR GLOVES). PLACE THE BROKEN PARTS IN A CLOSED PLASTIC BAG AND DEPOSIT AT YOUR LOCAL RECYCLING STATION. DO NOT USE A VACUUM CLEANER.



IT IS EXTREMELY IMPORTANT THAT YOU READ CAREFULLY AND UNDERSTAND THIS INSTALLATION MANUAL IN ITS ENTIRETY BEFORE USING THE NORDICCO NORTHERN LIGHT® HVLS FAN. INCORRECT USE MAY CAUSE SEVERE PHYSICAL INJURY AS WELL AS DAMAGE TO INVENTORY, ETC. BEFORE INSTALLATION, IT IS IMPORTANT TO ENSURE THAT YOU UNDERSTAND AND COMPLY WITH ALL LOCAL REGULATIONS AND RESTRICTIONS RELATED TO THE FAN'S INSTALLATION.



THE PURPOSE OF THIS INSTALLATION AND COMMISSIONING MANUAL IS TO ENSURE THAT THE NORDICCO NORTHERN LIGHT® HVLS FAN IS CORRECTLY INSTALLED AND THAT THE UVC IRRADIATION LEVELS ARE CORRECTLY CALIBRATED AND BELOW THE LIMITS REQUIRED BY APPLICABLE NORMS AND REGULATIONS. THE PROFESSIONAL INSTALLER IS RESPONSIBLE FOR THE ACTIVATION, CALIBRATION AND COMMISSIONING OF THE UVC SYSTEM.



ONLY A PROFESSIONAL UVC INSTALLER MAY ACTIVATE THE UVC SYSTEM IN THE FAN (REQUIRES A SPECIAL ACCESS CODE FOUND IN THIS MANUAL). IT IS THEREFORE THE LATTER'S RESPONSIBILITY TO ENSURE THAT PEOPLE ARE NOT EXPOSED TO EXCESSIVE UVC IRRADIATION LEVELS WHEN USING THE INSTALLED SYSTEM. ONLY QUALIFIED/PROFESSIONAL UVC INSTALLERS WITH THE CORRECT EQUIPMENT AND UNDERSTANDING OF UVC IRRADIATION ARE PERMITTED TO PERFORM THE ASSESSMENT AND CONFIGURATION OF THE UVC COMPONENTS IN THIS PRODUCT.



USE OF THE UVC SYSTEM OVER TIME CAN RESULT IN DISCOLORATION AND DECOMPOSITION OF NON-UV-RESISTANT MATERIALS.



IT IS THE RESPONSIBILITY OF THE OWNER AND OPERATOR TO ENSURE THAT THE IRRADIATION LEVEL OF THE INSTALLED NORDICCO NORTHERN LIGHT® HVLS FAN IS REVIEWED AND RECALIBRATED BY A PROFESSIONAL UVC INSTALLER IF CHANGES ARE MADE TO THE CEILING, INCL. NEW CEILING-MOUNTED FITTINGS/INSTALLATIONS ETC. AND/OR IF A NORDICCO NORTHERN LIGHT® HVLS FAN IS MOVED TO ANOTHER LOCATION.



THIS MANUAL MUST BE STORED IN A PLACE WHERE IT IS EASILY AVAILABLE TO USERS, INSTALLERS AND OTHERS WHO MAY NEED TO FIND INFORMATION ABOUT THE USE OF NORDICCO NORTHERN LIGHT® HVLS FANS. IF A MANUAL IS MISPLACED IT CAN BE DOWNLOADED FROM WWW.NORDICCO.EU

GENERAL SAFETY INFORMATION

WARNING

To reduce the risk of fire, electric shock or personal injury, the following must be observed:

1. Use this system only as instructed by Nordicco A/S. If you have any questions, please contact Nordicco A/S or its representatives.
2. Before servicing or cleaning the system, turn off the power to the control unit and disconnect it from the main supply to prevent the power from being turned on accidentally.
3. Installation and electrical wiring must be performed by qualified professionals in accordance with all applicable standards and regulations.
4. DO NOT ALLOW WATER OR SOLVENTS TO ENTER THE MOTOR OR DRIVE. UNDER NO CIRCUMSTANCES MAY THE MOTOR OR DRIVE BE SPRAYED WITH STEAM, WATER OR SOLVENTS.
5. It is recommended that a repair/safety breakers switch is installed between each NORDICCO Northern Light® HVLS fan and the electrical power supply network. Make sure that such a switch is NOT placed directly above the blades so that it is always accessible – even when the fan is running.



IMPORTANT: CHECK ALL APPLICABLE STANDARDS AND REGULATIONS TO ENSURE COMPLIANCE WITH ALL NECESSARY REQUIREMENTS. IT IS THE SOLE RESPONSIBILITY OF THE INSTALLER TO ENSURE COMPLIANCE WITH APPLICABLE REGULATIONS WHEN INSTALLING THE FAN.



IT IS THE RESPONSIBILITY OF THE PROFESSIONAL UVC INSTALLER TO ENSURE THAT THE IRRADIATION LEVELS FROM THE INSTALLED NORDICCO NORTHERN LIGHT® HVLS FAN(S) IS/ARE MEASURED CORRECTLY BEFORE COMMISSIONING THE UVC LIGHT COMPONENT (Part 2). IT IS THE OWNER'S SOLE RESPONSIBILITY TO ENSURE THAT THE IRRADIATION LEVEL IS REVIEWED AND RECALIBRATED IF ALTERATIONS ARE MADE TO THE CEILING, INCL. NEW CEILING-MOUNTED FITTINGS/INSTALLATIONS ETC. AND/OR IF A NORDICCO NORTHERN LIGHT® HVLS FAN IS MOVED TO ANOTHER LOCATION.



TO AVOID THE RISK OF EXCESSIVE UVC IRRADIATION LEVELS, ALWAYS ENSURE THAT THE SYSTEM IS DISCONNECTED FROM THE POWER SUPPLY AND IS SECURED WHEN WORKING IN PROXIMITY TO OR ABOVE THE FAN AND ITS BLADES.

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INSTALLATION AND COMMISSIONING

Installation of the NORDICCO Northern Light® system is divided into three parts/sections, which are each described below and illustrated in Figure 1.

PART 1: Installation of the HVLS fan

This part of the installation can be performed by an installer with a technically relevant qualification, such as a Service Engineer or electrical fitter. The installer is responsible for the processes and procedures presented in Part 1 of this installation manual.

PART 2: Activation, assessment and commissioning of the UVC system (Northern Light)

May only be performed by professional installation specialists experienced in measuring and assessing UVC light systems. Activating the UVC component of the fan requires a special password, which can be found in Part 2 of this manual.

The professional installer is responsible for the processes and procedures presented in Part 2 of this installation manual as well as being responsible for ensuring that the Administrator receives correct instruction and guidance in use of the system.

PART 3: Instruction, guidance and information

The professional installer will instruct and guide the Administrator in the correct use of the system. The professional installer will also deliver the Assessment report as well as inform the Administrator of the results found and measures taken during the assessment and commissioning of the system.

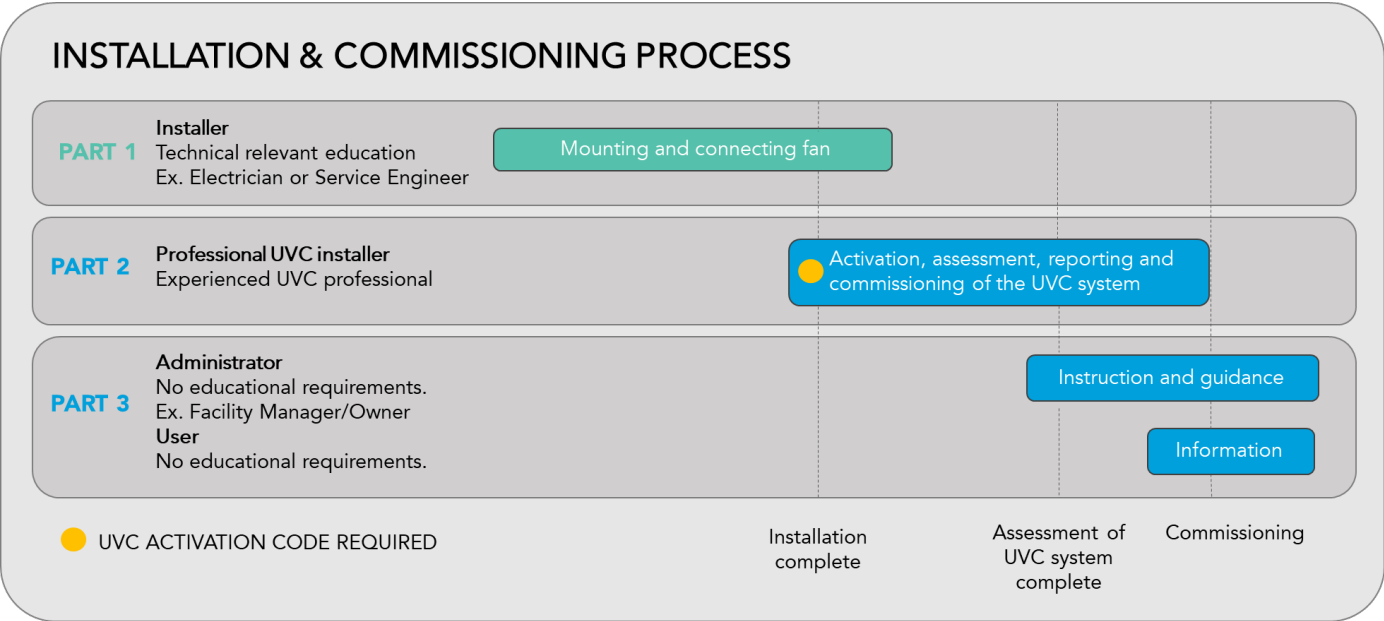


Figure 1: Installation procedure

PART 1

MOUNTING & CONNECTION OF FAN (EXCLUDING UVC SYSTEM)

PRE-INSTALLATION CHECK

1. MAKE SURE THAT THE CEILING FAN IS INSTALLED IN A LOCATION WHERE THE BLADES ARE AT LEAST 3.0 METERS ABOVE HIGHEST FLOOR LEVEL TO AVOID DIRECT EXPOSURE TO THE UVC LIGHT. FURTHERMORE ENSURE A SAFE DISTANCE FROM ANY OBSTACLES ALLOWING THE FAN TO OPERATE FREELY.
2. If the building has a mezzanine, staircase or other elevated area where people may be present this must be taken into account when measuring distances in accordance with point 1.
3. Make sure the ceiling fan is not installed near overhead doors or other building openings where gusts of wind may occur. The fan should not be installed or operated in places where wind is present.
4. If the building is equipped with a fire sprinkler system, verify that the placement of the fan will not interfere with correct sprinkler operation and that the installation of the fan complies with all applicable building codes, rules and regulations.
5. Check whether the intended placement of the fan is directly under lamps or skylights. If possible, avoid installing fans below a light source to prevent a stroboscopic effect that can be caused by the fan's rotation.
6. To achieve the best possible performance, the fan must be installed with a minimum clearance distance of two fan diameters to the nearest radiant heaters and HVAC system discharges (outlets) or intakes (inlets).
7. BEFORE INSTALLATION, IT IS IMPORTANT TO VERIFY THAT THE MOUNTING SURFACE CAN BEAR THE OPERATING WEIGHT AND MAXIMUM TORQUE (ROTATING FORCE) OF THE NORDICCO® FANS THAT WILL BE INSTALLED. IT IS THE SOLE RESPONSIBILITY OF THE INSTALLER TO ENSURE THAT THE MOUNTING STRUCTURE AND FAN INSTALLATION METHOD ARE ADEQUATE FOR SAFE OPERATION OF THE NORDICCO® FAN.

MAX TORQUE PER NORDICCO® FAN SIZE

Fan size (meters)	2.0	3.0	4.0	5.0
Max. torque (Nm)	9	28	45	64

8. THE FITTINGS/FIXING MEANS FOR ATTACHMENT TO THE CEILING MUST HAVE SUFFICIENT STRENGTH TO WITHSTAND FOUR (4) TIMES THE WEIGHT OF THE SPECIFIC NORDICCO® CEILING FAN (SEE ALSO TABLE BELOW).

Northern Light® System	2.0M	3.0M	4.0M	5.0M
Suspended weight	33kg	39kg	45kg	51kg
4 x suspended weight	132kg	156kg	180kg	204kg

9. To reduce the risk of strong reflective irradiation, make sure that there are no highly reflective surfaces above or near the top of the blades. These include, for example, aluminum, reflective lamps, polished steel surfaces, etc. A complete irradiation assessment is required before commissioning the system.
10. Inspect the blade's packaging before handling the blades to ensure that all UVC light sources are intact. If there is a risk or suspicion that a light source is broken or otherwise damaged, the light source should be checked by putting on gloves and ensuring that there is adequate ventilation until you have confirmed that they are undamaged. If in doubt, contact Nordicco A/S for the processing of a damage report and the replacement of spare parts if necessary.
11. INSTALLATION AND MAINTENANCE SHOULD ONLY BE PERFORMED BY QUALIFIED PROFESSIONAL PERSONNEL WHO ARE FAMILIAR WITH LOCAL REGULATIONS AND ARE EXPERIENCED WITH THIS TYPE OF EQUIPMENT.

