



Wind Resource Site Commissioning Form

Site Description

Client :	Mass. Clean Energy Center (MassCEC)	Project Manager :	Lesley Dubois
Project :	Met Ocean Initiative	Form Author :	Ken Marshall
Site Name :	WHOI ASIT Tower	AWST Project Name :	16-00975 MassCEC-Offshore Wind-Met Ocean Initiative
Site ID Number:	Metocean3	Installation Date :	Sensors: 2016-11-27 & 2016-12-14
Latitude :	41.325024°N	Last Service Date :	2016-12-14
Longitude:	70.566670°W	Time of Service :	10:15
Northing in meters :	4576023	FAA light lock info:	N/A
Easting in meters :	368888	Logger lock info :	N/A
Altitude in meters :	12	Time Zone :	Eastern Time Zone
Map datum & zone :	WGS 1984 19 North	Magnetic Declination :	14.64°W
GPS type :	Trimble Geo XH	GPS Serial Number :	4624480389
Site Description : (tree types and heights, terrain details, etc. in all 8 directions)	<p>ASIT station is located approximately 2 miles southeast of Martha's Vineyard. The met tower platform sits approximately 11m above the water line, depending on tide level.</p> <p>Regional tide station: https://tidesandcurrents.noaa.gov/datums.html?units=1&epoch=0&id=8448558&name=Edgartown&state=MA</p>		
Features, Obstruction (physical and electro-magnetic, with distances)	<p>Tower and plat form structures are steel – strong magnetic interference</p> <p>Mast has significant hardware mounted on and within structure; see photos</p>		
Site access, Land owner name and contact info:	<p>Site is accessed using a vessel provided by WHOI (Woods Hole Oceanographic Institution). Tower is maintained by WHOI and WHOI personnel are needed to access tower.</p>		

Client Information

	Client Contact	Station Manager / Operator
Company :	Massachusetts Clean Energy Center (MassCEC)	Woods Hole Oceanographic Institution (WHOI)
Contact Person :	Tyler Studds	Anthony Kirincich
Address :		
Phone Number(s) :		
Cell & Fax Number :		
E-mail Address :	TStudds@MassCEC.com	akirincich@whoi.edu

Logger Information

Logger Info		Device Config – Network Info.	
Manufacturer :	Campbell Scientific, Inc	Network Interface:	RS232 to MVCO node
Type & model :	CR1000	Data storage:	CSI, NL116 to 2G compact flash card
S/N :	80677	Power Source:	MVCO node 24VDC
Power supply/regulator:	PS100 with 7Ahr 12v battery back up		
Comments	<ul style="list-style-type: none"> - Campbell Logger used for local data collection, processing, storage and interface with the balance of the MVCO data logging and processing system, located onshore. - Data transfer via MVCO link; No cell modem; - Logger access via MVCO network, or in person; Data transfer via auto FTP posting 		

Sensor Information**Wind Speed Sensors (Anemometers) –**

Channel Number :	P1 (wind_1)	P2 (wind_2)
Instrument Manufacturer :	Windsensor	RNRG
Instrument Model :	P2546A	#40C
Instrument Height (meters) :	26.7	26.7
Boom Length (meters) :	N/A	N/A
Tower Diameter at monitoring height (meters):	N/A (1)	N/A (2)
Distance from top of tower to Instrument (meters) :	3.6	3.6
Boom Arm Orientation (from tower to sensor):	345°TN	165°TN
Installation Date of Device:	2016-11-27	2016-12-14
Serial Number :	36194	274622
Calibration Date:	2016-08-21	2016-08-19
Calib. Slope (m/s/Hz) :	0.62064	0.76108
Calib. Offset (m/s) :	0.22160	0.34260
Units:	m/s	m/s
Comments :	(1) stub-mast diameter 27mm (2) stub-mast diameter 13mm	

