

## Isolated Lightning protection design – Digester Tank



### Report compiled by:

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## 1. Introduction

System where lightning protection system is isolated from the structure by a specified separation distance. This distance should be sufficient that energy is contained on the LPS and does not spark to the structure. Isolated systems are well suited to structure with combustible materials such as thatched roofs, or telecommunication sites that want to avoid lightning current being conducted on masts and antenna bodies.

For this project “Digester tank”, isolated LP system is designed to comply with IEC 62305 in design parameter and IEC TS 62561-8 for isolated down-conductors. Lightning protection system is designed using RSM (Rolling Sphere Method) explained in IEC 62305. LP system designed has following parameters,

- Designed to comply with Protection level I in accordance with IEC 62305
- Distance between all terminals is 10 meters except between T2-T3 and T6-T7, which is 15 meters, this is to achieve penetration distance of 0.6 and 1.4 meter respectively.
- Calculated separation distance (s) is 0.64 meter
- Mast height is 8meters (includes, 2m air terminal, 2.3m FRP mast and 3.7 meter Aluminum mast)
- IsonV70, isolated cable with separation distance of 0.7meter

## 2. Separation Distance

Electrical insulation between the air-terminal or the down-conductor and the structure metal parts, the metal insulations and the internal systems can be achieved by providing a separation distance,  $S$ , between the parts. The general equation for the calculation of  $s$  is given by IEC 62305-3 in section 6.3.1 see below,

$$s = \frac{k_i}{k_m} \times k_c \times l \quad (\text{m}) \quad (4)$$

where

- $k_i$  depends on the selected class of LPS (see Table 10);
- $k_m$  depends on the electrical insulation material (see Table 11);
- $k_c$  depends on the (partial) lightning current flowing on the air-termination and the down-conductor (see Table 12 and Annex C);
- $l$  is the length, in metres, along the air-termination and the down-conductor from the point, where the separation distance is to be considered, to the nearest equipotential bonding point or the earth termination (see E.6.3 of Annex E).

NOTE The length  $l$  along the air-termination can be disregarded in structures with continuous metal roof acting as natural air-termination system.

Value of  $K_i$ ,  $k_m$ , and  $K_c$  is given in same standard in table 10, 11 and 12 respectively,

**Table 10 – Isolation of external LPS – Values of coefficient  $k_i$**

Class of LPS	$k_i$
I	0,08
II	0,06
III and IV	0,04

**Table 11 – Isolation of external LPS – Values of coefficient  $k_m$**

Material	$k_m$
Air	1
Concrete, bricks, wood	0,5

NOTE 1 When there are several insulating materials in series, it is a good practice to use the lower value for  $k_m$ .

NOTE 2 In using other insulating materials, construction guidance and the value of  $k_m$  should be provided by the manufacturer.

**Table 12 – Isolation of external LPS – Approximated values of coefficient  $k_c$**

Number of down-conductors $n$	$k_c$
1 (only in case of an isolated LPS)	1
2	0,66
3 and more	0,44

NOTE Values of Table 12 apply for all type B earthing arrangements and for type A earthing arrangements, provided that the earth resistance of neighbouring earth electrodes do not differ by more than a factor of 2. If the earth resistances of single earth electrodes differ by more than a factor of 2,  $k_c = 1$  is to be assumed.

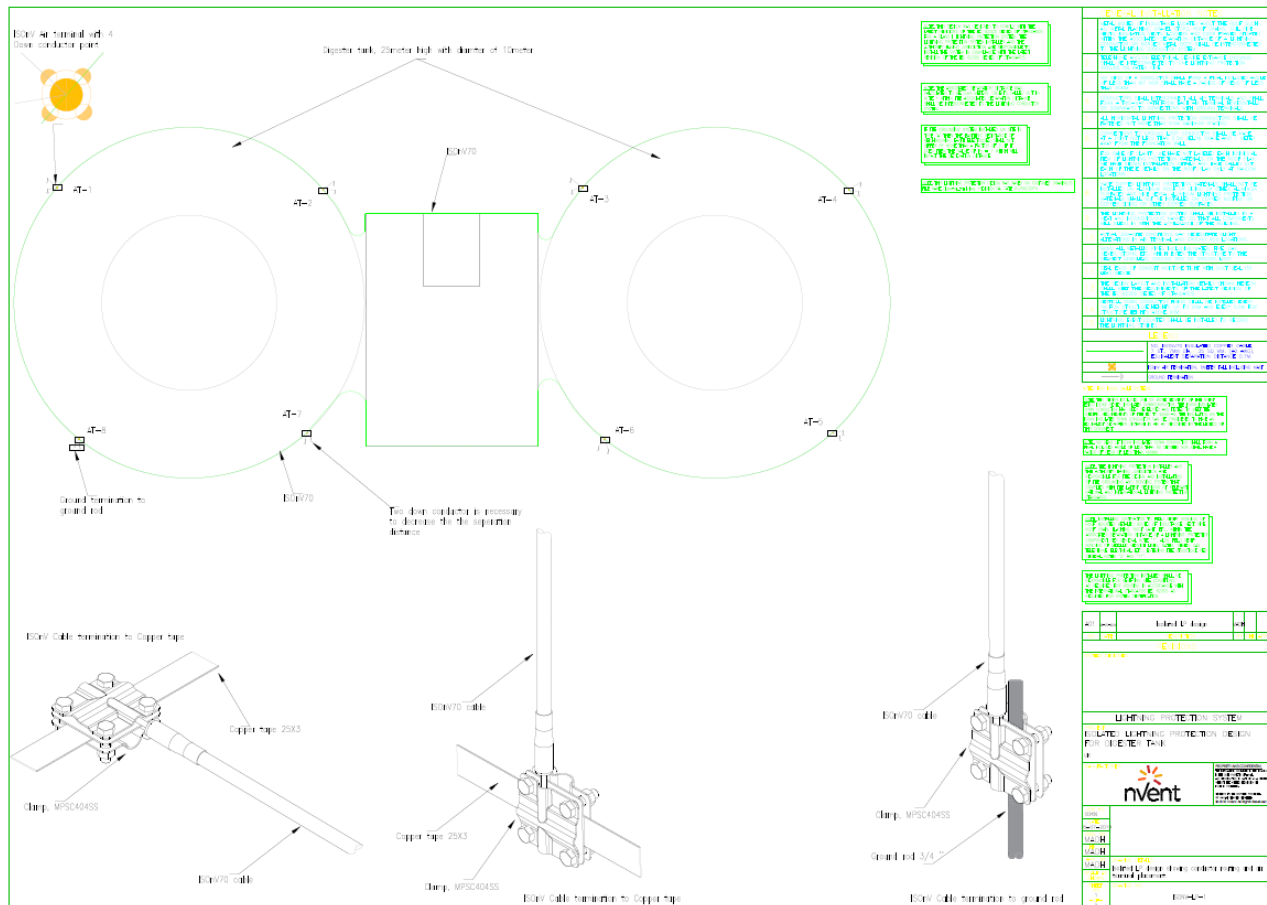
As described in IEC 62305-3 Annex C separation distance for this project was calculated to be **0.64** meters for protection level I. See below details on separation distance for all protection level.

Protection level	Separation distance (meters)
I	0.64
II	0.48
III	0.32
IV	0.32

Above-mentioned separation distance is calculated following IEC 62305-3.