FIRE PRECAUTIONS

IMPORTANT: It is the installers responsibility to ensure full compliance with all national and local requirements in relation to fire and fire hazards. Nordicco A/S always recommends that a competent advisor is consulted prior to the installation.

The following 3 scenario examples have been developed by DBI (The Danish Institute of Fire and Security Technology) as suggestions for a fire hazard assessment. **These scenarios are for informational purposes only and do not replace any national or local requirements.**

According to DBI it should be noted that the smaller the rotor diameter of an HVLS fan, the lower the risk of a fire spreading. The risk of fire spreading also depends on the location of the individual HVLS fan. Three (3) scenarios are described below, where it is relevant to assess the early detection of an incipient fire.

Scenario 1: HVLS fans installed in a room without any fire protection systems:

1. The HVLS fans should be installed so that they can be easily disconnected – for example via a control panel, emergency stop button or safety switch mounted visibly at exits or located at strategic/easily accessible locations in the room.
2. A vertical respecting distance of at least 0.5 meters from combustible / flammable storage should be kept, to ensure that any fire spread is reduced.
3. HVLS fans should be installed as far away from storage (e.g. storage shelves) as possible. When installing in shelved storage sections, fans should be installed above walking aisles, and not above actual storage racks.

Scenario 2: HVLS fans installed in a room, where an Automatic Fire Alarm system is installed.

1. The HVLS fans must stop when the Automatic Fire Alarm system detects a fire and preferably do so even before a fire is detected. This can be achieved via the built-in "fire alarm cable", or by using manual stop options, as indicated in scenario 1.
2. For systems with flame detectors, the location of the HVLS fans should be assessed in relation to the flame detectors' location. There are examples of ceiling fans causing reflections that are mistaken for light from a flame, thereby giving an unintended alarm. Flame detectors are typically used in rooms with high ceilings and in atriums.
3. The HVLS fans should not be installed in the line of sight of a linear smoke detector, as this may cause false alarms to trigger on the Automatic Fire Alarm system. A linear smoke detector uses invisible beams of ultraviolet and infra-red light. The light is either received or reflected on an opposing wall. The Automatic Fire Alarm system goes into fault mode if the light beam is interrupted.
4. Where point smoke detectors are installed, a number of considerations must be taken into account:
 - a) The velocity of the airflow from the HVLS fan should not exceed 0.5 m/sec.
 - b) A respecting distance of at least 0.5 meters should be maintained from point smoke detectors to the HVLS fan blades.

Scenario 3: HVLS fans installed in a room where sprinkler systems are installed. The actions listed in scenario 1 should be followed, in addition to the following points, which are recommended by the NFPA (National Fire Protection Association):

1. The largest HVLS fan diameter should not exceed 8 meters.
2. The HVLS fans should be centered between four sprinkler heads.
3. The distance between the HVLS fans and the sprinkler heads should be at least 0.9 meters, so as not to disrupt sprinkler system activation.
4. HVLS fans should be connected to the Automatic Fire Alarm system (if installed in the room) and the sprinkler system control and indication equipment, so that the HVLS fans shut down when a fire is detected.

INSIDE THE BOX

BOX 1

- 1 Saddle
- 2 Drop Tube
- 3 Drive and Onboard Electronics
- 4 Motor
- 5 Controller (if ordered)
- 6 Starfish Blade Hub
- 7 Patch cable (optional)
- 8 230V power cable (3 x 1.0 mm²)
- 9 Fire alarm cable
- 10 Mount Cover (if ordered)
- 11 Safety wire
- 12 Safety wire lock (Gripple)
- 13 2 x Extension Tubes
- 14 2 x Alu Extension Connectors
- 15 Required screws and bolts
- 16 Bottom cover
- 17 UVC-irradiation aperture shields



SCREWS FOR CONCRETE MOUNTING

HUS3-H 6X60MM (4 pcs)



DRILL 6MM HSS

SCREWS FOR WOOD MOUNTING

8X70MM (4 pcs).



DRILL 5MM

BOLTS FOR STEEL MOUNTING

8X25MM (4 pcs).

4 washers, 4 locknuts



DRILL 8.5MM HSS

DROP TUBE & EXTENSION TUBE BOLTS

10x70mm (10 pcs), 10 locknuts

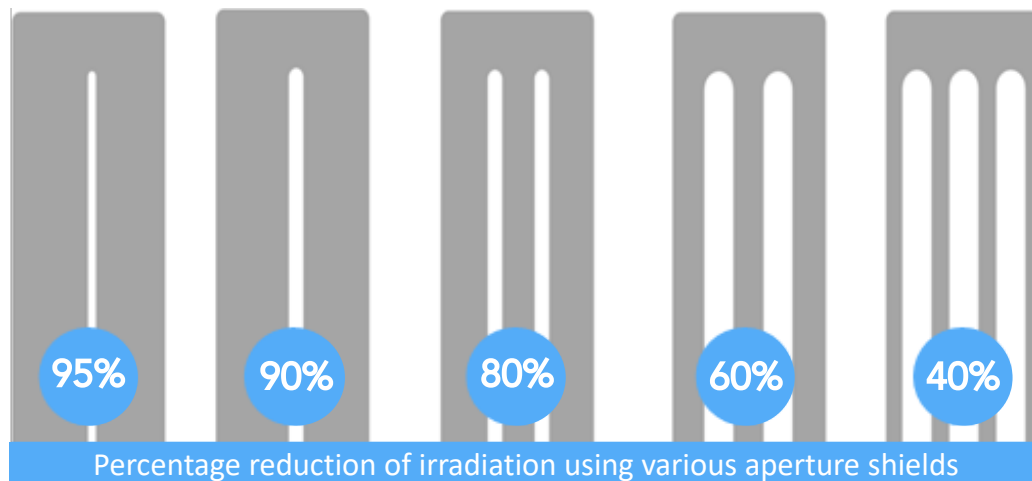
20 plastic caps (secure at both ends)



NO PRE-DRILL REQUIRED



- 17 UVC aperture shields / emission dampers



- 1 Anodised aluminium air blades with UVC system

- 2 Required screws



- 2 **SCREWS FOR MOUNTING AIR BLADES**
6 x 16mm (10 pcs)
lock spring washers (10 pcs)

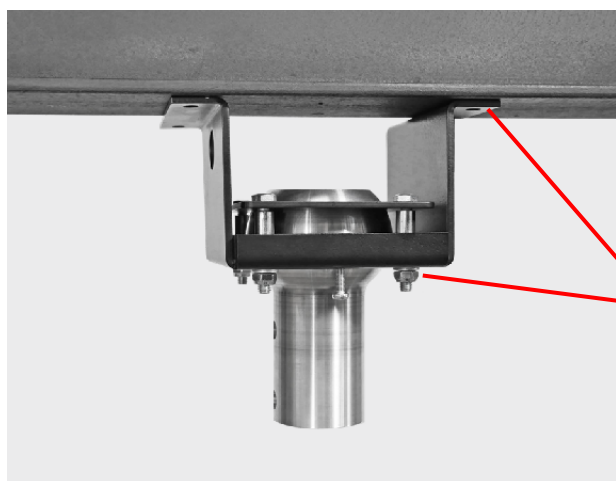


NO DRILL BIT NEEDED

REQUIRED TOOLS & ACCESSORIES



STANDARD INSTALLATION

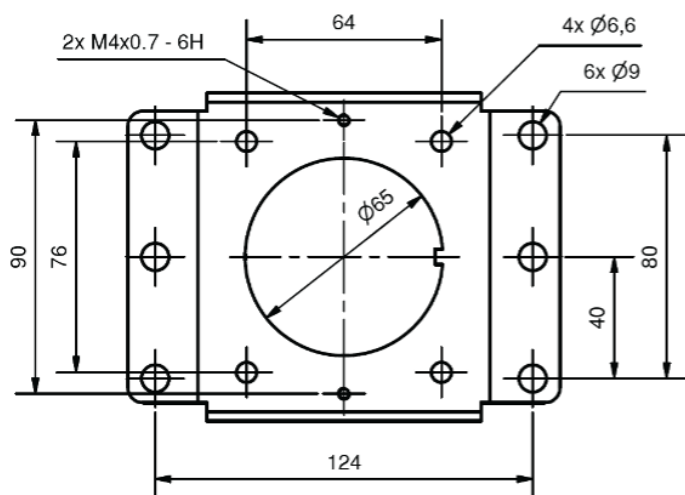


Using the saddle allows the Northern Light® system to be mounted directly on standard I and H steel beams, as well as wooden and concrete beams. This is done using the supplied screws and bolts, as shown in item 15 of the section 'Inside the Box'.



REMEMBER to tighten screws / bolts after suspending and levelling the fan.

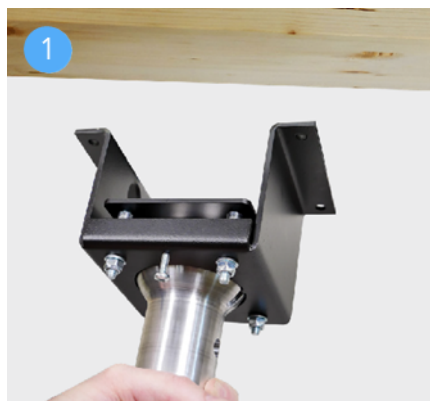
SADDLE DIMENSIONS



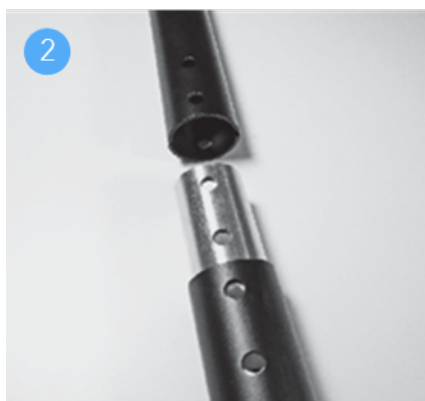
Before carrying out a standard installation, make sure that the mounting beam is of sufficient width to accommodate the saddle. If this is not the case, additional mounting brackets can be used. Contact your Nordicco supplier.

For installations that use optional mounting brackets or additional stabilizing wires, refer to the manuals for these, which can be found in the relevant product boxes or can be downloaded from: www.nordicco.eu/downloads

STANDARD INSTALLATION PROCESS



Use the saddle as a template to drill the required holes in the mounting beam using the drill bit specified.



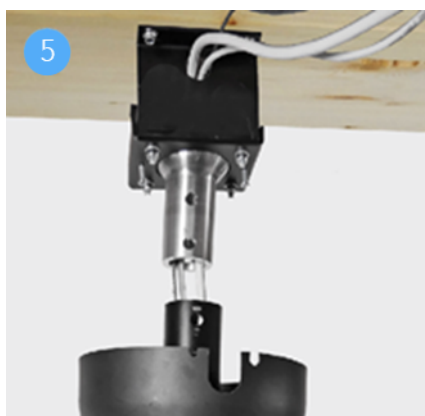
If needed, attach one or two Extension Tubes to the Drop Tube using the Alu Extension connectors.



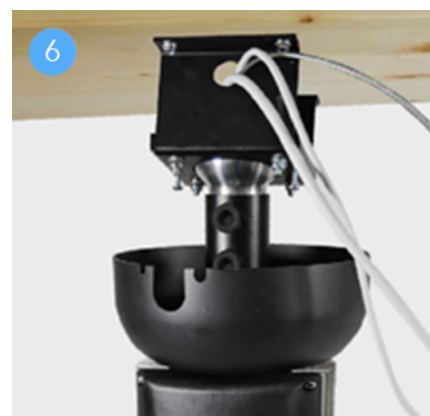
Pull the cables through the Drop Tube.



Line up holes and tighten bolts thoroughly.



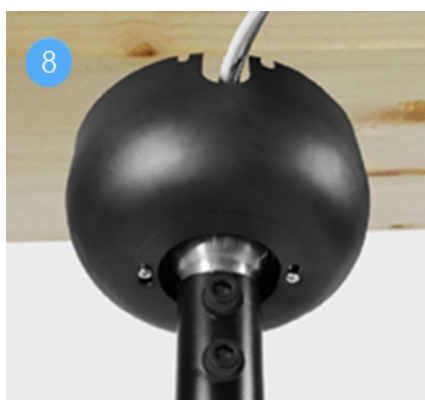
Fasten the saddle to the mounting surface using screws (wood and concrete) or bolts (steel). Tighten thoroughly.



Attach the fan assembly to the swivel mount via the drop tube using specified bolts and secure tightly.



Attach the safety wire around the mounting beam. **IMPORTANT:** follow the steps on page 14.



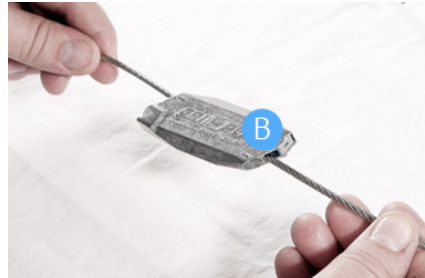
IF ORDERED: Push up the mount cover and twist to lock in place using the two small screws as shown above.