Additional Sensors –

	Campbell Logger	MVCO Data Logger				
Channel Number :	SE1(WindDir)	airT	airP	RH	WaterT	saln
Instrument Type :	Vane	Air Temp	Air Pressure	RH	Water Temp	Salinity
Instrument Manufacturer :	RNRG	Vaisala			SeaBird	
Instrument Model :	200P				SBE37 Microcat	
Instrument Height (meters MSL) :	23.5	17.6			-4.4	
Boom Length (meters) :	N/A (3)	N/A				
Distance from top of boom to Instrument (meters) :	1.4m	N/A			N/A	
Boom Arm Orientation (from tower to sensor):	N/A (vertical mount)	N/A			Approx. 165°	
Deadband Orientation : (vanes only)	10° True	N/A			N/A	
Installation Date of Device:	2016-11-27	2013-08-01			2016-11-19	
Serial Number :	00187	V1750001				
Required vane offset for TN ref:	10° (4)	N/A			N/A	
Programmed Slope (m/s/Hz) :	360					
Programmed Offset (m/s) :	0					
Units:	Deg (°)	°C	mbar	%	°C	% of Sat.
Comments:	(3) mounted at the top of tower (4): Updated based upon vane and lidar direction data analysis, see: Dubois, L. "Wind Direction Offset Adjustments for the Metocean Initiative", 23 March 2017 WHOI Station design drawings attached. Note – Actual Diving board orientation is 255° True (indicated as 245°)					

ASIT Station

Tower Type :	Rohn RS tower mounted on ocean platform.		
Overall Tower Height :	~23.1m above water, depending on tide & sea state.	Guy Levels:	N/A
Tower face width :	1.4m	Anchor Points/Type:	3 legs mounted to ocean platform
Anchor Points Bearings:	Anchor 1	Anchor 2	Anchor 3
Position in Degrees:	75°TN	255°TN	345°TN
Comments :	Windcube V2 is mounted on the work platform on the south side of the "diving board" platform extension. See lidar commissioning form for details		

Site Photographs

Pictures were taken looking in 8 different directions (N, NE, E, SE, S, SW, W, & NW) from the base of the tower (looking out) and from outside the far anchor radius (looking towards the tower) showing the surrounding terrain features. Pictures were also taken looking up the tower from the base (from two positions) as well as zoomed in photos of the anemometry equipment at each level (when perpendicular to supporting horizontal boom arms).

General Site photo pasted below. All site Photos Posted on Project FTP & Public FTP

Project FTP Credentials: Noted on page 1

Public FTP Credentials:

- Web: <https://ftp.awstruepower.com>
- FTP: <ftp://ftp.awstruepower.com>
- Username: MassCEC_Stakeholder
- Password: s74!MC3d
 - o (sierra-Seven-Four-Exclamation-MIKE-CHARLIE-Three-delta)



Figure 1: General configuration of ASIT mast-top sensors from station platform, looking East Northeast

ASIT Station

Equipment Log – The boom heights must be marked on tower with tape and the boom orientations must be measured after each tilt down.					
Site ID #	Dates -->	2016-11-27	2016-12-24		
	Logger Type	CR1000			
	Logger S/N	80677			
	Logger time	EST			
	Units	SI			
	Tower Total Height	23.1m			
P1 (Wind_1)	Sensor – S/N	WS P2546A - 36194			
	Height	26.7			
	Boom Arm Orientation	345°TN			
	Slope	0.62064			
	Offset	0.22160			
P2 (Wind_2)	Sensor – S/N		RNRG #40C - 274622		
	Height		26.7		
	Boom Arm Orientation		165°TN		
	Slope		0.76108		
	Offset		0.34260		
SE1 (WindDir)	Sensor – S/N	Vane - 00187			
	Height	23.5			
	Sensor orient./mast	-			
	Vane deadband ref.	10°TN			
	Slope	360			
	Offset	0			

WHOI Meta Data File for WINSD Data Stream
- **SumWD_metadata_10Feb2017.txt**

Metadata file for the WINSD data stream
#####

WinSD_s files contain a merged data product from three different logged data streams captured in real time by the Martha's Vineyard Coastal Observatory (MVCO). While individual data files/archives for each data stream are available elsewhere for the raw captured product and 20-min averages of the measured parameters, a combined version using a 10-min time base for all parameters is given in WINSD.

File name convention follow the YYYYydy_WinSD_s.C14 format where:

YYYY is the calendar year
ydy is the yearday, or day of the year

Within the file, the time at the START of each 10-min averaging period is listed before the data products. Missing data is represented with 999s or 9999s. Missing averaging periods (i.e. no data from any sensors during the 10 minutes) are excluded.

The WinSD file is made each day between 00:30 and 01:00 GMT for the previous GMT day and available via the MVCO ftp server there after.