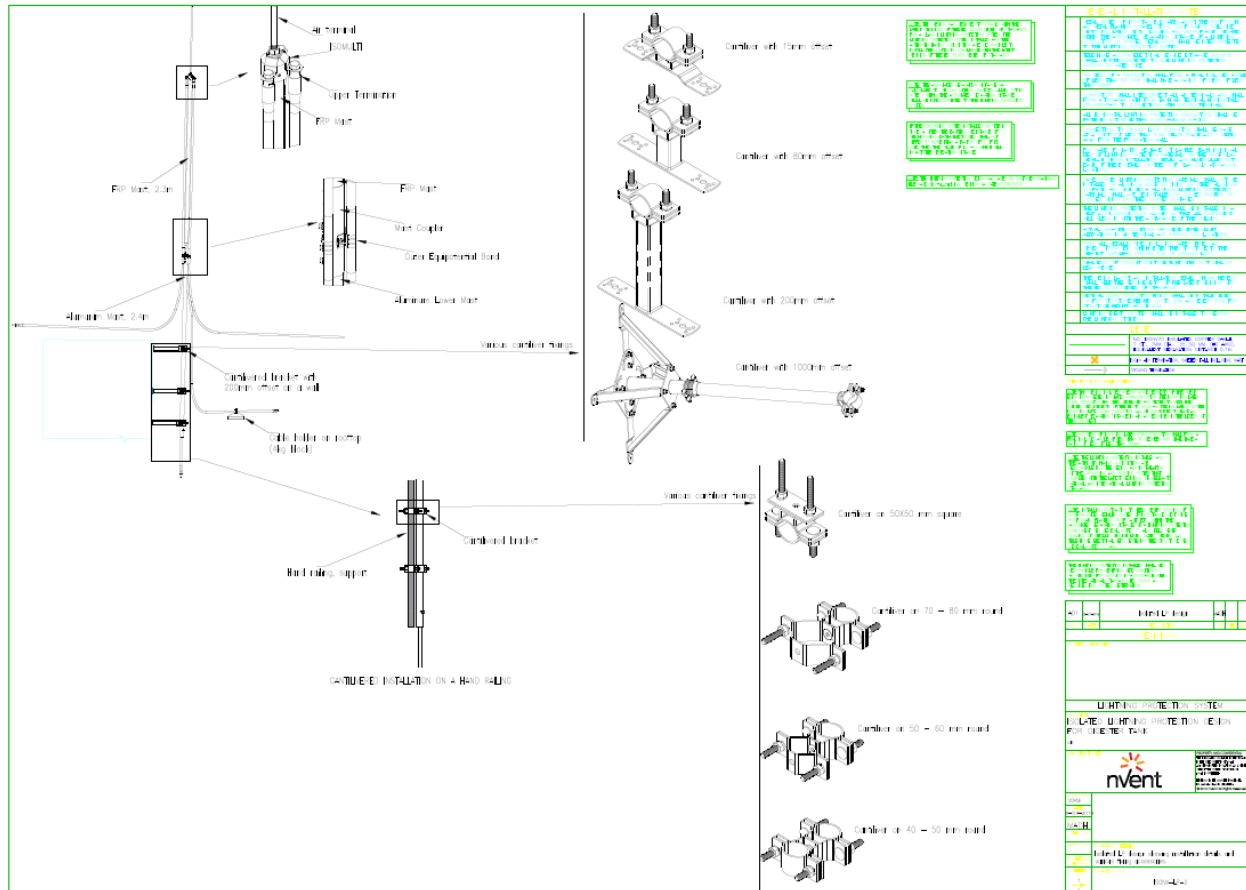
Three CAD layouts has been created for this project.

This layout gives an overview of design and shows the placement of the air terminals and the routing of isonv conductor. See below the layout, refer to layout (***ISONV-LP-1.pdf***) attached along this document for details.



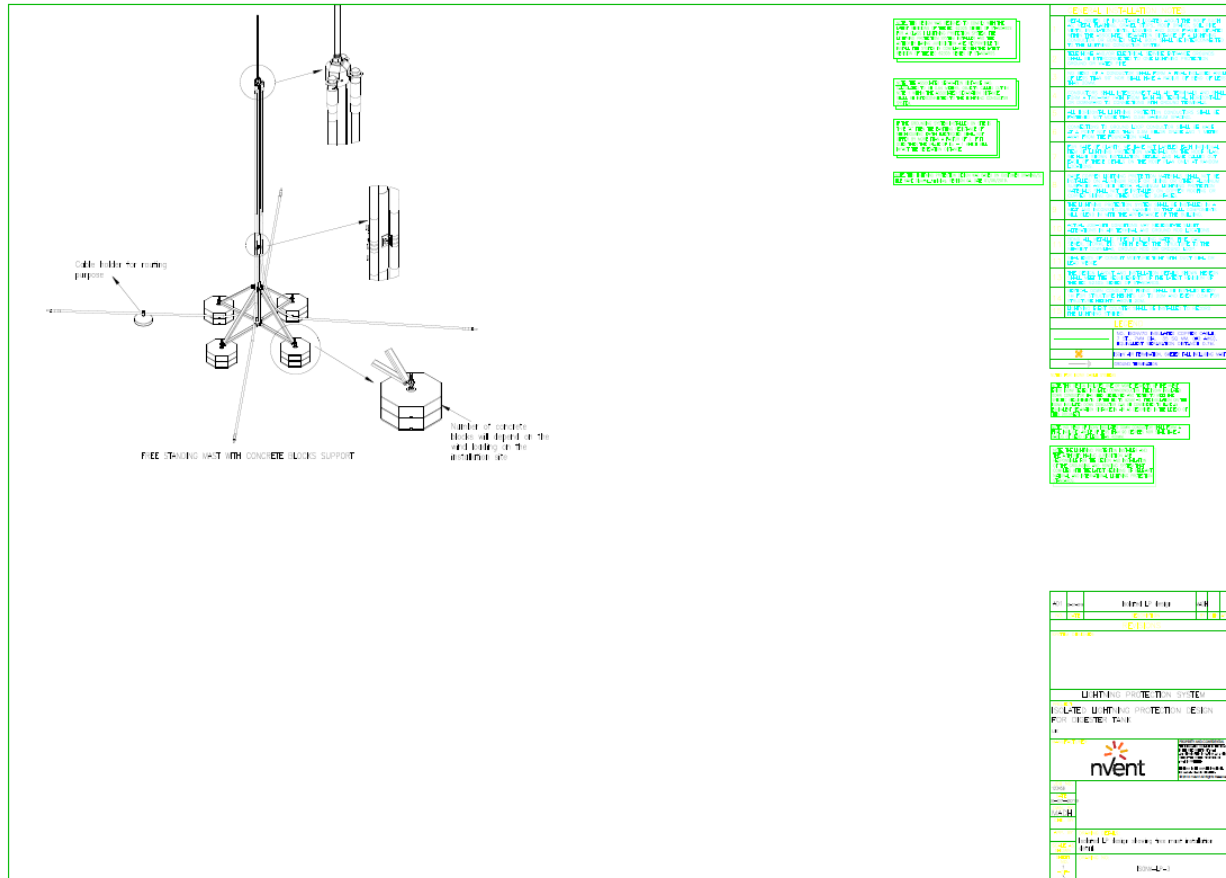
### 3.2. ISONV-LP-2

This layout gives an overview on cantilever installation and shows the mast arrangement and various components associated to it. See below the layout, refer to layout (**ISONV-LP-2.pdf**) attached along this document for details.



### 3.3. ISONV-LP-3

This layout gives an overview on freestanding mast and shows the mast arrangement and various components associated to it. See below the layout, refer to layout (*ISONV-LP-3.pdf*) attached along this document for details.