PLEASE NOTE: IF YOU ARE UNABLE TO INSTALL DIRECTLY ON THE MOUNTING SURFACE, YOU CAN USE EXTRA MOUNTING BRACKETS. SEE SEPARATE MANUAL OR CONTACT YOUR NORDICCO SUPPLIER:
WWW.NORDICCO.EU/DOWNLOADS

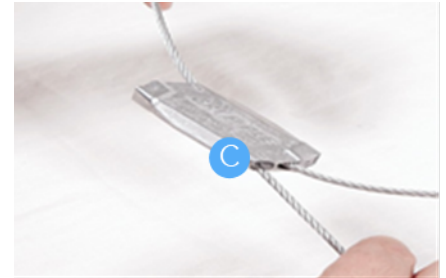
INSTALLING & SECURING THE SAFETY WIRE



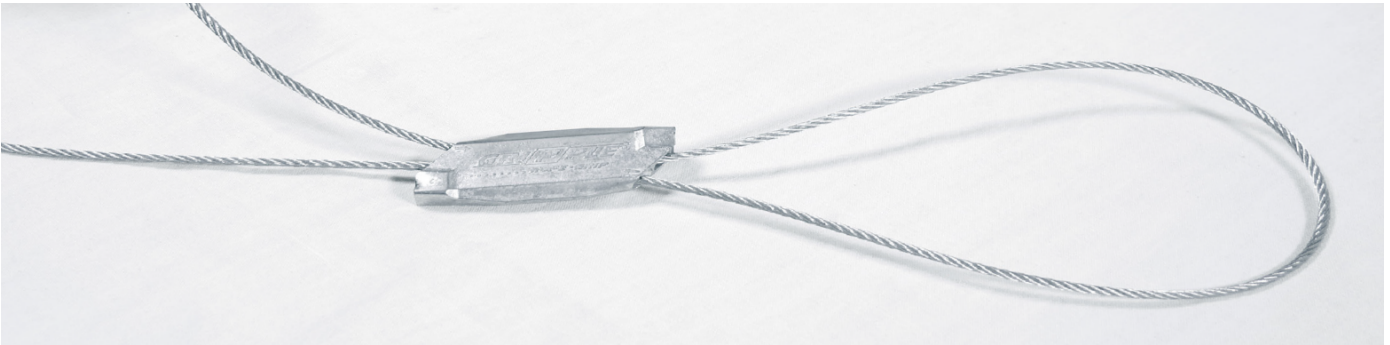
Insert the wire by inserting it into **A** and turning it clockwise.



Pull the wire through **B**.



Pull the wire around the mounting beam and insert the wire into **C**. Follow the direction of the arrows.



Tighten the wire. Cut or adjust excess wire to ensure that it does not affect the fan when in operation.

WARNING: THE SAFETY WIRE MUST BE INSTALLED.

THE SAFETY WIRE WILL PREVENT THE FAN FROM FALLING DOWN IF THE INSTALLATION SYSTEM FAILS. THE FAN SHOULD NEVER BE OPERATED WITHOUT A PROPERLY INSTALLED SAFETY WIRE, AS THIS MAY RESULT IN SERIOUS INJURY, DEATH OR DAMAGE TO INVENTORY.

AIR BLADE INSTALLATION



PLEASE NOTE: Make sure that the fan is vertically and horizontally levelled before mounting the blades.
IMPORTANT: Do not use the fan without mounting the blades, as this may damage the motor and drive.



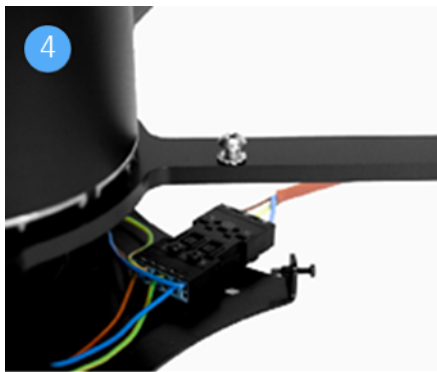
IMPORTANT: Systems must NOT be connected to a power supply when the following steps are performed.



Position the blade onto the starfish (make sure that the wires are not damaged during installation)



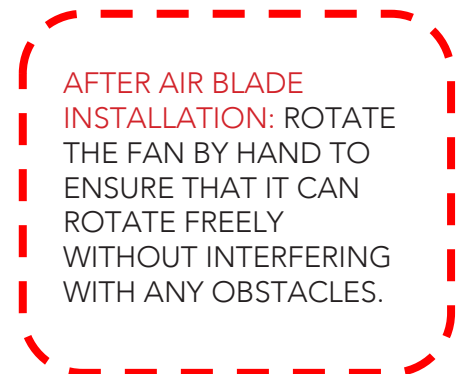
Secure the blade with specified screws and tools.



Connect power from the fan's power distributor plate to the blades



Move the base cover to the correct position and secure with the screws



AFTER AIR BLADE INSTALLATION: ROTATE THE FAN BY HAND TO ENSURE THAT IT CAN ROTATE FREELY WITHOUT INTERFERING WITH ANY OBSTACLES.

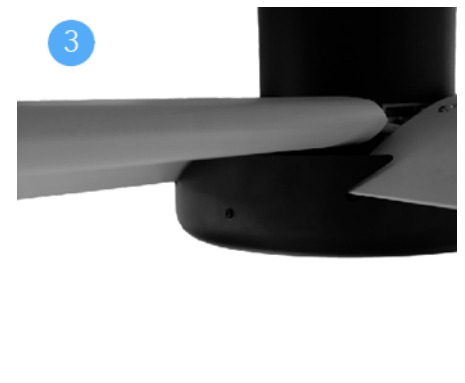
CORRECT SCREW ALIGNMENT



Blades viewed from **above**

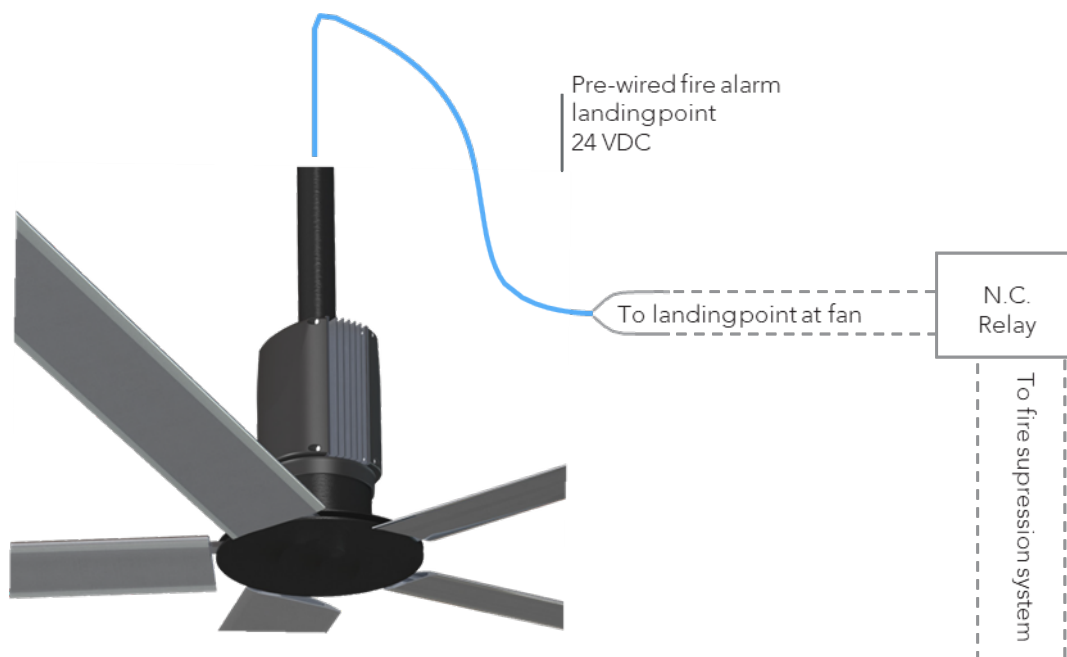


Blades viewed from **below**



Base cover viewed from **the side**

FIRE ALARM INSTALLATION



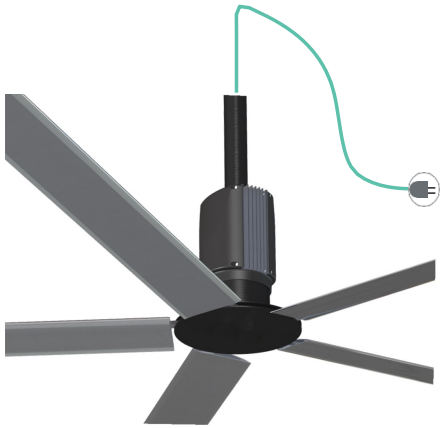
OPTIONAL FIRE ALARM INSTALLATION

Note: This section is only relevant in buildings equipped with fire extinguishing systems. For buildings with no fire suppression system, simply leave the fire cable untouched inside the drop tube.

Important: The fire alarm relay must only be installed by qualified persons who understand how to deal with fire suppression systems. It is the sole responsibility of the installer to ensure correct handling of the fire alarm relay in the event of a fire in the building.

Remove the excess length of wire and attach to a normally-closed (N.C.) potential-free relay on the fire alarm emergency stop and the building's fire suppression system following the wire diagram above.

CONNECTION OF POWER & CONTROL



Connect the power plug to the power cable.

Then connect a 230 VAC single-phase power supply with earth.

CONTROL OPTIONS

When ordering the fan, you have chosen one of the control options mentioned below which will determine the further installation process.

- **Northern Sky:** Log in via app.northernsky.io with the user information you have received by e-mail. **Please note:** It can take up to 20 minutes until the system is online after connecting to 230V.
- **Nordicco HMI Controller:** Insert the patch cable in the controller and see the manual for HMI-Controller for further steps.
- **BMS:** If the Nordicco fan is to be monitored and controlled with a Building Management System (BMS) please use the CAT6 cable to connect it to the BMS system.

Contact your local BMS operator for further implementation. Furthermore, see the manual 'ADVANCED OPERATIONS – INTEGRATING TO A BUILDING MANAGEMENT SYSTEM' which can be found at <https://nordicco.eu/downloads/>

SECURITY CHECK

Before use, please perform an initial security check of the fan on a secure distance by slowly increasing speed one level at a time. If any shaking, vibrations, or similar appears, decrease speed immediately and make the fan come to a complete stop. Go back and make sure all installation steps were performed correctly and make any necessary adjustments. Perform a second check, and if any abnormalities persist, please turn off fan and contact your local support office.

CLEANING AND MAINTENANCE

CLEANING

- The fan must be powered off using the repair/safety switch before commencing any cleaning tasks.
- The fan's exterior surfaces, including blades, motor, drive and drop tube, can be wiped down with a damp cloth. Use only clean water for cleaning.

MAINTENANCE

- The fan must be powered off using the repair/safety switch before commencing any maintenance tasks.
- Mounting screws should be inspected and retightened at least once a year. This includes blade mounting screws, drop tube assembly screws and screws in fixed construction.
- The system's safety wire should be inspected annually to ensure that it shows no signs of visible damage, beginning wear or other signs of damage. Likewise, the point where the safety wire is attached to the fixed structure should be inspected to ensure full attachment.
- The safety wire and/or the attachment point should be replaced if in any doubt. Contact NORDICCO for information about replacing the safety wire.
- The motor and other moving parts are lifetime lubricated and require no maintenance.
- We recommend that installed systems are inspected by a UVC-professional every six months.

REPAIRS AND SPARE PARTS

- Contact Nordicco for access to spare parts and guidance on how to perform repairs and replacement of spare parts.
- When repairs are required, contact Nordicco.
Telephone +45 73 70 90 83
Email: info@nordicco.eu
www.nordicco.eu

PART 2

ACTIVATION AND COMMISSIONING OF THE NORTHERN LIGHT UVC SYSTEM

ACCORDING TO EN 14255-1

ACTIVATION OF THE UVC SYSTEM IS PROTECTED WITH AN ACTIVATION CODE. ONLY PROFESSIONAL UVC INSTALLERS MAY ACTIVATE AND ADJUST THE UVC SYSTEM BEFORE COMMISSIONING.