#Sensor descriptions
#####

#From WinSD

Sensor ID: Wspd1
Sensor name: P2546C-OPR Cup Anemometer, MEASNET Calibrated
s/n: 662536194
Installed height: 27.4 m above Mean Low Water
orientation bearing: 337+/-2.5 deg (from the center of the tower axis)
Units: m/s
Installation date: 11/30/2016
Installer: S. Faluotico

Sensor ID: Wspd2
Sensor name: NRP-#40C Anemometer (MEASNET Calibrated), AC Output,
s/n: 274622
Installed height: 27.4 m above Mean Low Water
orientation bearing: 157+/-2.5 deg (from the center of the tower axis)
Units: m/s
Installation date: 12/14/2016
Installer: S. Faluotico

Sensor ID: Wdir1
Sensor name: NRG #200P Wind Direction Sensor
s/n: 1799-0000187
Installed height: 24.2 m above Mean Low Water
Units: degrees from True North
Convention: Wind direction from (meteorological convention)
Installation date: 11/30/2016
Installer: S. Faluotico

ASIT Station

#####

#From vais

Sensor name: Vaisala P/T/RH Sensor
 s/n: V1750001
 Calibration date: ?
 Calibration org: Vaisala
 Installed height: 18 m above Mean Low Water
 airT_Units: degC
 airP_Units: mBar
 RH_Units: %
 Installation date: 8/1/2013
 Installer: H. Popeneo

#####

#From ctd_s

Sensor ID: CTD
 Sensor name: SeaBird SBE37 MicroCat
 s/n: ?
 Calibration date: 8/2016
 Calibration org: Seabird
 Installed depth: 4 m below Mean Low Water
 Temperature Units: degC
 Salinity Units: PSU
 Installation date: 11/19/2016
 Installer: A. Shalapyonok

#####

File format: Columns in the SumWD_s data files:

#####

Column #	Field	Units
1	Year	years (at the start of the averaging period)
2	Julian day	decimal days, where 1.5 is noon on January 1
3	Month	months (at the start of the averaging period)
4	Day	day (at the start of the averaging period)
5	Hour	hours (at the start of the averaging period)
6	Minute	minutes (at the start of the averaging period)
7	Second	seconds (at the start of the averaging period)
8	Wspd1_winsd_mean	m/s
9	Wspd1_winsd_std	m/s
10	Wspd1_winsd_min	m/s
11	Wspd1_winsd_max	m/s
12	Wspd2_winsd_mean	m/s
13	Wspd2_winsd_std	m/s
14	Wspd2_winsd_min	m/s
15	Wspd2_winsd_max	m/s
16	Wdir_winsd_mean	degrees from True North (direction from: meteorological convention)
17	Wdir_winsd_std	degrees
18	Wdir_winsd_min	degrees from True North
19	Wdir_winsd_max	degrees from True North

ASIT Station

20	wind_winsd_len	% data return for burst
21	airT_vais_mean	degrees Celsius
22	airT_vais_std	degrees Celsius
23	airT_vais_min	degrees Celsius
24	airT_vais_max	degrees Celsius
25	airP_vais_mean	mbar
26	airP_vais_std	mbar
27	airP_vais_min	mbar
28	airP_vais_max	mbar
29	RH_vais_mean	% of saturation
30	RH_vais_std	% of saturation
31	RH_vais_min	% of saturation
32	RH_vais_max	% of saturation
33	air_vais_len	% data return for burst
34	waterT_ctd_mean	degrees Celsius
35	waterT_ctd_std	degrees Celsius
36	waterT_ctd_min	degrees Celsius
37	waterT_ctd_max	degrees Celsius
38	saln_ctd_mean	PSU (practical salinity unit)
39	saln_ctd_std	PSU (practical salinity unit)
40	saln_ctd_min	PSU (practical salinity unit)
41	saln_ctd_max	PSU (practical salinity unit)
42	water_ctd_len	% data return for burst

#Data from Woods Hole Oceanographic - Marthas Vineyard Coastal Observatory - Win3D