#### 4. Coordinated Surge Protection

It is advised to have a coordinated surge protection devices (SPDs) installed on the incoming power system. Surge can occur due to transients from the main line or can be induced during the lightning activities. SPDs should be installed in Main Distribution panels and sub-distribution panels. For sensitive electronic devices, data surge protection devices should be installed. Details should be made available in order to add SPDs in existing bill of material.

#### 5. Bill of Materials

Following is a typical list of materials that would be appropriate for this project.

<b><i>NO.</i></b>	<b><i>Item</i></b>	<b><i>Description</i></b>	<b><i>Quantity</i></b>
<b><u>Isolated mast assembly</u></b>			
1	LPAAT1000	AIR TERMINAL	8 EA
2	ISOMASTASSY	FRP MAST, 2.3M	8 EA
3	ISONVMAS37	ALUMINUM MAST, 3.7M	8 EA
4	ISONVBKTR40	MAST FIXTURE ON HAND RAILING OD 40-50MM	16 EA
5	ISOTMN70ITL	LOWER TERMINATION KIT	16 EA
6	ISONVEBL70	EQUIPOTENTIAL BONDING KIT	24 EA
7	MPSC40SS	CLAMP	8 EA
<b><u>Isolated cable</u></b>			
8	ISONV70	ISONV CABLE 70MM SEPERATION DISTANCE	666 MT
9	ISOTMN70KITU	UPPER TERMINATION KIT, OUTSIDE MAST	24 EA
10	ISOTMN70KITUA	UPPER TERMINATION KIT, INSIDE MAST	8 EA
<b><u>Stripping tool for isolated cable</u></b>			
11	ISONVSTRIPT	STRIP TOOL HANDLE	1 EA
12	ISONVSTRIP70	BUSHING FOR ISONV70	1 EA
13	ISONVSTRIPBL	BLADE REPLACEMENT	2 EA
14	ISONVSTRIPCS	CASE FOR TOOLS	1 EA
<b><u>Grounding</u></b>			
15	103450	INSPECTION PIT CONCRETE	8 EA
16	545140	EARTH BAR FOR CONCRETE PIT	8 EA
17	503900	PREFABRICATED CROWFOOT	8 EA
18	633400	GND ROD, 3/4" DIA. X 10' SECTIONAL	8 EA
19	158050	THREADED COUPLER FOR COPPER-BONDED GROUND ROD, SECTIONAL	8 EA
20	158110	DRIVING STUD FOR SECTIONAL GROUND RODS	8 EA
21	163670	GROUND AGENT - GEM 11.5KG, 20CM DIAMETER	160 BAG
22	LECV	LIGHTNING EVENT COUNTER	8 EA

## 6. General Notes

Following notes shall be adhered during the installation of above designed system.

- This system is designed to comply with the latest revision of the IEC 62305 series of standards for a class I lightning protection system. The lightning protection system installer and the authority having jurisdiction are responsible to install the system in compliance with the latest revision of the IEC 62305 series of standards.
- If the grounding system installed on site is Type “A” then the earthing resistance of neighboring earth electrode shall not differ by more than a factor of 2. If it does then the value of  $K_c = 1$  which will impact the separation distance of the isolated system.
- This design includes one or more segments of the nvent erico ISONV series insulated down conductor. This insulated conductor has been developed and tested to meet the specific requirement of the IEC TS 62561-8. The insulation on the isonv down conductor can be considered to have an equivalent separation distance in air.
- No bend of isonv cable shall form a final included angle of less than 90 degree nor shall have a radius of bend of less than 400mm.
- The lightning protection installer and the authority having jurisdiction are responsible for the design and installation of the grounding and bonding system that complies with the latest revision of relevant national and international lightning protection standards.

ISOvV Air terminal with 4  
Down conductor point

Digester tank, 25meter high with diamter of 10meter

ISOvV70

AT-1

AT-2

AT-3

AT-4

AT-8

AT-7

AT-6

AT-5

Ground termination to  
ground rod

ISOvV70

Two down conductor is necessary  
to decrease the the seperation  
distance

ISOvV Cable termination to Copper tape

Copper tape 25X3

Clamp, MPSC404SS

ISOvV70 cable

Copper tape 25X3

Clamp, MPSC404SS

ISOvV Cable termination to Copper tape

ISOvV70 cable

ISOvV70 cable

Clamp, MPSC404SS

Ground rod 3/4 "

ISOvV Cable termination to ground rod

NOTE: THIS DESIGN WAS DESIGNED TO COMPLY WITH THE LATEST REVISIONS OF THE IEC 62305 SERIES OF STANDARDS FOR A CLASS 1 LIGHTNING PROTECTION SYSTEM. THE LIGHTNING PROTECTION SYSTEM INSTALLER AND THE AUTHORITY HAVING JURISDICTION ARE RESPONSIBLE TO INSTALL THE SYSTEM IN COMPLIANCE WITH THE LATEST REVISION OF THE IEC 62305 SERIES OF STANDARDS.

NOTE: THE ASSOCIATED SEPARATION DISTANCE WAS CALCULATED TO BE 0.64 METERS. OBJECTS CALLED OUT IN NOTE 1 WITHIN THE ASSOCIATED SEPARATION DISTANCE SHALL BE INTERCONNECTED TO THE LIGHTNING CONDUCTOR SYSTEM.

IF THE GROUNDING SYSTEM INSTALLED ON SITE IS TYPE "A" THEN THE EARTHING RESISTANCE OF NEIGHBOURING EARTH ELECTRODES SHALL NOT DIFFER BY MORE THAN A FACTOR OF 2. IF IT DOES THEN THE VALUE OF  $K_g = 1$  WHICH WILL IMPACT THE SEPERATION DISTANCE.

NOTE: THIS LIGHTNING PROTECTION DESIGN WAS BASED ON CUSTOMER DRAWING/S. FILE NAME: Digester\_tank.dwg, REVISION 0A, DATE 01/06/2019.