UVC ACTIVATION CODE: 7000#Karet

GENERAL INSTRUCTIONS

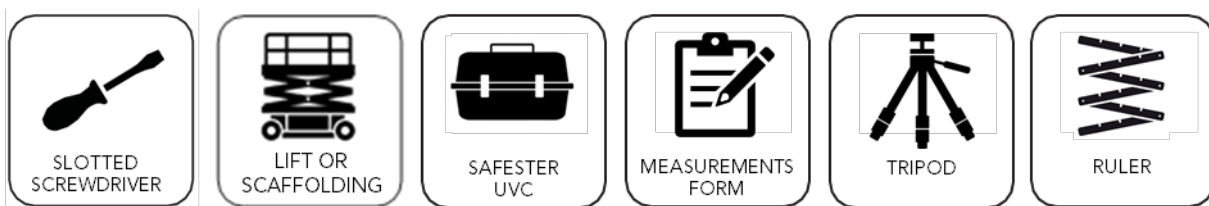
UVC irradiation measurements are required in several cases, including:

- At first installation
- When installing new UVC light sources
- When moving the fan to a new position in the room
- When making changes or adjustments in the room (e.g. height, position, change in placement of walls or ceiling and wall materials, change in room dimensions etc.)
- When any kind of reports or complaints about possible overexposure have been made

After the measurement assessment, the system will be in compliance with the limit values specified in EN 62471, c.f. the formula below (4.1).

$$E_s \cdot t = \sum_{200}^{400} \sum_t E_{\lambda}(\lambda, t) \cdot S_{UV}(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 30 \quad J \cdot m^{-2}$$

REQUIRED EQUIPMENT AND PROTECTIVE GEAR



Please note: Required measuring equipment, materials and protective equipment are sold separately.

MATERIALS & MEASURING EQUIPMENT

Safester UVC

- The sensor must have a valid certification of the calibration.
- The sensor must be calibrated to measure 254nm low pressure lamps.
- Documentation material (Assessment form)
- Tripod stand to mount the Safester sensor
- Ruler / measuring tape to measure the height of the Safester sensor head before starting the assessment process



Figure 2: Safester UVC measuring equipment

PERSONAL PROTECTIVE EQUIPMENT (PPE):

- Safety glasses with closed sides
- Long-sleeved jersey, long trousers and closed-type shoes
- Protective gloves
- Face mask and hat and/or sunscreen¹ (must contain either zinc oxide or titanium dioxide for face, neck and other areas where skin is exposed)

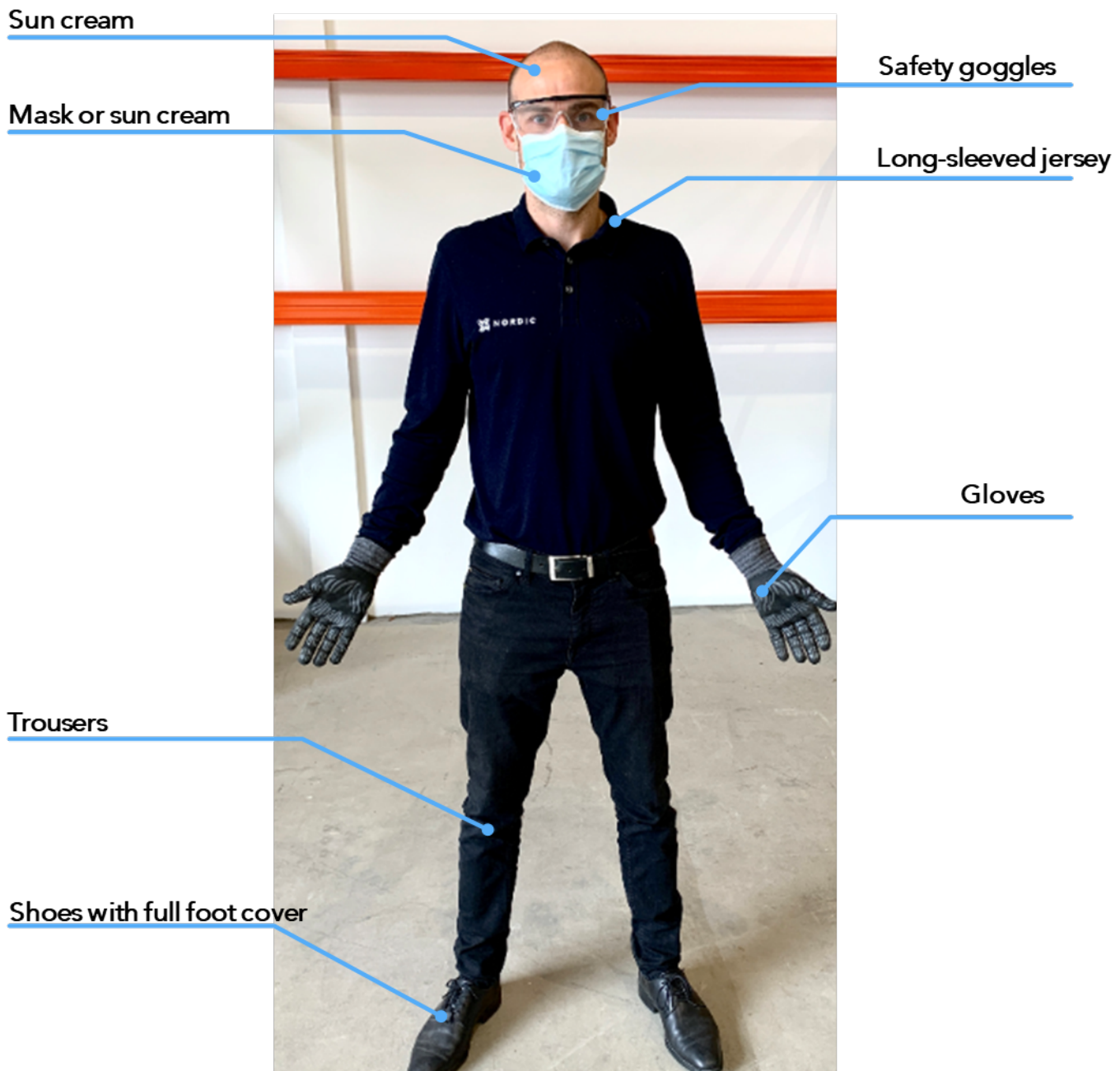


Figure 3 Required protective equipment PPE

¹ National Institute for Occupational Safety and Health. Atlanta, GA: National Institute for Occupational Safety and Health; 2009. Environmental control of tuberculosis: basic upper-room ultraviolet germicidal irradiation guidelines for healthcare settings.

ACTIVITIES PRIOR TO THE ASSESSMENT

Before installation, NORDICCO recommends that light sources are burned in for 100 hours, if possible.

After the burn-in has been completed, the lamps will be stable and can be considered as a fixed starting point when starting to take the measurements. Failure to complete the 100-hour burn-in period may result in higher initial readings. In terms of safety, it would therefore be considered conservative to perform the assessment within the 100-hour burn-in period.

- Make sure you have the latest design diagrams including the most recent architectural and electrical plans, simulation calculation report (if performed), list of surface materials and reflective values (APPENDIX C – REFLECTIVITY FACTORS), revision notes from previous assessments (if applicable) to compare with the current situation.
- If a subsequent control is to be performed, such as when replacing light sources, check whether the usage of the room (time spent there, primary work areas, etc.) is the same as during the original commissioning. Where there are changes, these must be registered and the measuring points must be adjusted if necessary.
- Look for objects (hanging from the ceiling or taller objects on the floor) that may affect the UV-C light. If this is the case, these must be registered. Subsequent control measurement must be compared with the original documentation.
- Check for nearby objects (smoke detectors, alarms, projectors, wi-fi routers, etc.) that may be of materials or painted with paints that can be degraded by UV-C and advise the customer.
- Clear the room before activating the system and lock doors if possible. Place warning signs at doors.
- Activate the light sources and allow them to stabilize for 10 minutes before starting measurements.
- Thoroughly clean the sensor lens according to the instructions provided by the sensor supplier before starting to take measurements.
- Check for standard light sources installed in the ceiling directly in the irradiated area, which could reflect irradiation down into the area where people may be present. Nordicco A/S recommends moving or removing these light sources.

ASSESSMENT AND MEASUREMENT INSTRUCTIONS

1. Create a table with the required number of measuring grid-points, see assessment form **Appendix F**. The grid-points should be placed at equal distances from each other. See the figure and table below to determine the number of measuring grid-points:

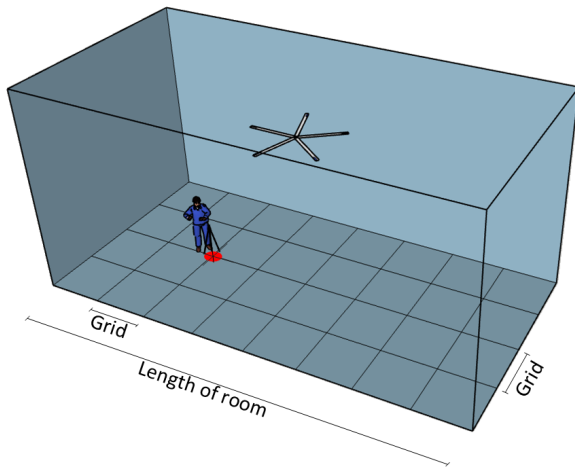


Figure 4: Measurement grid

Length of room (m)	Maximum distance between measuring points [m]. Height h stated in [m] ($h \geq 3\text{m}$)	Minimum number of measuring points
2-7.5m	$0.35 * h$, max 2m	5
7.5-15m	$0.45 * h$, max 3.5m	8
15-25m	$0.55 * h$, max 5m	12
>25m	$0.65 * h$, max 6m	16
<ul style="list-style-type: none"> - The larger the room area, the greater the distance between measuring points. - The higher the ceiling height, the greater the distance between measuring points. - Grid lines should not coincide if more than 1 UVC system is installed. - If there is simulated irradiation in the room, the grid distance should be based on the simulation. - The grid distance should be reduced if highly-reflective materials (See APPENDIX C – REFLECTIVITY FACTORS) are found in the room. 		

Table 1: Determining the required number of grid line measuring points in the room.

2. If more than one Northern Light system is installed in the room, both systems must be activated during the survey. If there are any elevated areas such as balconies, staircases, mezzanines etc. in the room, the assessment including irradiation measurements must also be performed in these locations.
3. Place the tripod at a standard 183 cm or an acceptable height for the tasks that will be performed in the room. As the limits specified in EN 62471 apply to both skin and eye exposure, the sensor must not be shielded and must be completely exposed during the assessment.
4. At each measurement point, the hotspot is identified (where the irradiation is of highest intensity). This is done by rotating the sensor in the room, aiming first at the UVC system and then around the room to take into account any high-reflective surfaces that may be present. The maximum measured value must always be used to calibrate the system.
5. Record the location of all measured points in the assessment form (Appendix F) and clearly highlight if a measurement exceeds limit values based on the maximum permitted UV-C guidelines for exposure in APPENDIX A – LIMIT VALUES FOR ARTIFICIAL OPTICAL IRRADIATION.

6. The measurement process is illustrated below in .

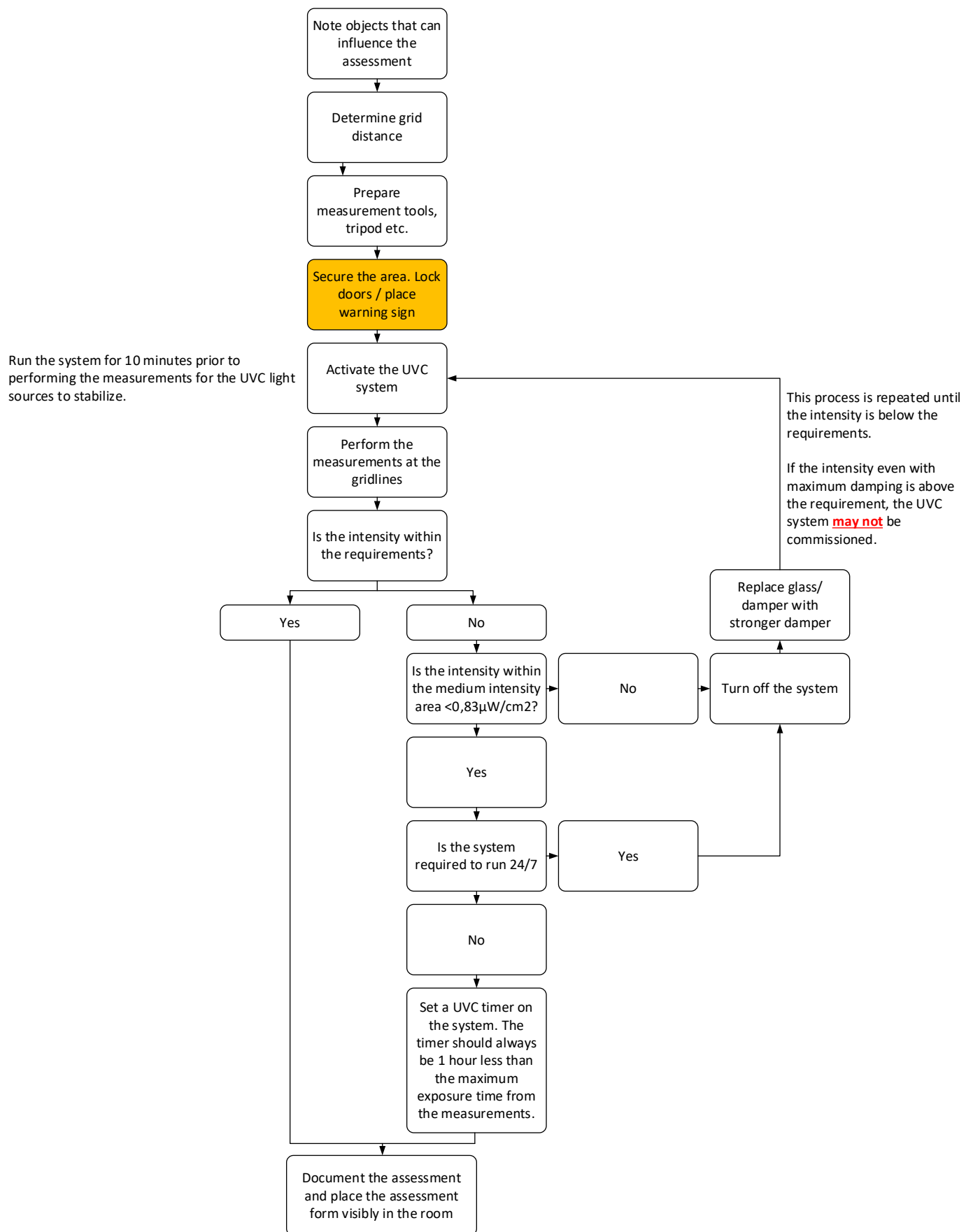


Figure 5: Flow chart illustration of assessment procedure

PICTURE EXAMPLES OF THE ASSESSMENT PROCEDURE

Below are picture examples of an assessment procedure with measurement equipment, as well as safety gear in the form of protective equipment.