ASIT CR1000 Program- **Anthony_K_Campbell_6.CR1**

```

'CR1000
'Created by Short Cut (3.2)
'Modified by Steve Faluotico October 2016
'Program name: Anthony_K_Campbell_2.CR1
'The baud rate is 9600 N81
'BattV      Battery Voltage in volts
'PTemp_C    Temperature of logger in C
'Wind_1     Wind Sensor P2546c-OPR in m/s read on channel P1
'Wind_2     NRG #40C Anemometer in m/s read on channel P2
'WindDirNRG 200P Direction Vane in degrees read on channel 1H
,
PipeLineMode
,
Const COMPRT = COM2          'set rs232 com port2
,
'Public BattV
'Public PTemp_C
Public wind_1
Public wind_2
Public WindDir
Public datastr As String * 100
Public rTime(9) 'declare as public and dimension rTime to 6
,
Alias rTime(1) = Year 'assign the alias Year to rTime(1)
Alias rTime(2) = Month 'assign the alias Month to rTime(2)
Alias rTime(3) = DOM 'assign the alias Day to rTime(3)
Alias rTime(4) = Hour 'assign the alias Hour to rTime(4)
Alias rTime(5) = Minute 'assign the alias Min to rTime(5)
Alias rTime(6) = Second 'assign the alias Sec to rTime(6)
Alias rTime(7) = uSecond 'assign the alias uSecond to rTime(7)
Alias rTime(8) = WeekDay 'assign the alias WeekDay to rTime(8)
Alias rTime(9) = DOY 'assign the alias Day_of_Year to rTime(9)
,
'Units BattV=Volts
'Units PTemp_C=Deg C
Units wind_1=meters/Second
Units wind_2=meters/Second
Units WindDir=degrees
,
.....
'Define Data Tables
.....
DataTable(Wind,True,-1)
    DataInterval(0,1,sec,10)
    TableFile("CRD:Wind_Data",64,-1,0,20,min,0,0)
    Average(1,wind_1,FP2,False)
    Average(1,wind_2,FP2,False)
    Average(1,WindDir,FP2,False)
    WindVector(1,wind_1,WindDir,FP2,False,0,0,0)
    FieldNames("wind_1_S_WVT,WindDir_D1_WVT,WindDir_SD1_WVT")
EndTable
.....
'Main Program
.....

```

ASIT Station

```
BeginProg
  SerialOpen(COMPR,9600,3,0,50)          'open serial output for port #2 9600 n81
  SerialFlush(COMPR)                    'clear serial port #2
  Scan(1,Sec,1,0)                       'Set scan rate to 1 Hz
  RealTime(rTime)                       'Get date and time
  'Battery(BattV)                       'Default CR1000 Datalogger Battery Voltage measurement
'BattV'
  'PanelTemp(PTemp_C,_60Hz)             'Default CR1000 Datalogger Wiring Panel Temperature
measurement 'PTemp_C'
  PulseCount(wind_1,1,1,1,1,0.62064,0.2216)  'P2546A Wind Speed Sensor measurements 'wind_1'
  If wind_1<=0.2216 Then wind_1=0
  PulseCount(wind_2,1,2,1,1,0.765,0.35)      'NRG #40 Wind Speed Sensor measurements 'wind_2'
  If wind_2<0.36 Then wind_2=0
  BrHalf(WindDir,1,mV2500,1,1,1,2500,True,20000,_60Hz,360,0)  'NRG #200P Wind Direction Sensor
measurements 'WindDir'
  If WindDir>=360 OR WindDir<0 Then WindDir=0
  CallTable Wind                          'Call Data Tables to store wind data
  GetRecord(datastr,Wind,1)
  SerialOut (COMPR,datastr,0,0,0)
  NextScan
EndProg
.....
```

WHOI ASIT Metocean Data Structures Summary

MVCO_ASIT_metoceandatastructures_v02102017.docx

Within the MVCO data structures, data coming from the Metocean Campbell logger, which logs the two cup anemometers and the wind vane installed as part of the MassCEC-funded initiative is referred to by the identifier:

winSD

WinSD data products are available for the (1) raw 1-Hz data stream captured by MVCO servers and a 20-min averaged result, following the MVCO conventions. The 1-Hz data stream is available upon request, via ftp, while the 20-min averaged MVCO format results for the winSD can be found at:

<http://mvcodata.whoi.edu/jg/dir/mvco/>

For the MetOcean data collection campaign, each day a separate data product is made using a 10-min averaging time that combines the raw **winSD** data with the raw meteorological data logged by **vais_s** and **ctd_s** to form a combined product of all sensors on a 10-min time base. This data product:

SumWD_s

Is available at:

ftp://mvcodata.whoi.edu/pub/mvcodata/data/SumWD_s

using an anonymous (or guest) login from the start of the campaign (11/30/2016) and is updated daily. The metadata file for the **SumWD** data file is available

ftp://mvcodata.whoi.edu/pub/mvcodata/data/formats/SumWD_s.C99.txt

however a more complete version containing detailed sensor and file information will be distributed separately.