#### GENERAL INSTALLATION NOTES

- METAL BODIES OF INDUCTANCE LOCATED ABOUT THE ROOF SUCH AS: METAL FLASHING, GRAVEL STOPS, ROOF DRAINS, SOIL PIPE VENTS, INSULATION VENTS, LOUVERS AND DOOR FRAMES SITUATED WITHIN THE ASSOCIATED SEPARATION DISTANCE OF A LIGHTNING CONDUCTOR OR BONDED METAL BODY SHALL BE INTERCONNECTED TO THE LIGHTNING CONDUCTOR SYSTEM.
- TELEPHONE AND/OR ELECTRICAL SERVICE ENTRANCE GROUNDS SHALL BE INTERCONNECTED TO ONE LIGHTNING PROTECTION GROUND OR WATER PIPE.
- NO BEND OF A CONDUCTOR SHALL FORM A FINAL INCLUDED ANGLE OF LESS THAN 90° NOR SHALL HAVE A RADIUS OF BEND OF LESS THAN 20MM.
- CONDUCTORS SHALL INTERCONNECT ALL AIR TERMINALS AND SHALL FORM A TWO-WAY PATH FROM EACH AIR TERMINAL HORIZONTALLY OR DOWNWARD TO CONNECTIONS WITH GROUND TERMINALS.
- ALL HORIZONTAL LIGHTNING PROTECTION CONDUCTORS SHALL BE FASTENED NOT MORE THAN 0.5M MAXIMUM SPACING.
- CONNECTIONS TO GROUND LOOP CONDUCTOR SHALL BE MADE AT A POINT NOT LESS THAN 0.5M BELOW GRADE AND 1 METER AWAY FROM THE FOUNDATION WALL.
- FOR SAKE OF CLARITY, WE HAVE NOT LABELED EACH INDIVIDUAL ITEM OF LIGHTNING PROTECTION MATERIALS ON THE ROOF PLAN. WE HAVE SHOWN INSTALLATION DETAILS AND HAVE CALLED OUT EACH OF THESE DETAILS ON THE ROOF PLAN ONLY AT RANDOM LOCATIONS.
- BARE COPPER LIGHTNING PROTECTION MATERIALS SHALL NOT BE INSTALLED ON ALUMINUM ROOF OR SIDING OR OTHER ALUMINUM SURFACES AND VICE VERSA, ALUMINUM LIGHTNING PROTECTION MATERIALS SHALL NOT BE INSTALLED ON COPPER ROOFING OR COPPER SIDING OR OTHER COPPER SURFACES.
- THE LIGHTNING PROTECTION SYSTEM SHALL BE INSTALLED IN A NEAT AND INCONSPICUOUS MANNER SO THAT ALL COMPONENTS WILL BLEND IN WITH THE APPEARANCE OF THE BUILDING.
- ACTUAL JOB-SITE CONDITIONS MAY NECESSITATE SLIGHT ALTERATIONS IN AIR TERMINAL AND GROUND ROD LOCATIONS.
- BOND ALL METALLIC PIPES INCLUDING WATER, FIRE, GAS, SEWER, STORM, ETC. WHICH ENTER THE STRUCTURE TO THE NEAREST DOWNLOAD, GROUND ROD OR GROUND LOOP.
- SEAL ENDS OF CONDUIT MOISTURE TIGHT WITH DUCT SEAL OR LEAD WEDGE.
- THE DESIGN LAYOUT AND INSTALLATION DETAILS SHOWN HEREON SHALL MEET THE REQUIREMENTS OF THE LATEST REVISION OF THE IEC 62305 SERIES OF STANDARDS.
- VERTICAL DOWN CONDUCTOR FIXING SHALL BE INSTALLED EVERY 1M FOR STRUCTURE HEIGHTS UP TO 20M AND EVERY 0.5M FOR STRUCTURE HEIGHTS ABOVE 20M.
- LIGHTNING EVENT COUNTER SHALL BE INSTALLED TO RECORD THE LIGHTNING STRIKES.

#### LEGEND

	NO. ISOvV70 INSULATED COPPER CABLE, 7 ST., 7MM DIA, 35 SQ MM. (#2 AWG), EQUIVALENT SEPARATION DISTANCE 0.7M.
	ISOvV AIR TERMINATION, 6METER TALL INCLUDING MAST
	GROUND TERMINATION

#### NOTES FOR ISOvV CABLE SYSTEMS

NOTE: THIS DESIGN INCLUDES ONE OR MORE SEGMENTS OF THE INVENT ERICO ISOvV SERIES INSULATED DOWNCONDUCTOR. THE ISOvV INSULATED DOWN CONDUCTOR HAS BEEN DEVELOPED AND TESTED TO MEET THE SPECIFIC REQUIREMENTS OF THE IEC 62305-1-8. THE INSULATION ON THE ISOvV INSULATED DOWN CONDUCTOR CAN BE CONSIDERED TO HAVE AN EQUIVALENT SEPARATION DISTANCE IN AIR AS DESCRIBED IN THE LEGEND OF THIS DOCUMENT.

NOTE: NO BEND OF ISOvV INSULATED DOWN CONDUCTOR SHALL FORM A FINAL INCLUDED ANGLE OF LESS THAN 90 DEGREES NOR SHALL HAVE A RADIUS OF BEND OF LESS THAN 400MM.

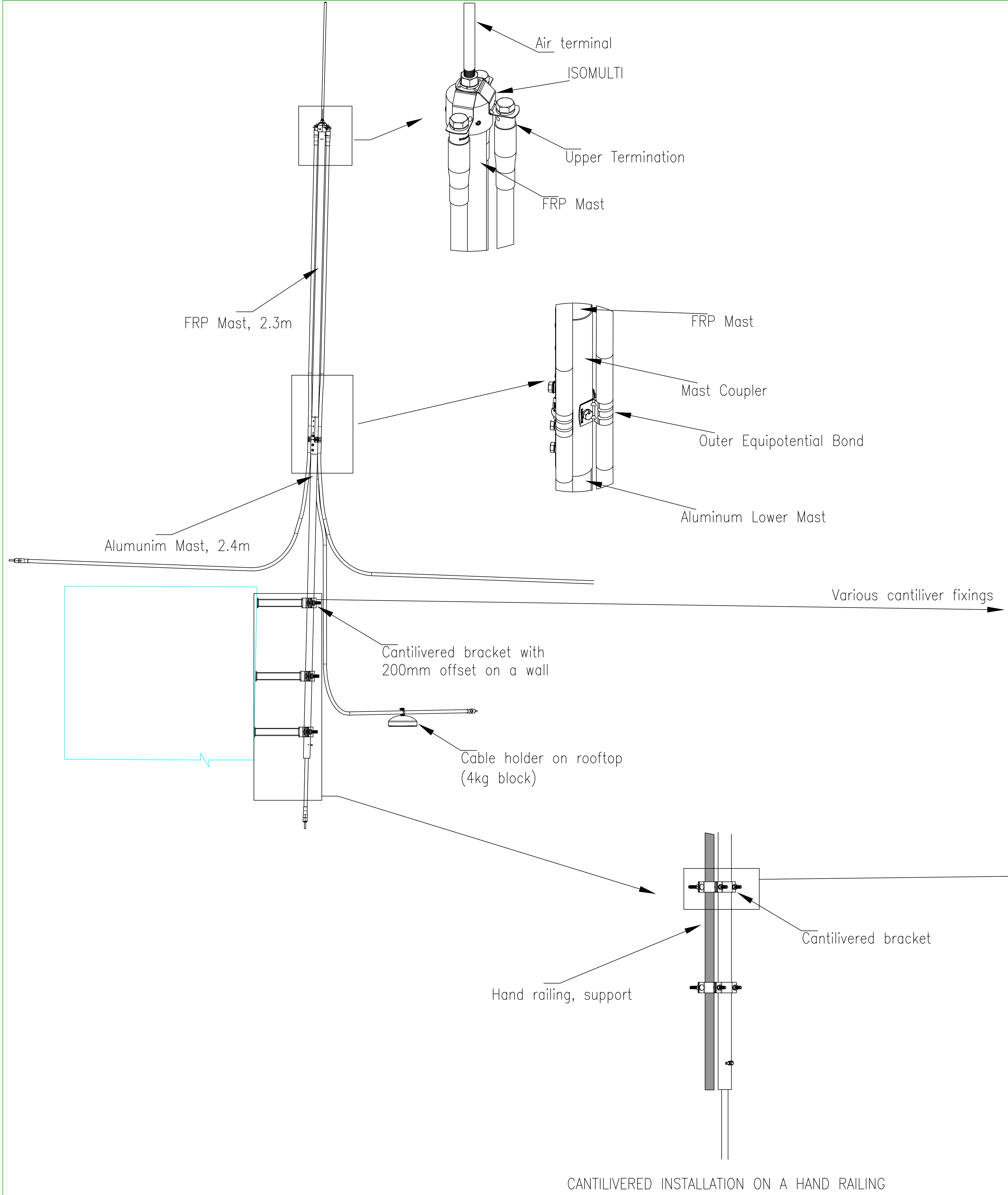
NOTE: THE LIGHTNING PROTECTION INSTALLER AND THE AUTHORITY HAVING JURISDICTION ARE RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF THE GROUNDING AND BONDING SYSTEM THAT COMPLIES WITH THE LATEST REVISIONS OF RELEVANT NATIONAL AND INTERNATIONAL LIGHTNING PROTECTION STANDARDS.