Figure 6: Setting the height of the sensor head to a standard 183 cm or acceptable height for the tasks that are performed in the room.



Figure 5: Measurement of irradiation in grid points



SENSOR ORIENTATION

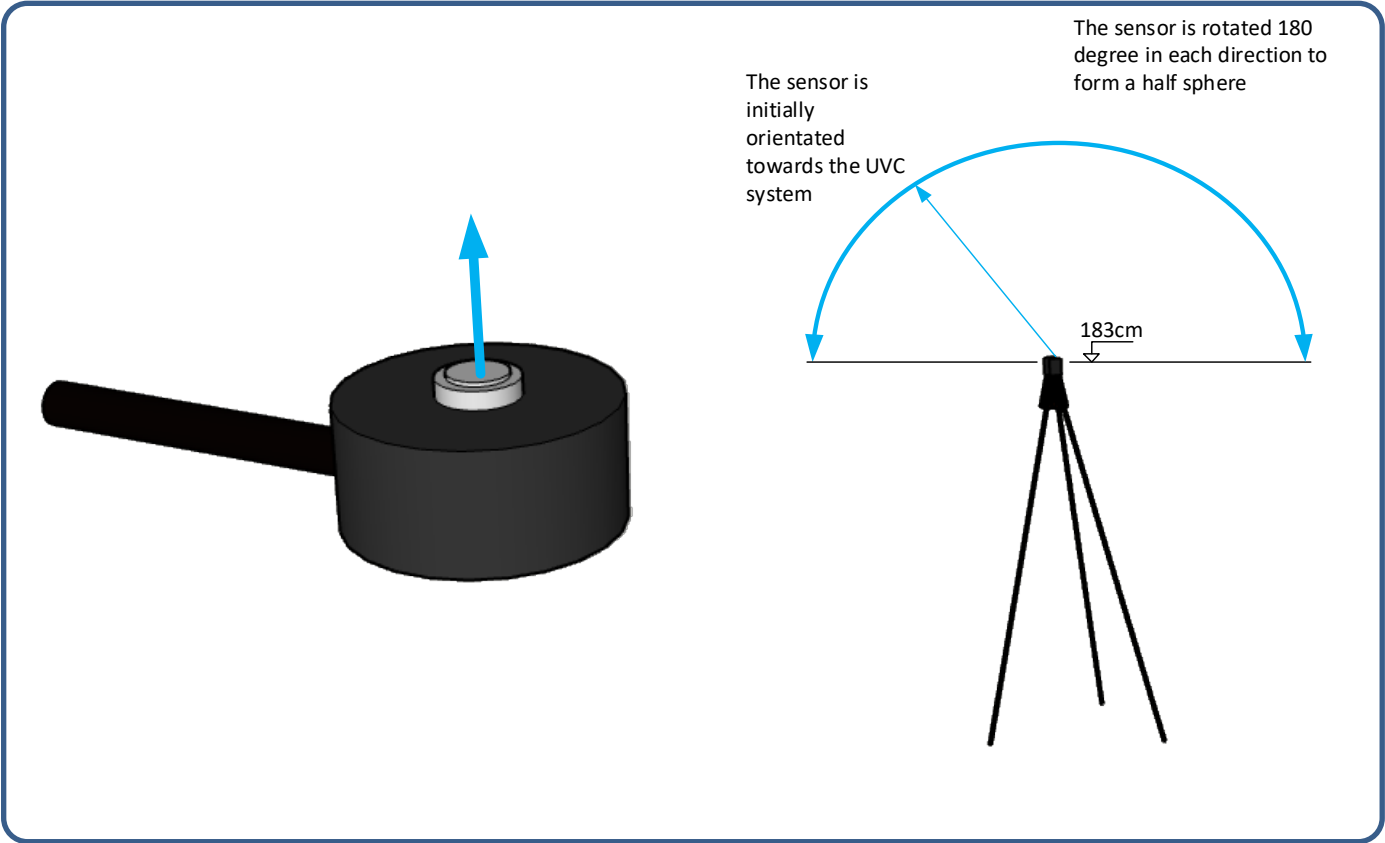


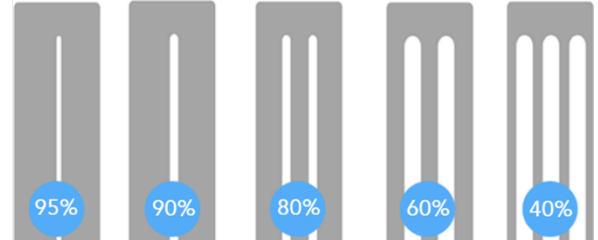
Figure 7: Examples of different sensor directions when measuring to locate hotspots.

MECHANICAL DAMPING OF UVC SYSTEM

The system must be damped if irradiation intensities that exceed permitted values c.f. APPENDIX A – LIMIT VALUES FOR ARTIFICIAL OPTICAL IRRADIATION are registered during the assessment.

Mechanical damping is done by replacing the glass/or aperture shield that covers the integrated UVC light sources with an aperture shield that blocks sufficient irradiation.

Use the supplied aperture shields to dampen the system. 5 different aperture shields are included, which block from 40% and up to 95% of the irradiation (the quartz glass alone blocks 20% of the irradiation).



The mechanical damping removes a given percentage of the irradiation, and it is therefore possible to estimate which aperture shield to use, based on the initial irradiation.

IMPORTANT NOTICE: After calibration/damping of the system, a full re-assessment of the system must be performed to verify compliance with limit values. A new assessment form (Appendix F) must be filled out and documented.

Example:

A measurement has been taken in a room and maximum irradiation has been measured at $0.41 \mu\text{W}/\text{cm}^2 \rightarrow 4$ hours exposure time. The system's owner does not wish to put time limits on the use of the system, so damping is required.

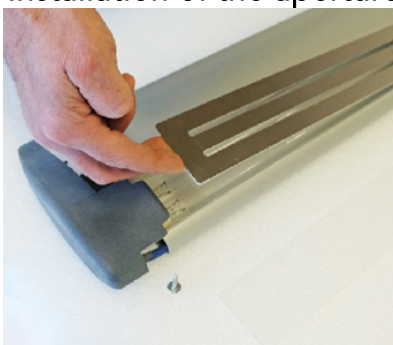
To comply with EN62471 requirements, maximum constant irradiation must not exceed $0.21 \mu\text{W}/\text{cm}^2$ when working up to or over 8 hours.

To achieve the desired reduction in irradiation, the specific aperture shield can be estimated as:

$$1 - \left(\frac{0,21 \mu \frac{\text{W}}{\text{cm}^2}}{0,41 \mu \frac{\text{W}}{\text{cm}^2}} \right) * 80\% = 59\% \rightarrow 60\% \text{ Aperture shields}$$

PLEASE NOTE: This calculation only indicates a damping estimate. A subsequent on-site inspection assessment must be performed to ensure compliance with permitted limit values.

Installation of the aperture shields is illustrated below:



Loosen the end section and replace the glass/aperture shield with the required UVC aperture shield.



Attach the end section to the blade and screw the parts back together.



Blade with UVC aperture shield inserted.

DOCUMENTATION AND DELIVERABLES

After activation, assessment and possible damping/calibration of the system, an assessment report must be prepared and made available to all involved parties.

The report must at least contain the following information:

- **Inspection report**
A safety inspection must be performed if the UVC installer has not been responsible for the fan's suspension and connection to ensure that the fan is installed correctly as set out in Part 1 of the installation procedure.
- **Visual inspection**
Note any highly reflective objects and other objects that might affect irradiation intensity. For control measurements, compare with any previous visual inspections.
- **Measurements**
Irradiation measurements, cf. the assessment form.
- **Notes and more**
Attach any notes and observations.

THE ASSESSMENT FORM

Complete an assessment form to document the irradiation intensity in the room.
The assessment form in its entirety can be found in APPENDIX F – ASSESSMENT FORM.

Complete the form with the relevant information listed below:

1. Specify Address, Building Number and Room Number
2. Specify the Sensor Model, for example Safester from Sglux.
3. Specify the Sensor Serial Number S/N.
4. Specify the Date the measurement was performed.
5. Specify the name of the company that performed the assessment.
6. State the name of the employee who performed the assessment.
7. Draw a sketch of the room to indicate where the measurements were performed. Note objects etc.

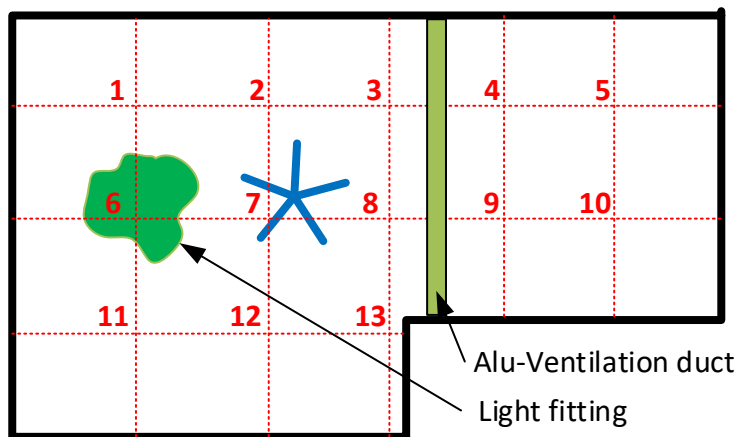


Figure 8: Example of sketch

8. Specify the maximum irradiation intensity for each of the specified measuring points in 7).
9. Specify the highest measured intensity.
10. Using the limit value table, specify the specified maximum exposure time.
11. Produce photographic documentation of the front and back of the form for archiving and documentation purposes if the form in the room should be misplaced.
12. Fold the form and place it somewhere visible in the measured room.

Advarsel:
Begrænsningsskiltet

1 APPENDIX F - INDMÅLINGSBLANKET

Kun en NORDICCO A/S certificeret UVC installationsleverandør må foretage indmålinger.

Denne blanket udfyldes efter montage af kalibreringsdampning af en eller flere NORDICCO Northern Lighten UVC systemer. Hvis du har monteret mere end 1 system i det pågældende lokale, skal målingerne foretages, mens samtlige systemer er aktiveret for at måle den samlede strålingsintensitet.

UVC SENSOR MODEL: **2**

UVC SENSOR SERIENR.: **3**

Blanketten udfyldes med blækstifter, foldes på midten og monteres efterfølgende sprøjt i lokalt med forinden udfyldt.

De indtatte værdier, skitter samt bilagets dokumentation skal indberettes i en indmålingsrapport og efterfølgende udføres af relevante parter.

Grenseværdier
Bestemmelse af maksimal eksponeringsgrænse pr. dag kan aflæses fra nedenstående tabel. Bemærk: Skiltet er relevant i rum med flere lyskilder i lokaler, der skal dokumenteres ved den laveste tilladte eksponeringsgrænse.