Svend Ole Hansen ApS

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 TEL: (+45) 33 25 38 38 · WWW.SOHANSEN.DK



WIND
ENGINEERING
FLUID
DYNAMICS

CERTIFICATE FOR CALIBRATION OF CUP ANEMOMETER

Certificate number: 16.02.02963

Date of issue: August 23, 2016

Type: WindSensor P2546C-OPR Cup Anemometer **Serial number:** 36194

Manufacturer: WindSensor, Nyvang 6, DK-4000 Roskilde, Denmark

Client: WindSensor, Nyvang 6, DK-4000 Roskilde, Denmark

Anemometer received: August 17, 2016

Anemometer calibrated: August 21, 2016

Calibrated by: mmm

Procedure: MEASNET, referring to IEC 61400-12-1

Certificate prepared by: ca

Approved by: Calibration engineer, rgs

Calibration equation obtained: $v \text{ [m/s]} = 0.62064 \cdot f \text{ [Hz]} + 0.22160$

Robin Sørensen

Standard uncertainty, slope: 0.00067

Standard uncertainty, offset: 0.03173

Covariance: -0.0000028 (m/s)²/Hz

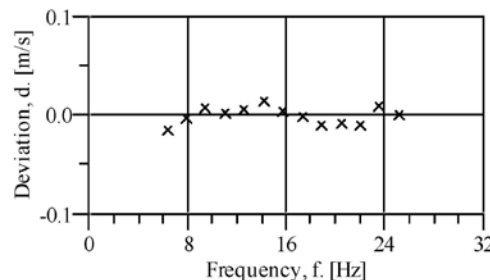
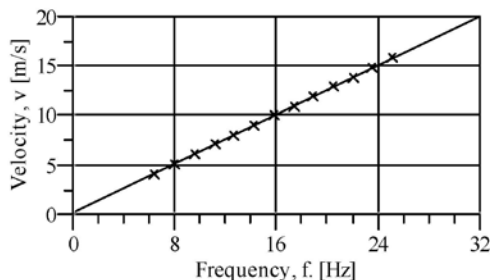
Coefficient of correlation: $\rho = 0.999998$

Absolute maximum deviation: 0.014 m/s at 9.042 m/s

Barometric pressure: 1013.8 hPa

Relative humidity: 34.7%

Succession	Velocity pressure, q. [Pa]	Temperature in wind tunnel [°C]	Temperature in control room [°C]	Wind velocity, v. [m/s]	Frequency, f. [Hz]	Deviation, d. [m/s]	Uncertainty u _c (k=2) [m/s]
2	9.99	30.3	24.6	4.155	6.3603	-0.014	0.021
4	15.38	30.2	24.6	5.154	7.9527	-0.003	0.025
6	21.70	30.1	24.6	6.122	9.4938	0.008	0.029
8	29.28	30.1	24.5	7.111	11.0963	0.002	0.033
10	37.65	30.0	24.5	8.062	12.6231	0.006	0.037
12	47.37	30.0	24.5	9.042	14.1898	0.014	0.042
13-last	58.25	29.9	24.5	10.026	15.7900	0.005	0.046
11	69.90	30.0	24.5	10.984	17.3429	-0.001	0.051
9	82.13	30.0	24.5	11.908	18.8440	-0.009	0.055
7	96.72	30.1	24.5	12.923	20.4782	-0.008	0.060
5	111.75	30.1	24.6	13.893	22.0420	-0.009	0.064
3	127.76	30.2	24.6	14.856	23.5652	0.009	0.068
1-first	145.10	30.3	24.6	15.835	25.1564	0.000	0.073



EQUIPMENT USED

Serial number	Description
-	Boundary layer wind tunnel.
1256	Control cup anemometer.
-	Mounting tube, D = 25 mm
t2	PT100 temperature sensor, wind tunnel.
t1	PT100 temperature sensor, control room.
9904031	PPC500 Furness pressure manometer
X4650038	HMW71U Humidity transmitter
X4350042	PTB100AVaisala analogue barometer.
PS1	Pitot tube
HB2835279	Computer Board. 16 bit A/D data acquisition board.
-	PC dedicated to data acquisition.