NOTE: INSTALLING CONTRACTOR TO FIELD VERIFY BONDING OF ROOF MOUNTED METALLIC BODIES OF INDUCTANCE: VENT PIPE, ROOF DRAIN, FLASHING, ROOF DAVIT, ETC., WITHIN THE ASSOCIATED SEPARATION DISTANCE OF A LIGHTNING PROTECTION COMPONENT PER GENERAL NOTE "1". ALSO FIELD VERIFY BONDING OF METALLIC SERVICE LINES: WATER, SEWER, GAS, TELEPHONE, ELECTRICAL, ETC., ENTERING THE STRUCTURE PER GENERAL NOTES "2" AND "11".

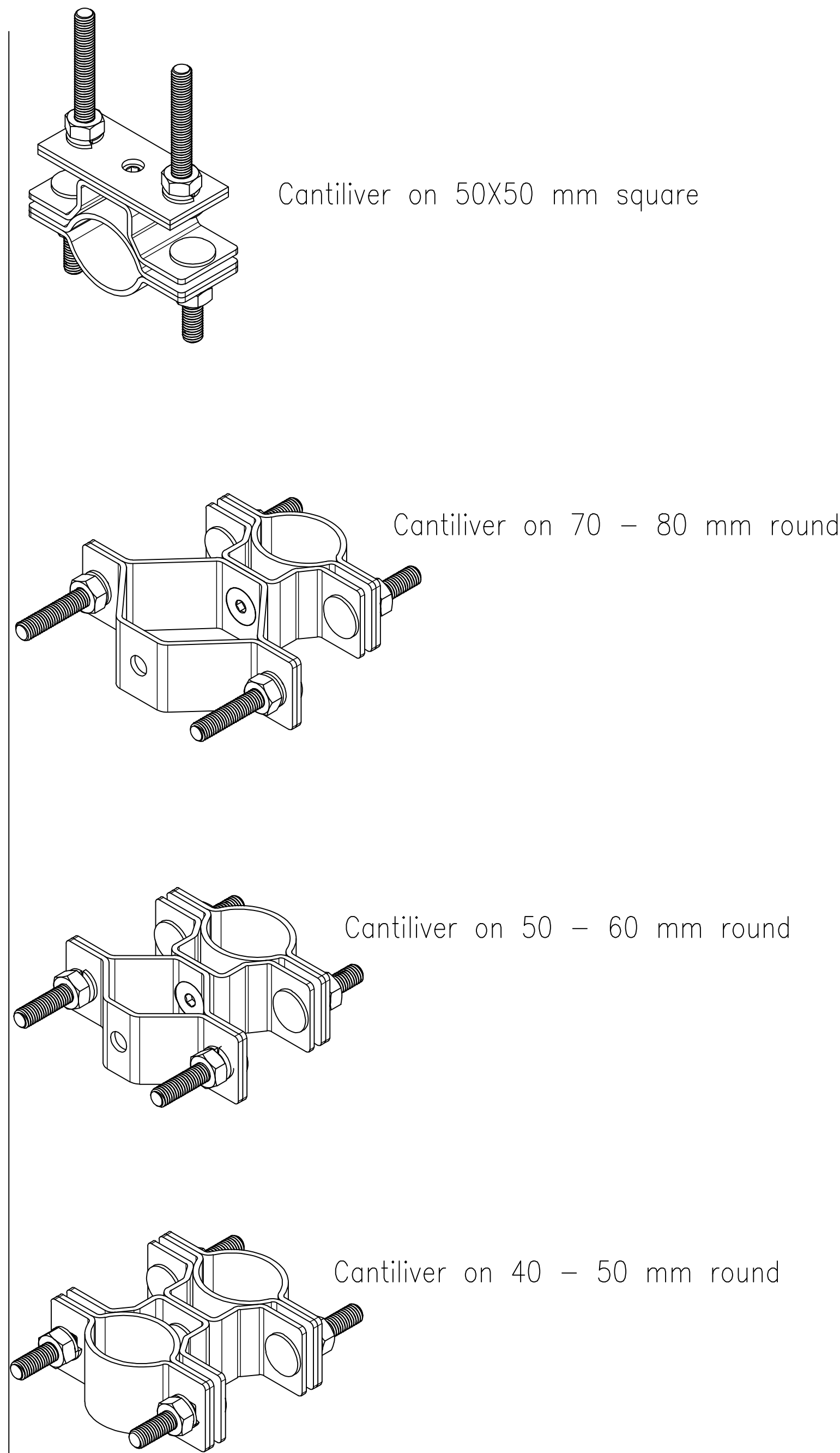
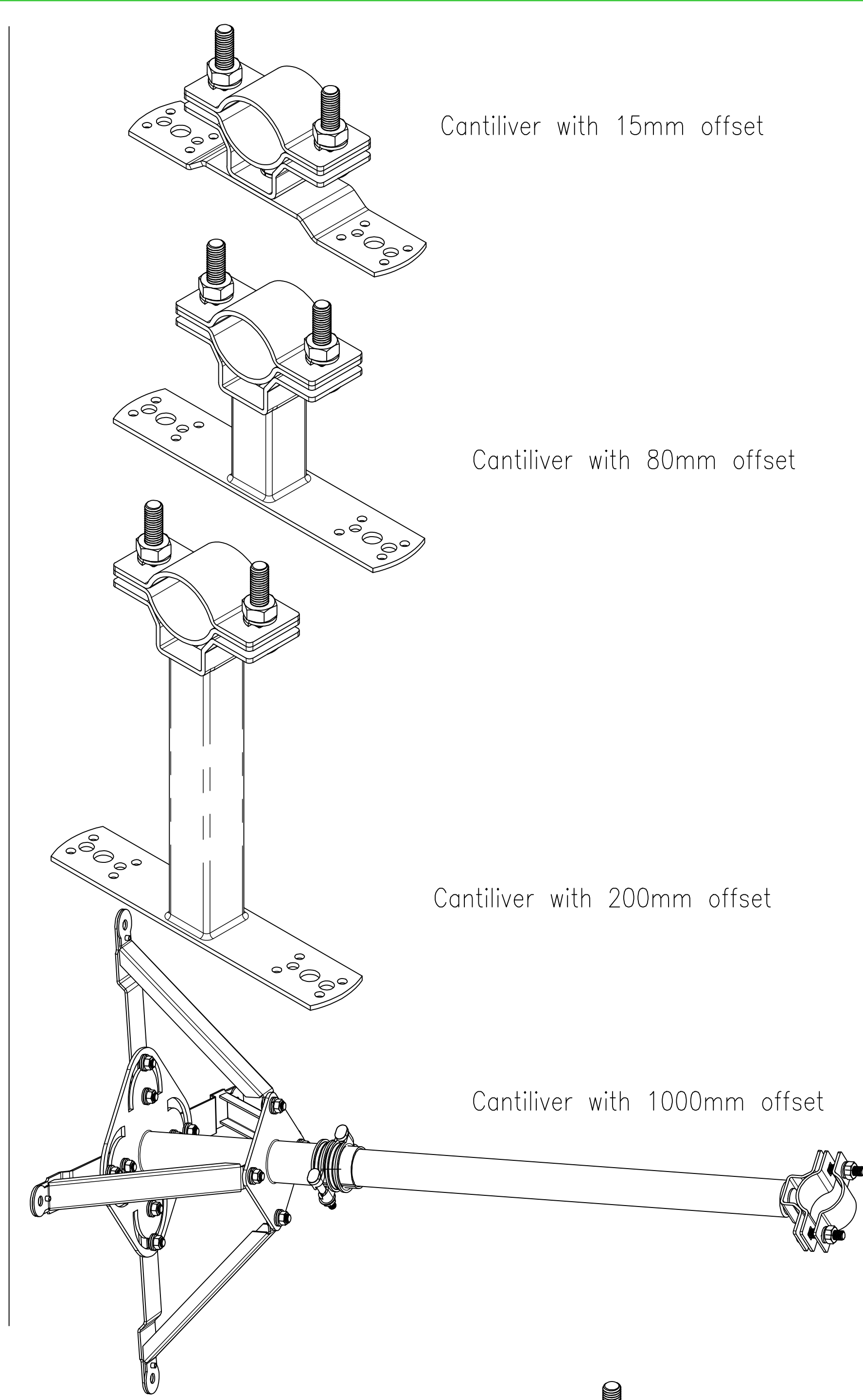
THE LIGHTNING PROTECTION INSTALLER SHALL BE RESPONSIBLE FOR VERIFYING SITE CONDITIONS AS REQUIRED FOR BONDING IN ACCORDANCE WITH THE INTERNATIONAL STANDARDS IEC 62305 AS REQUIRED FOR SYSTEM CERTIFICATION.