Strålingsintensitet (W/m²)	Eksposertid (min)	Maksimal eksponeringstid (min)
0,1	10	10
0,2	5	5
0,3	3,3	3,3
0,4	2,5	2,5
0,5	2	2
0,6	1,7	1,7
0,7	1,4	1,4
0,8	1,3	1,3
0,9	1,1	1,1
1,0	1	1
1,1	0,9	0,9
1,2	0,8	0,8
1,3	0,7	0,7
1,4	0,6	0,6
1,5	0,5	0,5
1,6	0,4	0,4
1,7	0,3	0,3
1,8	0,3	0,3
1,9	0,2	0,2
2,0	0,2	0,2
2,1	0,2	0,2
2,2	0,2	0,2
2,3	0,2	0,2
2,4	0,2	0,2
2,5	0,2	0,2
2,6	0,2	0,2
2,7	0,2	0,2
2,8	0,2	0,2
2,9	0,2	0,2
3,0	0,2	0,2
3,1	0,2	0,2
3,2	0,2	0,2
3,3	0,2	0,2
3,4	0,2	0,2
3,5	0,2	0,2
3,6	0,2	0,2
3,7	0,2	0,2
3,8	0,2	0,2
3,9	0,2	0,2
4,0	0,2	0,2
4,1	0,2	0,2
4,2	0,2	0,2
4,3	0,2	0,2
4,4	0,2	0,2
4,5	0,2	0,2
4,6	0,2	0,2
4,7	0,2	0,2
4,8	0,2	0,2
4,9	0,2	0,2
5,0	0,2	0,2
5,1	0,2	0,2
5,2	0,2	0,2
5,3	0,2	0,2
5,4	0,2	0,2
5,5	0,2	0,2
5,6	0,2	0,2
5,7	0,2	0,2
5,8	0,2	0,2
5,9	0,2	0,2
6,0	0,2	0,2
6,1	0,2	0,2
6,2	0,2	0,2
6,3	0,2	0,2
6,4	0,2	0,2
6,5	0,2	0,2
6,6	0,2	0,2
6,7	0,2	0,2
6,8	0,2	0,2
6,9	0,2	0,2
7,0	0,2	0,2
7,1	0,2	0,2
7,2	0,2	0,2
7,3	0,2	0,2
7,4	0,2	0,2
7,5	0,2	0,2
7,6	0,2	0,2
7,7	0,2	0,2
7,8	0,2	0,2
7,9	0,2	0,2
8,0	0,2	0,2
8,1	0,2	0,2
8,2	0,2	0,2
8,3	0,2	0,2
8,4	0,2	0,2
8,5	0,2	0,2
8,6	0,2	0,2
8,7	0,2	0,2
8,8	0,2	0,2
8,9	0,2	0,2
9,0	0,2	0,2
9,1	0,2	0,2
9,2	0,2	0,2
9,3	0,2	0,2
9,4	0,2	0,2
9,5	0,2	0,2
9,6	0,2	0,2
9,7	0,2	0,2
9,8	0,2	0,2
9,9	0,2	0,2
10,0	0,2	0,2

Tabelen er udarbejdet på baggrund af formel 1 i DS EN 62471. Den angivne eksponeringstid er kun en vejledning. Den reelle eksponeringstid kan variere afhængigt af den faktiske strålingsintensitet i rummet. Ved brug af denne tabel skal der tages hensyn til den faktiske strålingsintensitet i rummet.

DATE: **4**

MÅLING UDFØRT AF: **5**

Navn: **6**

MÅLINGER (udfyldes med blækstifter)

Målepunkt (Se skitse)	Strålingsintensitet (W/m²)	Målepunkt (Se skitse)	Strålingsintensitet (W/m²)	Målepunkt (Se skitse)	Strålingsintensitet (W/m²)
1	0,1	8	0,1	15	0,1
2	0,2	9	0,2	16	0,2
3	0,3	10	0,3	17	0,3
4	0,4	11	0,4	18	0,4
5	0,5	12	0,5	19	0,5
6	0,6	13	0,6	20	0,6
7	0,7	14	0,7	21	0,7
8	0,8	15	0,8	22	0,8
9	0,9	16	0,9	23	0,9
10	1,0	17	1,0	24	1,0
11	1,1	18	1,1	25	1,1
12	1,2	19	1,2	26	1,2
13	1,3	20	1,3	27	1,3
14	1,4	21	1,4	28	1,4
15	1,5	22	1,5	29	1,5
16	1,6	23	1,6	30	1,6
17	1,7	24	1,7	31	1,7
18	1,8	25	1,8	32	1,8
19	1,9	26	1,9	33	1,9
20	2,0	27	2,0	34	2,0
21	2,1	28	2,1	35	2,1
22	2,2	29	2,2	36	2,2
23	2,3	30	2,3	37	2,3
24	2,4	31	2,4	38	2,4
25	2,5	32	2,5	39	2,5
26	2,6	33	2,6	40	2,6
27	2,7	34	2,7	41	2,7
28	2,8	35	2,8	42	2,8
29	2,9	36	2,9	43	2,9
30	3,0	37	3,0	44	3,0
31	3,1	38	3,1	45	3,1
32	3,2	39	3,2	46	3,2
33	3,3	40	3,3	47	3,3
34	3,4	41	3,4	48	3,4
35	3,5	42	3,5	49	3,5
36	3,6	43	3,6	50	3,6
37	3,7	44	3,7	51	3,7
38	3,8	45	3,8	52	3,8
39	3,9	46	3,9	53	3,9
40	4,0	47	4,0	54	4,0
41	4,1	48	4,1	55	4,1
42	4,2	49	4,2	56	4,2
43	4,3	50	4,3	57	4,3
44	4,4	51	4,4	58	4,4
45	4,5	52	4,5	59	4,5
46	4,6	53	4,6	60	4,6
47	4,7	54	4,7	61	4,7
48	4,8	55	4,8	62	4,8
49	4,9	56	4,9	63	4,9
50	5,0	57	5,0	64	5,0
51	5,1	58	5,1	65	5,1
52	5,2	59	5,2	66	5,2
53	5,3	60	5,3	67	5,3
54	5,4	61	5,4	68	5,4
55	5,5	62	5,5	69	5,5
56	5,6	63	5,6	70	5,6
57	5,7	64	5,7	71	5,7
58	5,8	65	5,8	72	5,8
59	5,9	66	5,9	73	5,9
60	6,0	67	6,0	74	6,0
61	6,1	68	6,1	75	6,1
62	6,2	69	6,2	76	6,2
63	6,3	70	6,3	77	6,3
64	6,4	71	6,4	78	6,4
65	6,5	72	6,5	79	6,5
66	6,6	73	6,6	80	6,6
67	6,7	74	6,7	81	6,7
68	6,8	75	6,8	82	6,8
69	6,9	76	6,9	83	6,9
70	7,0	77	7,0	84	7,0
71	7,1	78	7,1	85	7,1
72	7,2	79	7,2	86	7,2
73	7,3	80	7,3	87	7,3
74	7,4	81	7,4	88	7,4
75	7,5	82	7,5	89	7,5
76	7,6	83	7,6	90	7,6
77	7,7	84	7,7	91	7,7
78	7,8	85	7,8	92	7,8
79	7,9	86	7,9	93	7,9
80	8,0	87	8,0	94	8,0
81	8,1	88	8,1	95	8,1
82	8,2	89	8,2	96	8,2
83	8,3	90	8,3	97	8,3
84	8,4	91	8,4	98	8,4
85	8,5	92	8,5	99	8,5
86	8,6	93	8,6	100	8,6
87	8,7	94	8,7		
88	8,8	95	8,8		
89	8,9	96	8,9		
90	9,0	97	9,0		
91	9,1	98	9,1		
92	9,2	99	9,2		
93	9,3	100	9,3		
94	9,4				
95	9,5				
96	9,6				
97	9,7				
98	9,8				
99	9,9				
100	10,0				

Disseksionsnødvendige (hvis nødvendigt) (hvis nødvendigt)

GRID OG MÅLEPUNKTER

LOKALE: **7**

UVC SYSTEM: **8**

GRID STØRRELSSE: **9**

ARTIFICIAL OPTICAL RADIATION

THIS FORM MUST NOT BE COVERED OR REMOVED FROM THE ROOM

1

Address, Building number and premises number:

The UVC system (ceiling fan) in this room has been calibrated and verified to the following intensity (254nm) in the occupancy zone.

9 $\mu\text{W/cm}^2$

This intensity means a maximum exposure time per day (c.f. DS/EN 62471 and Danish Working Environment Authority's Executive Order 562).

10 Hours Minutes per day

The system is timer controlled to comply with the above exposure time.

Please note: When working near or above the fan blades, the fan must be switched off with a safety switch.

Measurements were taken in compliance with:

- Danish Working Environment Authority's Executive Order no. 562 of 26/05/2010 on protection against exposure to artificial optical radiation at work.
- DS/EN 62471, 1st edition: Photobiological safety of lamps and lamp systems.

FRONT

USER INSTRUCTIONS – QUICK GUIDE

BRIEF ABOUT NORDICCO CONTROLLER

To control the Northern Light® fan using the Nordicco Controller, see separate manual. The controller manual contains information about how to activate the Northern Light function, link fans to the tablet, along with setting up schedules, admin codes, names etc. It is highly recommended that both the controller manual and this installation manual is archived by the building administrator. If any manual is misplaced the most recent version can be found on www.nordicco.eu.

General safety considerations when using the system.

ARTIFICIAL OPTICAL IRRADIATION



THIS SYSTEM PERIODICALLY EMITS ULTRAVIOLET IRRADIATION AT A WAVELENGTH OF 254NM, WHICH CAN BE HARMFUL TO HUMANS IN EXCESSIVE DOSES. THE SYSTEM IS CALIBRATED TO COMPLY WITH CURRENT LEGISLATION.

IF YOU UNEXPECTEDLY NOTICE REDNESS OF THE SKIN OR EYE IRRITATION, SWITCH OFF THE UVC LIGHT IMMEDIATELY BY PRESSING THE LIGHT BUTTON ON THE CONTROL PANEL AND CONTACT THE PROFESSIONAL UVC INSTALLER OR NORDICCO A/S.



THE BUILT-IN UVC SYSTEM IS INTEGRATED IN THE UPPER SIDE OF THE BLADES AND ONLY CASTS LIGHT IN AN UPWARD DIRECTION. **NEVER LOOK DIRECTLY INTO THE LIGHT SOURCES.** THE FAN MUST THEREFORE ALWAYS BE SWITCHED OFF WITH A SAFETY SWITCH BEFORE WORKING NEAR OR ABOVE THE FAN.



USE OF THE UVC SYSTEM OVER TIME CAN RESULT IN DISCOLORATION AND DECOMPOSITION OF NON-UV-RESISTANT MATERIALS.



THE LIGHT SOURCES USED IN THE SYSTEM CONTAIN SMALL AMOUNTS OF MERCURY. IT IS VERY UNLIKELY THAT A FRACTURE IN A LIGHT SOURCE WILL AFFECT YOUR HEALTH. IF A LIGHT SOURCE BREAKS, THE FAN MUST BE SWITCHED OFF IMMEDIATELY, THE ROOM VENTILATED FOR A MINIMUM OF 30 MINUTES AND THE BROKEN PARTS REMOVED (WEARING GLOVES). PUT THE PARTS IN A CLOSED PLASTIC BAG AND DEPOSIT AT YOUR LOCAL RECYCLING STATION. DO NOT USE A VACUUM CLEANER.



NORDICCO®
CLEAN • CLIMATE-FRIENDLY • COMFORT

APPENDIX OVERVIEW

APPENDIX A – LIMIT VALUES FOR ARTIFICIAL OPTICAL IRRADIATION

APPENDIX B – CALCULATION EXAMPLE

APPENDIX C – REFLECTIVITY FACTORS

APPENDIX D – ELECTRICAL DIAGRAM

APPENDIX E – DECLARATION OF CONFORMITY

APPENDIX F – ASSESSMENT FORM

APPENDIX A – LIMIT VALUES FOR ARTIFICIAL OPTICAL IRRADIATION

When calibrating the system, the limit values specified in EN 62471 Photobiological safety of lamps and lamp systems must be observed. Table 2 states the maximum permitted limit values for the Northern Light System, calculated on the basis of EN 62471.

The same limit values are specified in the UE Directive 2006/25/EC - artificial optical radiation and its requirements will therefore also be satisfied if these limit values are complied with.

The permissible exposure time shown in the table below for a 254nm low pressure lamp is calculated in accordance with EN 62471. A detailed calculation can be found in APPENDIX B – CALCULATION EXAMPLE

Permissible exposure time	Irradiation intensity $\mu\text{W}/\text{cm}^2$	Radiated area	Maximum exposure time/day
24 hours	0.07	Low The system can be put into operation without further action*	24 hours*
18 hours	0.09		
12 hours	0.14		
10 hours	0.17		
8 hours	0.21		
6 hours	0.28	Medium The system must be time-limited or dampened further.	See time chart.
5 hours	0.33		
4 hours	0.42		
3 hours	0.56		
2 hours	0.83		
1 hour	1.7	High The system may not be commissioned	The system may not be commissioned
30 minutes	3.3		
15 minutes	6.7		
5 minutes	20		
1 minute	100		

The table has been prepared on the basis of formula 4.1 in EN 62471 (Photobiological safety of lamps and lamp systems). The light source used is low pressure lamp with a wavelength of 254nm.