Traceable calibrations of the equipment are carried out by external accredited institutions: Furness (PPC500) and Exova Metech. A real-time analysis module within the data acquisition software detects pulse frequency.

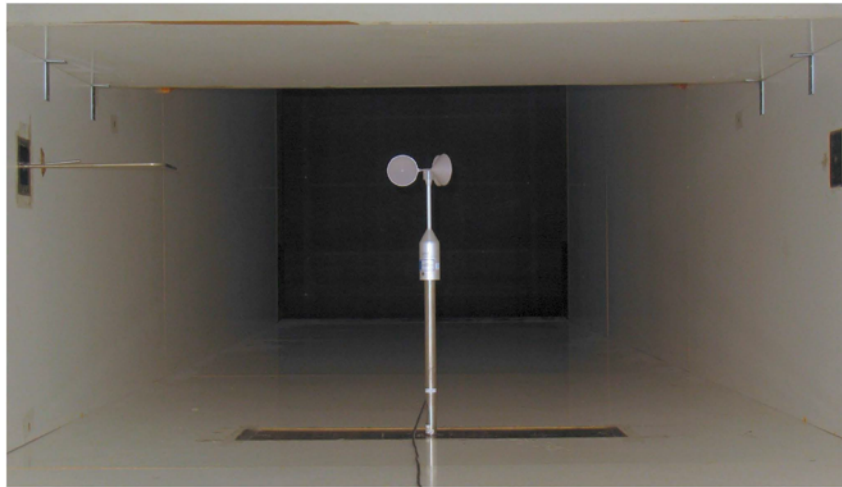


Photo of the wind tunnel setup ($h \times b = 0.85 \times 1.75$ m). The shown anemometer is of the same type as the calibrated one.

UNCERTAINTIES

The documented uncertainty is the total combined uncertainty at 95% confidence level ($k=2$) in accordance with EA-4/02. The uncertainty at 10 m/s comply with the requirements in the MEASNET procedure that prescribes an absolute uncertainty less than 0.1 m/s at a mean wind velocity of 10 m/s, that is 1%. See Document 97.00.004 "MEASNET - Test report on the calibration campaign" for further details.

Certificate number: 16.02.02963

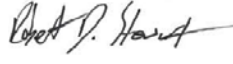


SOH Wind Engineering LLC

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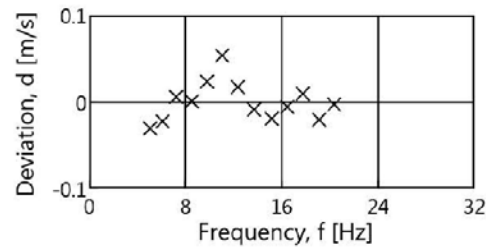
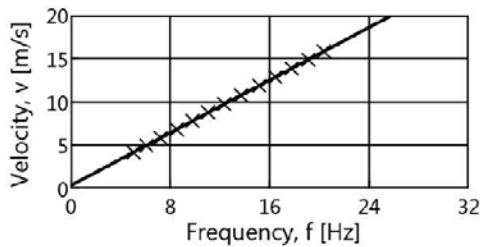
CERTIFICATE FOR CALIBRATION OF CUP ANEMOMETER

Certificate number: 16.US2.09747 **Date of issue:** August 19, 2016
Type: RNRG 40C Anemometer **Serial number:** 179500274622
Manufacturer: Renewable NRG Systems Inc, 110 Riggs Road, Hinesburg, VT 05461, USA
Client: Renewable NRG Systems Inc, 110 Riggs Road, Hinesburg, VT 05461, USA
Anemometer received: August 17, 2016 **Anemometer calibrated:** 07:57 August 19, 2016
Calibrated by: mej **Procedure:** MEASNET, IEC 61400-12-1:2005(E) Annex F
Certificate prepared by: Software Revision 7 **Approved by:** Calibration engineer, rds