A01	08-07-2019	Isolated LP design	MADH		
NO.	DATE:	DESCRIPTION	BY	CHK	APP
REVISIONS					
SYSTEM DESIGNER:					
LIGHTNING PROTECTION SYSTEM					
PROJECT: ISOLATED LIGHTNING PROTECTION DESIGN FOR DIGESTER TANK					
UK					
MANUFACTURER: 					
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JOB NO. 123456					
DATE 8-07-2019					
OWN BY MADH					
CHK BY MADH					
APP BY MADH					
SCALE AS SHOWN	DRAWING DETAILS: Isolated LP design showing conductor routing and air terminal placement.				
SHEET NO. 1 OF 3	DRAWING NO: ISOvV-LP-1				





CANTILVERED INSTALLATION ON A HAND RAILING



NOTE: THIS DESIGN WAS DESIGNED TO COMPLY WITH THE LATEST REVISIONS OF THE IEC 62305 SERIES OF STANDARDS FOR A CLASS I LIGHTNING PROTECTION SYSTEM. THE LIGHTNING PROTECTION SYSTEM INSTALLER AND THE AUTHORITY HAVING JURISDICTION ARE RESPONSIBLE TO INSTALL THE SYSTEM IN COMPLIANCE WITH THE LATEST REVISION OF THE IEC 62305 SERIES OF STANDARDS.

NOTE: THE ASSOCIATED SEPARATION DISTANCE WAS CALCULATED TO BE 0.64 METERS. OBJECTS CALLED OUT IN NOTE 1 WITHIN THE ASSOCIATED SEPARATION DISTANCE SHALL BE INTERCONNECTED TO THE LIGHTNING CONDUCTOR SYSTEM.

IF THE GROUNDING SYSTEM INSTALLED ON SITE IS TYPE "A" THEN THE EARTHING RESISTANCE OF NEIGHBOURING EARTH ELECTRODES SHALL NOT DIFFER BY MORE THAN A FACTOR OF 2. IF IT DOES THEN THE VALUE OF Kc = 1 WHICH WILL IMPACT THE SEPERATION DISTANCE.

NOTE: THIS LIGHTNING PROTECTION DESIGN WAS BASED ON CUSTOMER DRAWING/S: FILE NAME: Digester\_tank.dwg. REVISION: 0A, DATE: 01/06/2019.

## GENERAL INSTALLATION NOTES

- METAL BODIES OF INDUCTANCE LOCATED ABOUT THE ROOF SUCH AS: METAL FLASHING, GRAVEL STOPS, ROOF DRAINS, SOIL PIPE VENTS, INSULATION VENTS, LOUVERS AND DOOR FRAMES SITUATED WITHIN THE ASSOCIATED SEPARATION DISTANCE OF A LIGHTNING CONDUCTOR OR BONDED METAL BODY SHALL BE INTERCONNECTED TO THE LIGHTNING CONDUCTOR SYSTEM.
- TELEPHONE AND/OR ELECTRICAL SERVICE ENTRANCE GROUNDS SHALL BE INTERCONNECTED TO ONE LIGHTNING PROTECTION GROUND OR WATER PIPE.
- NO BEND OF A CONDUCTOR SHALL FORM A FINAL INCLUDED ANGLE OF LESS THAN 90° NOR SHALL HAVE A RADIUS OF BEND OF LESS THAN 20MM.
- CONDUCTORS SHALL INTERCONNECT ALL AIR TERMINALS AND SHALL FORM A TWO-WAY PATH FROM EACH AIR TERMINAL HORIZONTALLY OR DOWNWARD TO CONNECTIONS WITH GROUND TERMINALS.
- ALL HORIZONTAL LIGHTNING PROTECTION CONDUCTORS SHALL BE FASTENED NOT MORE THAN 0.5M MAXIMUM SPACING.
- CONNECTIONS TO GROUND LOOP CONDUCTOR SHALL BE MADE AT A POINT NOT LESS THAN 0.5M BELOW GRADE AND 1 METER AWAY FROM THE FOUNDATION WALL.
- FOR SAKE OF CLARITY, WE HAVE NOT LABELED EACH INDIVIDUAL ITEM OF LIGHTNING PROTECTION MATERIALS ON THE ROOF PLAN. WE HAVE SHOWN INSTALLATION DETAILS AND HAVE CALLED OUT EACH OF THESE DETAILS ON THE ROOF PLAN ONLY AT RANDOM LOCATIONS.
- BARE COPPER LIGHTNING PROTECTION MATERIALS SHALL NOT BE INSTALLED ON ALUMINUM ROOF OR SIDING OR OTHER ALUMINUM SURFACES AND VICE VERSA, ALUMINUM LIGHTNING PROTECTION MATERIALS SHALL NOT BE INSTALLED ON COPPER ROOFING OR COPPER SIDING OR OTHER COPPER SURFACES.
- THE LIGHTNING PROTECTION SYSTEM SHALL BE INSTALLED IN A NEAT AND INCONSPICUOUS MANNER SO THAT ALL COMPONENTS WILL BLEND IN WITH THE APPEARANCE OF THE BUILDING.
- ACTUAL JOB-SITE CONDITIONS MAY NECESSITATE SLIGHT ALTERATIONS IN AIR TERMINAL AND GROUND ROD LOCATIONS.
- BOND ALL METALLIC PIPES INCLUDING WATER, FIRE, GAS, SEWER, STORM, ETC. WHICH ENTER THE STRUCTURE TO THE NEAREST DOWNLEAD, GROUND ROD OR GROUND LOOP.
- SEAL ENDS OF CONDUIT MOISTURE TIGHT WITH DUCT SEAL OR LEAD WEDGE.
- THE DESIGN LAYOUT AND INSTALLATION DETAILS SHOWN HEREON SHALL MEET THE REQUIREMENTS OF THE LATEST REVISION OF THE IEC 62305 SERIES OF STANDARDS.
- VERTICAL DOWN CONDUCTOR FIXING SHALL BE INSTALLED EVERY 1M FOR STRUCTURE HEIGHTS UP TO 20M AND EVERY 0.5M FOR STRUCTURE HEIGHTS ABOVE 20M.
- LIGHTNING EVENT COUNTER SHALL BE INSTALLED TO RECORD THE LIGHTNING STRIKES.