** According to EN 62471 section 4.3.1, exposure time exceeding 8 hours can be disregarded: "Continuous exposure for times greater than 8 hours in any day need not be considered."*

Table 2 Limit values for artificial optical irradiation at 254nm

APPENDIX B – CALCULATION EXAMPLE

CODES AND STANDARDS

The calculation has been prepared on the basis of the following codes, standards and directives:

- EN 62471 (2008-09-29) - Photobiological safety of lamps and lamp systems
- EU Directive, 5 April 2006: Artificial Optical Radiation Directive (2006/25/EC)

CALCULATIONS

ASSUMPTIONS USED IN CALCULATIONS

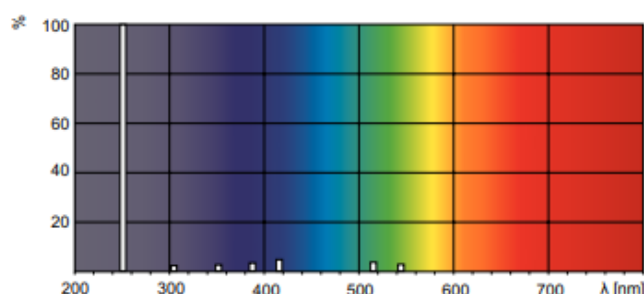
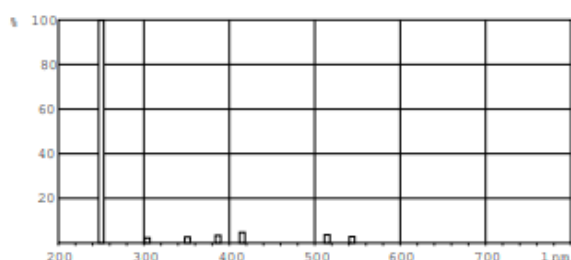
The system uses 5 TUV PL-L 60W/4P HO 1CT/25 low pressure lamps mounted as up-lights in the blades. Light source data can be found in the following:

Product data

General Information	
Cap-Base	2G11 [2G11]
Main Application	Disinfection
Useful Life (Nom)	9000 h
System Description	High Output
Light Technical	
Color Code	TUV
Color Designation	- [Not Specified]
Depreciation at Useful Lifetime	20 %
Operating and Electrical	
Power (Nom)	67 W
Lamp Current (Nom)	0.800 A
Order product name	TUV PL-L 60W/4P HO 1CT/25
EAN/UPC - Product	8711500710345
Order code	927909004007
Numerator - Quantity Per Pack	1
Numerator - Packs per outer box	25

Voltage (Nom)	84 V
Mechanical and Housing	
Cap-Base Information	4 Pins
Bulb Shape	2xT16
Approval and Application	
Mercury (Hg) Content (Nom)	4.4 mg
UV	
UV-C Radiation at 100 hr	19.0 W
Product Data	
Full product code	871150071034540
Material Nr. (12NC)	927909004007
Net Weight (Piece)	104.000 g

Photometric data



XDPO_XUTUVPLL-Spectral power distribution Colour

FORMULAE

The calculation is performed in accordance with the instructions in EN 62471 and is based on formula (4.1).

$$E_s \cdot t = \sum_{200}^{400} \sum_t E_{\lambda}(\lambda, t) \cdot S_{UV}(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 30 \quad J \cdot m^{-2}$$

The above formula takes into account multiple simultaneous wavelengths, as well as different exposure intensities over time.

If the maximum irradiation over time and the spectrum of light sources for 254nm low-pressure lamps are conservatively calculated, the formula can be rewritten as:

$$E_s \cdot t = t \cdot E_{\lambda} \cdot S_{UV}(\lambda) \leq 30 \quad J \cdot m^{-2}$$

The spectral weighting $S_{UV}(\lambda)$ is specified in table 4.1

Table 4.1 Spectral weighting function for assessing ultraviolet hazards for skin and eye.

Wavelength ¹ λ , nm	UV hazard function $S_{UV}(\lambda)$	Wavelength λ , nm	UV hazard function $S_{UV}(\lambda)$
200	0,030	313*	0,006
205	0,051	315	0,003
210	0,075	316	0,0024
215	0,095	317	0,0020
220	0,120	318	0,0016
225	0,150	319	0,0012
230	0,190	320	0,0010
235	0,240	322	0,00067
240	0,300	323	0,00054
245	0,360	325	0,00050
250	0,430	328	0,00044
254*	0,500	330	0,00041
255	0,520	333*	0,00037
260	0,650	335	0,00034
265	0,810	340	0,00028
270	1,000	345	0,00024
275	0,960	350	0,00020
280*	0,880	355	0,00016
285	0,770	360	0,00013
290	0,640	365*	0,00011
295	0,540	370	0,000093
297*	0,460	375	0,000077
300	0,300	380	0,000064
303*	0,120	385	0,000053
305	0,060	390	0,000044
308	0,026	395	0,000036
310	0,015	400	0,000030

¹ Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.

* Emission lines of a mercury discharge spectrum.

If this is introduced, the formula can be rewritten to:

$$E_s \cdot t = t \cdot E_{\lambda} \cdot 0,5 \leq 30 \quad J \cdot m^{-2}$$

$$E_s \cdot t = t \cdot E_{\lambda} \leq 60 \quad J \cdot m^{-2}$$

Formula 4.2. c.f. EN 61471 can thus also be rewritten as:

$$t_{max} = \frac{60}{E_s} \quad s$$

where t_{max} is maximum exposure time and E_s is irradiation intensity

CALCULATION EXAMPLE

Based on the described formula 4.2, maximum exposure time can now be calculated at different irradiation intensities.

The following is an example where the measured irradiation in the room is measured to E_s

$$E_s = 0,150 \mu W \cdot cm^{-2} \quad \text{Measured intensity at a 254nm low pressure lamp}$$

Based on the measured irradiation intensity, maximum exposure time can now be calculated as.

$$t_{max} = \frac{60 J \cdot m^{-2}}{0,150 \mu W \cdot cm^{-2}} = 11,11 \text{ hours}$$

APPENDIX C – REFLECTIVITY FACTORS

Reflectivity factors for common materials

Table 3 and Table 4 specify reflectivity values for common materials. The values in some cases cover both UVB and UVC wavelengths and must therefore be considered to be indicative.

Material	Reflection (%)
Untreated aluminium surface	40-60
Surface-treated aluminium	60-89
Aluminium (mirror covering)	75-85
Aluminium paint	55-75
Stainless steel	25-30
Tin sheet	25-30
Magnesium oxide	75-88
Calcium carbonate	70-80
Putty	55-60
White oil-based paint	5-10
White water-based paint	10-35
Zinc oxide paint	4-5

Table 3 Reflection factors, source: Illuminating Engineering Society of North America (IESNA) (2000) Nonvisual Effects of Radiant Energy-Effects on Microorganisms-Germicidal (Bactericidal) Ultraviolet Irradiance. In Lightning Handbook (Edited by M. S. Rea)

Material (selected)	Reflection (%) (both UVB and UVC)
Silicone	62-73
Galvanised pipe – smooth	57
Galvanised pipe – corrugated	53
White putty	46
Chrome	39
Nickel	37-38
Steel	37
Zinc	37
Wallpaper (white)	25-35
Stainless steel	28
Copper	25-31
Concrete	<19
Wallpaper (other colour)	18
Linen	17
Carbon fibre	16
Cement	11
Oil-based paint	8
Glass	4

Table 4 Reflection factors, source: Kowalski, W. (2009) Ultraviolet material reflectivities (UVB/UVC range). In Ultraviolet Germicidal Irradiation: UVGI for Air and Surface Disinfection, Springer, New York

Reflectivity factors for common ceiling panels

Table 5 and Table 6 indicate reflection values for common ceiling panels. The reflection values should be considered indicative. The reflection values have been prepared on the basis of the 254nm low-pressure lamp.

The reflection values originate from:

Reed NG, Wengraitis S, "Ultraviolet Spectral Reflectance of Ceiling Tiles, and Implications for the Safe Use of Upper-Room Ultraviolet Germicidal Irradiation"

Photochemistry & Photobiology 2012, 88: 1480-1488

ID	INCL SPECULAR	EXCL SPECULAR	ID	INCL SPECULAR	EXCL SPECULAR	ID	INCL SPECULAR	EXCL SPECULAR
A	0.035±0.001	0.034	N	0.096±0.003	0.041	Z	0.260±0.048	0.288
B	0.043±0.002	0.041	O	0.106±0.006	0.047	AA	0.260±0.035	0.243
C	0.048±0.001	0.047	P	0.107±0.024	0.05	BB	0.273±0.007	0.274
D	0.051±0.001	0.05	Q	0.122±0.007	0.047	CC	0.275±0.016	0.28
E	0.052±0.002	0.047	R	0.151±0.008	0.054	DD	0.276±0.013	0.283
F	0.055±0.006	0.054	S	0.152±0.009	0.059	EE	0.276±0.026	0.29
G	0.060±0.002	0.059	T	0.165±0.021	0.062	FF	0.282±0.029	0.306
H	0.064±0.004	0.062	U	0.237±0.011	0.065	GG	0.334±0.024	0.333
I	0.070±0.001	0.065	V	0.240±0.033	0.071	HH	0.353±0.031	0.363
J	0.071±0.005	0.071	W	0.240±0.063	0.069	II	0.362±0.028	0.364
K	0.071±0.001	0.069	X	0.244±0.023	0.071	JJ	0.423±0.103	0.41
L	0.074±0.001	0.071	Y	0.245±0.070	0.067	KK	0.459±0.015	0.438
M	0.076±0.003	0.067						

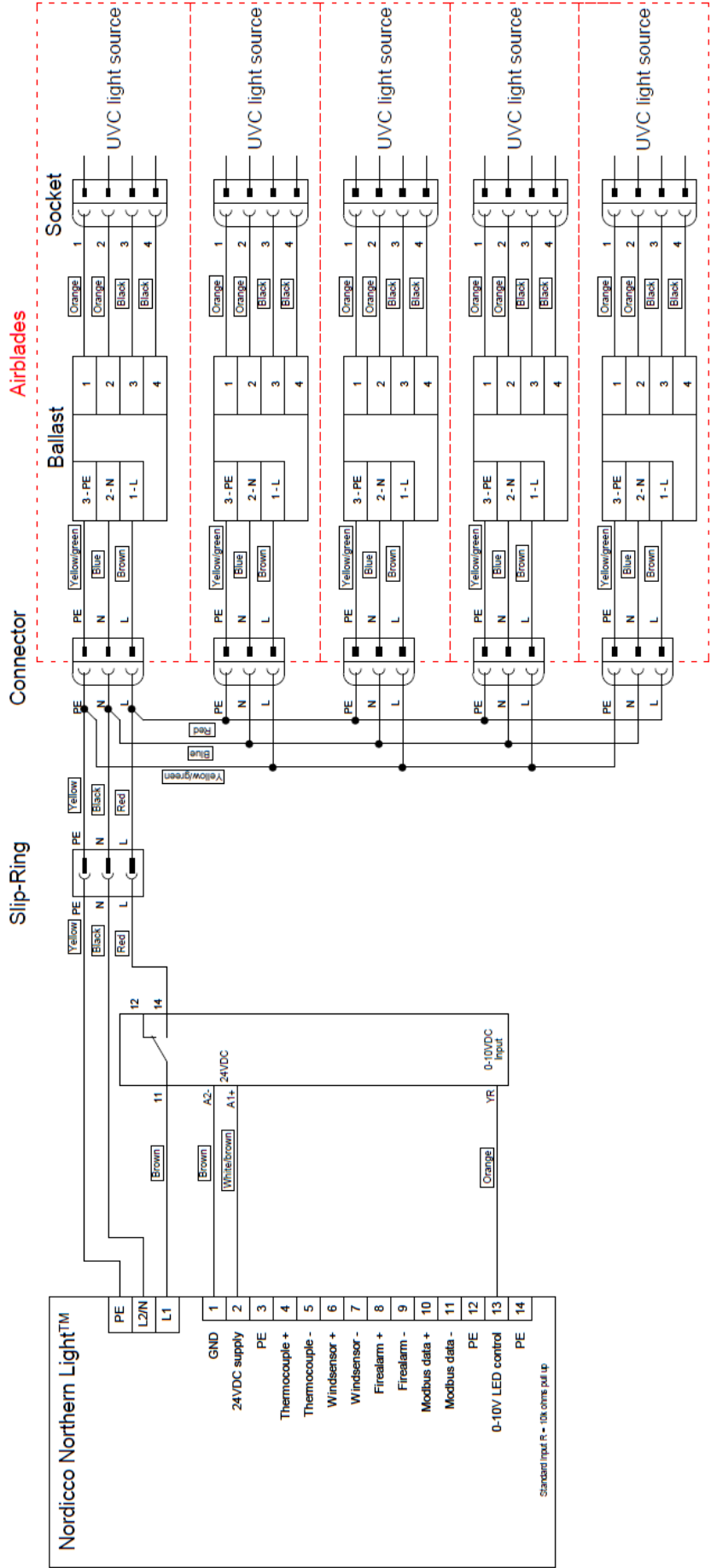
Table 5 Reflection values for ceiling panels. See Table 6 for panel categories.

Ceiling panels

Table 6 Ceiling panel categories, See Table 5 for reflection values: Please note: All panels are white unless otherwise indicated in parentheses next to the model or in the model name itself. ID is used to identify specific panels in diagrams, tables, and text.