## LEGEND

—	NO. 150KV70 INSULATED COPPER CABLE, 7 ST., 7MM DIA., 35 SQ. MM. (#2 AWG), EQUIVALENT SEPARATION DISTANCE 0.7M.
	150KV AIR TERMINATION, 6METER TALL INCLUDING MAST
	GROUND TERMINATION

NOTES FOR 150KV CABLE SYSTEMS

NOTE: THIS DESIGN INCLUDES ONE OR MORE SEGMENTS OF THE INVENT ERICO 150KV SERIES INSULATED DOWNCONDUCTOR. THE 150KV INSULATED DOWN CONDUCTOR HAS BEEN DEVELOPED AND TESTED TO MEET THE SPECIFIC REQUIREMENTS OF THE IEC 62361-8. THE INSULATION ON THE 150KV INSULATED DOWN CONDUCTOR CAN BE CONSIDERED TO HAVE AN EQUIVALENT SEPARATION DISTANCE IN AIR AS DESCRIBED IN THE LEGEND OF THIS DOCUMENT.

NOTE: NO BEND OF 150KV INSULATED DOWN CONDUCTOR SHALL FORM A FINAL INCLUDED ANGLE OF LESS THAN 90 DEGREES NOR SHALL HAVE A RADIUS OF BEND OF LESS THAN 400MM.

NOTE: THE LIGHTNING PROTECTION INSTALLER AND THE AUTHORITY HAVING JURISDICTION ARE RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF THE GROUNDING AND BONDING SYSTEM THAT COMPLIES WITH THE LATEST REVISIONS OF RELEVANT NATIONAL AND INTERNATIONAL LIGHTNING PROTECTION STANDARDS.

NOTE: INSTALLING CONTRACTOR TO FIELD VERIFY BONDING OF ROOF MOUNTED METALLIC BODIES OF INDUCTANCE; VENT PIPE, ROOF DRAIN, FLASHING, ROOF DAVIT, ETC. WITHIN THE ASSOCIATED SEPARATION DISTANCE OF A LIGHTNING PROTECTION COMPONENT PER GENERAL NOTE "1". ALSO FIELD VERIFY BONDING OF METALLIC SERVICE LINES; WATER, SEWER, GAS, TELEPHONE, ELECTRICAL, ETC., ENTERING THE STRUCTURE PER GENERAL NOTES "2" AND "11".

THE LIGHTNING PROTECTION INSTALLER SHALL BE RESPONSIBLE FOR VERIFYING SITE CONDITIONS AS REQUIRED FOR BONDING IN ACCORDANCE WITH THE INTERNATIONAL STANDARDS IEC 62305 AS REQUIRED FOR SYSTEM CERTIFICATION.

A01	08-07-2019	Isolated LP design	MADH		
NO.	DATE:	DESCRIPTION	BY	CHK	APP.

## REVISIONS

SYSTEM DESIGNER:

DATE:

DATE:

DATE:

## LIGHTNING PROTECTION SYSTEM

PROJECT:  
ISOLATED LIGHTNING PROTECTION DESIGN  
FOR DIGESTER TANK

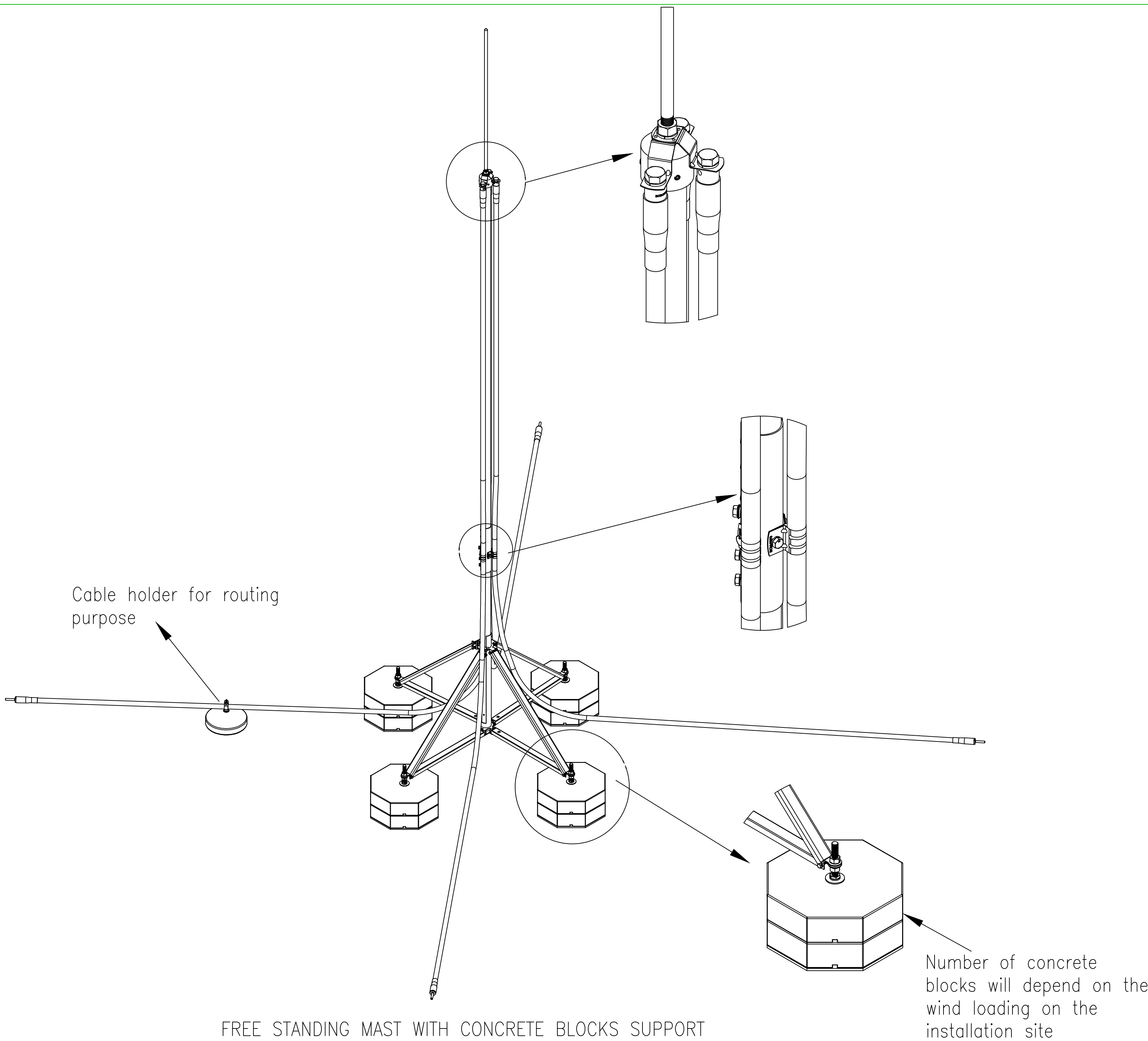
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JOB NO. 123456	DATE: 8-07-2019	CHK BY: MADH	APP BY:	DRAWING DETAILS: Isolated LP design showing installation details and various fixing accessories.
SCALE AS SHOWN	SHEET NO. 2 OF 3	DRAWING NO.	IS0NW-LP-2	





NOTE: THIS DESIGN WAS DESIGNED TO COMPLY WITH THE LATEST REVISIONS OF THE IEC 62305 SERIES OF STANDARDS FOR A CLASS I LIGHTNING PROTECTION SYSTEM. THE LIGHTNING PROTECTION SYSTEM INSTALLER AND THE AUTHORITY HAVING JURISDICTION ARE RESPONSIBLE TO INSTALL THE SYSTEM IN COMPLIANCE WITH THE LATEST REVISION OF THE IEC 62305 SERIES OF STANDARDS.