Supplier	Product name	Product number	Materials	Obvious surface properties	ID
Armstrong	Armatuff	860	Wet-formed high-density mineral fibre	Latex paint	R
Armstrong	Ceramagurad	605	Ceramic and mineral fibre composite	Scrubable plastic finish	KK
Armstrong	Cirrus	574	Wet-formed mineral fibre	Latex paint	HH
Armstrong	Cirrus (camel)	589	Wet-formed mineral fibre	Latex paint	S
Armstrong	Cirrus (platinum)	589	Wet-formed mineral fibre	Latex paint	X
Armstrong	Clean Room Mylar	1721	Wet-formed mineral fibre	Soil-resistant polyester film	G
Armstrong	Clean Room VL	870	Wet-formed mineral fibre	Vinyl-faced membrane	K
Armstrong	Cortega	769	Wet-formed mineral fibre	Latex paint	V
Armstrong	Crossgate	2625	Wet-formed mineral fibre	Latex paint	AA
Armstrong	Dune	1772	Wet-formed mineral fibre	Latex paint	U
Armstrong	Endura	639	Wet-formed high-density mineral fibre	Vinyl latex paint	GG
Armstrong	Fine Fissured School Zone	1714	Wet-formed mineral fibre	Latex paint	FF
Armstrong	Fine Fissured (camel)	1729	Wet-formed mineral fibre	Latex paint	T
Armstrong	Fine Fissured (haze)	1729	Wet-formed mineral fibre	Latex paint	DD
Armstrong	Fine Fissured (techblack)	1729	Wet-formed mineral fibre	Latex paint	D
Armstrong	Fine Fissured (white)	1729	Wet-formed mineral fibre	Latex paint	Z
Armstrong	Fine Fissured Open Plan	1754	Wet-formed mineral fibre	Latex paint	II
Armstrong	Georgian	17	Wet-formed mineral fibre	Latex paint	CC
Armstrong	Graphis	1753	Wet-formed mineral fibre	Latex paint	J
Armstrong	Latitudes	8005	Wet-formed mineral fibre	Latex paint	W
Armstrong	Ledges	8011	Wet-formed mineral fibre	Latex paint	P
Armstrong	Mesa	680	Wet-formed mineral fibre	Latex paint	E
Armstrong	Optima	3151	Fibreglass with acoustically transparent membrane	Acoustically transparent membrane and latex paint	B
Armstrong	Painted Nubby	3101	Fibreglass	Latex paint	EE
Armstrong	Pebble	2989	Fibreglass	Latex paint	N
Armstrong	Random Fissured	2910	Fibreglass	Scrubable vinyl film facing	F
Armstrong	Sansera	573	Embossed wet-formed mineral fibre	Latex paint	Y
Armstrong	Shasta	2906	Fibreglass	Scrubable vinyl film facing	H
Armstrong	Stratus	531	Wet-formed mineral fibre	Latex paint	JJ
Armstrong	VL	871	Wet-formed mineral fibre	Vinyl-faced membrane	L
Certain-Teed	Ecophon Gedina E	-	Fibreglass	Sound-resistant coating	BB
Certain-Teed	Fine Fissured High NRC	454	Wet-felted mineral fibre	Latex paint	M
Certain-Teed	Symphony F	134,2,4	Fibreglass	Laminate	C
Certain-Teed	Theatre Black F	1910.2	Fibreglass	Laminate	A
Certain-Teed	Vinyl Rock	1140,2-CRF-1	Gypsum	Scrubable vinyl film facing	I
USG	Astro Climaplus	-	Mineral fibre	-	Q
USG	Brio Climaplus	-	Mineral fibre	-	Q

APPENDIX D – ELECTRICAL DIAGRAM



APPENDIX E – DECLARATION OF CONFORMITY

EF-overensstemmelseserklæring for maskine

- Original -

1. Firmanavn og adresse:

Firmanavn	Nordicco A/S
Adresse	Karetmagervej 23 7000 Fredericia Telefon +45 73709083

2. Følgende person har bemyndigelse til at samle det tekniske dossier:

Navn	Dennis Thomsen
Titel	Adm direktør
Kontaktdata	dennis@nordicco.eu


3. Beskrivelse og identifikation af maskinen:

Generisk betegnelse	Ventilator HVLS
Funktion	Cirkulation og desinfektion
Type	Northern light
Serienummer	Fortløbende
Handelsbetegnelse	Northern Light

4. Erklæring om overensstemmelse:

Erklæring	Ovennævnte maskine erklæres i overensstemmelse med relevante bestemmelser i maskindirektivet, direktiv nr. 2006/42/ EU DS/EN 62471-2008
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5. Bemyndiget person til udstedelse af erklæringen, samt underskrift

Navn	Dennis Thomsen
Titel	Adm. Direktør
Sted	Fredericia
Dato og underskrift	Den: 15-07-2021  Dennis Thomsen

APPENDIX F – ASSESSMENT FORM

Only a professional UVC installer may perform the assessment.

Complete this form after installation and calibration/damping of one or more NORDICCO Northern Light® UVC systems. If more than one system is installed in the room in question, the measurement must be made while all systems are activated, so as to measure the total irradiation in the room.

UVC SENSOR MODEL: _____

UVC SENSOR SERIAL NO: _____

Complete the form in block letters, fold in the middle and then mount somewhere visible in the room, with the front page filled in.

The measured values, sketches and image documentation must be incorporated into an assessment report and subsequently handed out to relevant parties.

Limit values

Determination of maximum exposure time per day can be read from the table below:
Please note: If a measured value is between two values in the table, the lowest permissible exposure time must be conservatively chosen.

Permitted exposure time	Irradiation intensity $\mu\text{W}/\text{cm}^2$	Radiation range	Maximum exposure time/day
24 hours	0.07	Low The system can be put into operation without further action *	24 hours*
18 hours	0.09		
12 hours	0.14		
10 hours	0.17		
8 hours	0.21		
6 hours	0.28	Average Use of the system must be on a limited time basis	See time chart
5 hours	0.33		
4 hours	0.42		
3 hours	0.56		
2 hours	0.83		
1 hour	1.7	High The system may not be commissioned	The system may not be commissioned
30 minutes	3.3		
15 minutes	6.7		
5 minutes	20		
1 minute	100		

The table has been prepared on the basis of formula 4.1 in EN 62471 (Photobiological safety of lamps and lamp systems). The light source used is low pressure lamp with a wavelength of 254nm.

** According to EN 62471 section 4.3.1, exposure time exceeding 8 hours can be disregarded:
"Continuous exposure for times greater than 8 hours in any day need not be considered."*

Grid and measurement points

Room dimensions:

Length, L (m) =

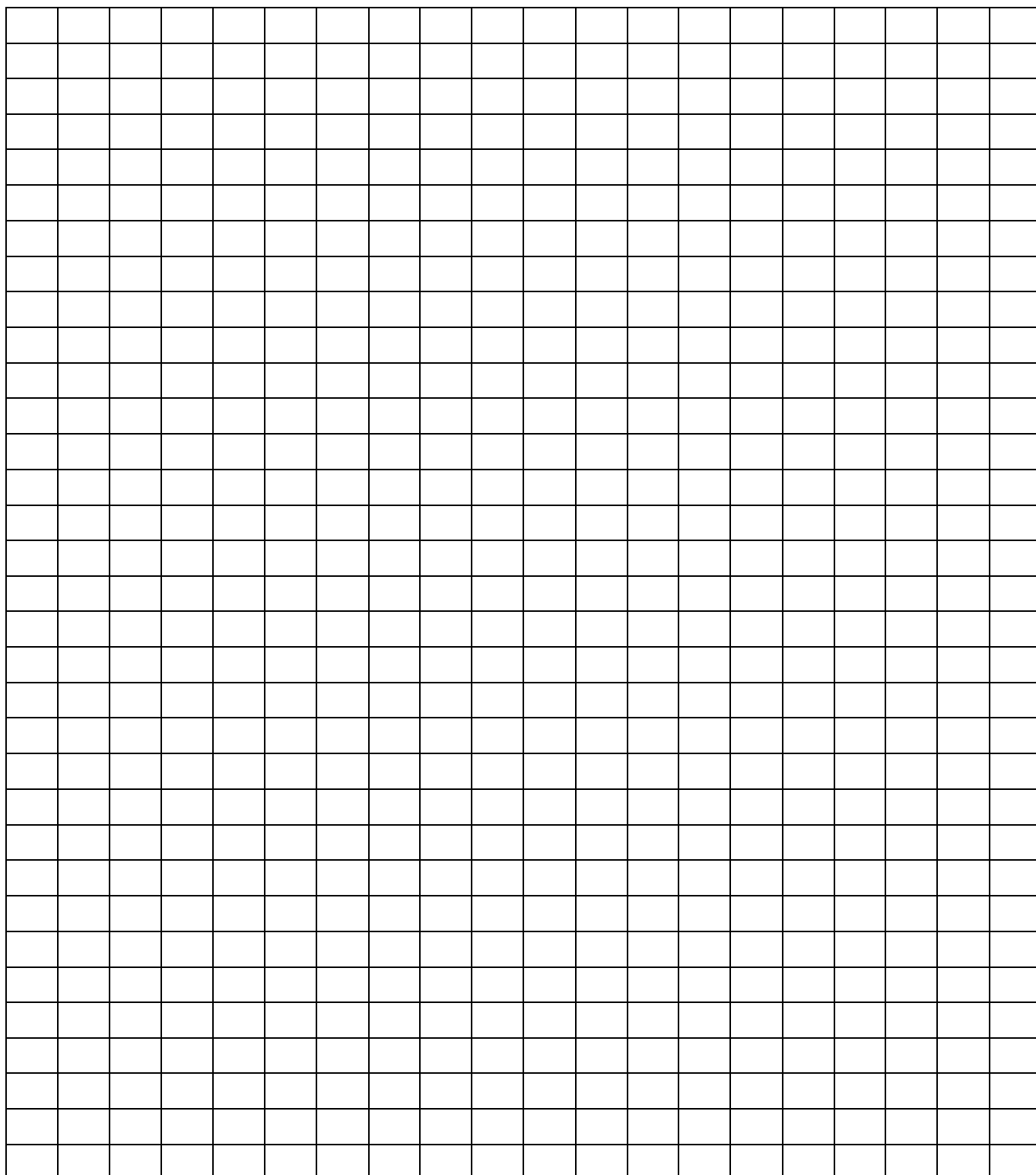
Width, W (m) =

Height, h (m) =

Grid size: _____

Room Length L (m)	Maximum distance between measuring points (m). Height h in (m) ($h > 3m$)	Minimum measuring points
2-7,5m	$0,35 * h$. Max 2m	5
7,5-15m	$0,45 * h$, max 3,5m	8
15-25m	$0,55 * h$, max 5m	12
>25m	$0,65 * h$, max 6m	16

The grid size is calculated by measuring the room length L (where $L > W$) and then finding the formula in the above table. Example, $L = 18m$. Here the interval 15-25m is used, resulting in the formula $0,55 * h$ (limited by a maximum of 5m spacing). Below the room is sketched out and the numbered measuring points are marked.



DATE: _____

ASSESSMENT PERFORMED BY:

Company _____ Name _____

MEASUREMENTS: (Complete in block letters)

Measuring point (Location)	Radiation intensity ($\mu\text{W}/\text{cm}^2$)	Measuring point (Location)	Radiation intensity ($\mu\text{W}/\text{cm}^2$)	Measuring point (Location)	Radiation intensity ($\mu\text{W}/\text{cm}^2$)
1		31		61	
2		32		62	
3		33		63	
4		34		64	
5		35		65	
6		36		66	
7		37		67	
8		38		68	
9		39		69	
10		40		70	
11		41		71	
12		42		72	
13		43		73	
14		44		74	
15		45		75	
16		46		76	
17		47		77	
18		48		78	
19		49		79	
20		50		80	
21		51		81	
22		52		82	
23		53		83	
24		54		84	
25		55		85	
26		56		86	
27		57		87	
28		58		88	
29		59		89	
30		60		90	

Dimensioning intensity (highest measured value)

ARTIFICIAL OPTICAL RADIATION

THIS FORM MUST NOT BE COVERED OR REMOVED FROM THE ROOM



Address, Building number and premises number:

The UVC system (ceiling fan) in this room has been calibrated and verified to the following intensity (254nm) in the occupancy zone.

_____ ($\mu\text{W}/\text{cm}^2$)

This intensity means a maximum exposure time per day
(c.f. EN 62471):

_____ Hours _____ Minutes per day

The system is timer controlled to comply with the above exposure time.

Please note: When working near or above the fan blades, the fan must be switched off with a safety switch.

Measurements were taken in compliance with

- EN 62471, 1st edition: Photobiological safety of lamps and lamp system

FRONT

ENERGY SAVINGS & DISINFECTION

NORDICCO

We are a Danish company, wanting to contribute towards the acceleration to a more sustainable economy.

Nordicco designs and manufactures climate-friendly High Volume Low Speed (HVLS) fans and associated control systems.

WHAT WE DO

Our solutions help our customers improve their indoor climate, lower their energy consumption, reduce their CO2 emissions and eliminate the spread of airborne pathogens.

At our Headquarters in Denmark we design and manufacture our systems and we always strive to source from locally-based suppliers, ensuring the lowest possible overall carbon footprint.



ADDRESS

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