NOTE: THE ASSOCIATED SEPARATION DISTANCE WAS CALCULATED TO BE 0.84 METERS. OBJECTS CALLED OUT IN NOTE 1 WITHIN THE ASSOCIATED SEPARATION DISTANCE SHALL BE INTERCONNECTED TO THE LIGHTNING CONDUCTOR SYSTEM.

IF THE GROUNDING SYSTEM INSTALLED ON SITE IS TYPE "A" THEN THE EARTHING RESISTANCE OF NEIGHBOURING EARTH ELECTRODES SHALL NOT DIFFER BY MORE THAN A FACTOR OF 2. IF IT DOES THEN THE VALUE OF  $K_e = 1$  WHICH WILL IMPACT THE SEPERATION DISTANCE.

NOTE: THIS LIGHTNING PROTECTION DESIGN WAS BASED ON CUSTOMER DRAWING/S: FILE NAME Digester\_tank.dwg, REVISION 0A, DATE 01/06/2019.

GENERAL INSTALLATION NOTES

- METAL BODIES OF INDUTANCE LOCATED ABOUT THE ROOF SUCH AS, METAL FLASHING, GRAVEL STOPS, ROOF DRAINS, SOIL PIPE VENTS, INSULATION VENTS, LOUVERS AND DOOR FRAMES SITUATED WITHIN THE ASSOCIATED SEPARATION DISTANCE OF A LIGHTNING CONDUCTOR OR BONDED METAL BODY, SHALL BE INTERCONNECTED TO THE LIGHTNING CONDUCTOR SYSTEM.
- TELEPHONE AND/OR ELECTRICAL SERVICE ENTRANCE GROUNDS SHALL BE INTERCONNECTED TO ONE LIGHTNING PROTECTION GROUND OR WATER PIPE.
- NO BEND OF A CONDUCTOR SHALL FORM A FINAL INCLUDED ANGLE OF LESS THAN 90° NOR SHALL HAVE A RADIUS OF BEND OF LESS THAN 20MM.
- CONDUCTORS SHALL INTERCONNECT ALL AIR TERMINALS AND SHALL FORM A TWO-WAY PATH FROM EACH AIR TERMINAL HORIZONTALLY OR DOWNWARD TO CONNECTIONS WITH GROUND TERMINALS.
- ALL HORIZONTAL LIGHTNING PROTECTION CONDUCTORS SHALL BE FASTENED NOT MORE THAN 0.5M MAXIMUM SPACING.
- CONNECTIONS TO GROUND LOOP CONDUCTOR SHALL BE MADE AT A POINT NOT LESS THAN 0.5M BELOW GRADE AND 1 METER AWAY FROM THE FOUNDATION WALL.
- FOR SAKE OF CLARITY, WE HAVE NOT LABELED EACH INDIVIDUAL ITEM OF LIGHTNING PROTECTION MATERIALS ON THE ROOF PLAN. WE HAVE SHOWN INSTALLATION DETAILS AND HAVE CALLED OUT EACH OF THESE DETAILS ON THE ROOF PLAN ONLY AT RANDOM LOCATIONS.
- BARE COPPER LIGHTNING PROTECTION MATERIALS SHALL NOT BE INSTALLED ON ALUMINUM ROOF OR SIDING OR OTHER ALUMINUM SURFACES AND VICE VERSA. ALUMINUM LIGHTNING PROTECTION MATERIALS SHALL NOT BE INSTALLED ON COPPER ROOFING OR COPPER SIDING OR OTHER COPPER SURFACES.
- THE LIGHTNING PROTECTION SYSTEM SHALL BE INSTALLED IN A NEAT AND INCONSPICUOUS MANNER SO THAT ALL COMPONENTS WILL BLEND IN WITH THE APPEARANCE OF THE BUILDING.
- ACTUAL JOB-SITE CONDITIONS MAY NECESSITATE SLIGHT ALTERATIONS IN AIR TERMINAL AND GROUND ROD LOCATIONS.
- BOND ALL METALLIC PIPES INCLUDING WATER, FIRE, GAS, SEWER, STORM, ETC. WHICH ENTER THE STRUCTURE TO THE NEAREST DOWNLEAD, GROUND ROD OR GROUND LOOP.
- SEAL ENDS OF CONDUIT MOISTURE TIGHT WITH DUCT SEAL OR LEAD WEDGE.
- THE DESIGN LAYOUT AND INSTALLATION DETAILS SHOWN HEREON SHALL MEET THE REQUIREMENTS OF THE LATEST REVISION OF THE IEC 62305 SERIES OF STANDARDS.
- VERTICAL DOWN CONDUCTOR FIXING SHALL BE INSTALED EVERY 1M FOR STRUCTURE HEIGHTS UP TO 20M AND EVERY 0.5M FOR STRUCTURE HEIGHTS ABOVE 20M.
- LIGHTNING EVENT COUNTER SHALL BE INSTALLED TO RECORD THE LIGHTNING STRIKES.

LEGEND


	NO. ISONV70 INSULATED COPPER CABLE, 7 ST., 7MM DIA., 35 SQ MM. (#2 AWG), EQUIVALENT SEPARATION DISTANCE 0.7M.
	ISONV AIR TERMINATION, 6METER TALL INCLUDING MAST
	GROUND TERMINATION

NOTES FOR ISONV CABLE SYSTEMS

NOTE: THIS DESIGN INCLUDES ONE OR MORE SEGMENTS OF THE NVENT ERGO ISONV SERIES INSULATED DOWNCONDUCTOR. THE ISONV INSULATED DOWN CONDUCTOR HAS BEEN DEVELOPED AND TESTED TO MEET THE SPECIFIC REQUIREMENTS OF THE IEC TS 62561-8. THE INSULATION ON THE ISONV INSULATED DOWN CONDUCTOR CAN BE CONSIDERED TO HAVE AN EQUIVALENT SEPARATION DISTANCE IN AIR AS DESCRIBED IN THE LEGEND OF THIS DOCUMENT.

NOTE: NO BEND OF ISONV INSULATED DOWN CONDUCTOR SHALL FORM A FINAL INCLUDED ANGLE OF LESS THAN 90 DEGREES NOR SHALL HAVE A RADIUS OF BEND OF LESS THAN 400MM.

NOTE: THE LIGHTNING PROTECTION INSTALLER AND THE AUTHORITY HAVING JURISDICTION ARE RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF THE GROUNDING AND BONDING SYSTEM THAT COMPLIES WITH THE LATEST REVISIONS OF RELEVANT NATIONAL AND INTERNATIONAL LIGHTNING PROTECTION STANDARDS.

A01	08-07-2019	Isolated LP design	MADH		
NO.	DATE:	DESCRIPTION	BY	CHK	APP
REVISIONS					
SYSTEM DESIGNER:					
PROJECT:					
ISOLATED LIGHTNING PROTECTION DESIGN FOR DIGESTER TANK					
UK					
MANUFACTURER:					
					
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JOB NO. 123456	DATE: 8-07-2019	CHK. BY: MADH	CHK. BY:	APP. BY:	DRAWING DETAILS:
SCALE AS SHOWN	Isolated LP design showing free mast installation detail.				
SHEET NO. 3	OF 3	DRAWING NO:	ISONV-LP-3		