Calibration equation obtained: $v \text{ [m/s]} = 0.76108 \cdot f \text{ [Hz]} + 0.34263$ 

Standard uncertainty, slope: 0.00178 **Standard uncertainty, offset:** 0.05314
Covariance: -0.0000230 (m/s)²/Hz **Coefficient of correlation:** $\rho = 0.999983$
Absolute maximum deviation: 0.054 m/s at 8.806 m/s
Barometric pressure: 1003.1 hPa **Relative humidity:** 49.2%

Succession	Velocity pressure, q, [Pa]	Temperature in wind tunnel, [°C]	Temperature in d.p. box, [°C]	Wind velocity, v, [m/s]	Frequency, f, [Hz]	Deviation, d, [m/s]	Uncertainty u_c (k=2) [m/s]
2	9.99	28.6	28.2	4.169	5.0672	-0.031	0.024
4	14.13	28.6	28.2	4.958	6.0931	-0.022	0.025
6	19.64	28.6	28.2	5.845	7.2219	0.006	0.027
8	26.81	28.6	28.2	6.829	8.5212	0.001	0.029
10	35.16	28.6	28.2	7.820	9.7939	0.024	0.032
12	44.59	28.6	28.2	8.806	11.0494	0.054	0.035
13-last	54.80	28.5	28.2	9.762	12.3534	0.017	0.038
11	66.58	28.6	28.2	10.761	13.7011	-0.009	0.041
9	80.96	28.6	28.2	11.867	15.1678	-0.019	0.045
7	95.15	28.6	28.2	12.866	16.4625	-0.006	0.048
5	110.51	28.6	28.2	13.867	17.7578	0.009	0.052
3	127.06	28.6	28.2	14.870	19.1141	-0.020	0.055
1-first	144.08	28.5	28.2	15.833	20.3573	-0.003	0.058



AC-1746



EQUIPMENT USED

Serial Number	Description
Njord 2	Wind tunnel, blockage factor = 1.002
13924	Control cup anemometer
-	Mounting tube, D = 12.7 mm
TT001	Summit RT-AUI, wind tunnel
TP001	Summit RT-AUI, differential pressure box
DP007	Setra Model 239 pressure transducer
HY002	Dwyer Instruments RHP-2D20 humidity transmitter
BP003	Setra Model 278 barometer
PL3	Pitot tube
XB001	Computer Board. 16 bit A/D data acquisition board
66GSPS1	PC dedicated to data acquisition

Traceable calibrations of the equipment are carried out by external accredited institutions: Atlantic Scale, Esseo Calibration Labs & Furness Controls. A real-time analysis module within the data acquisition software detects pulse frequency.

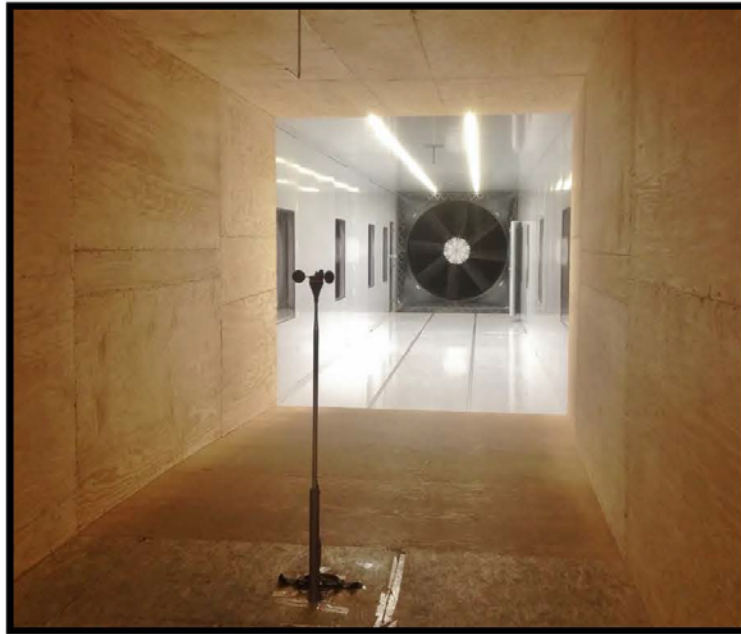
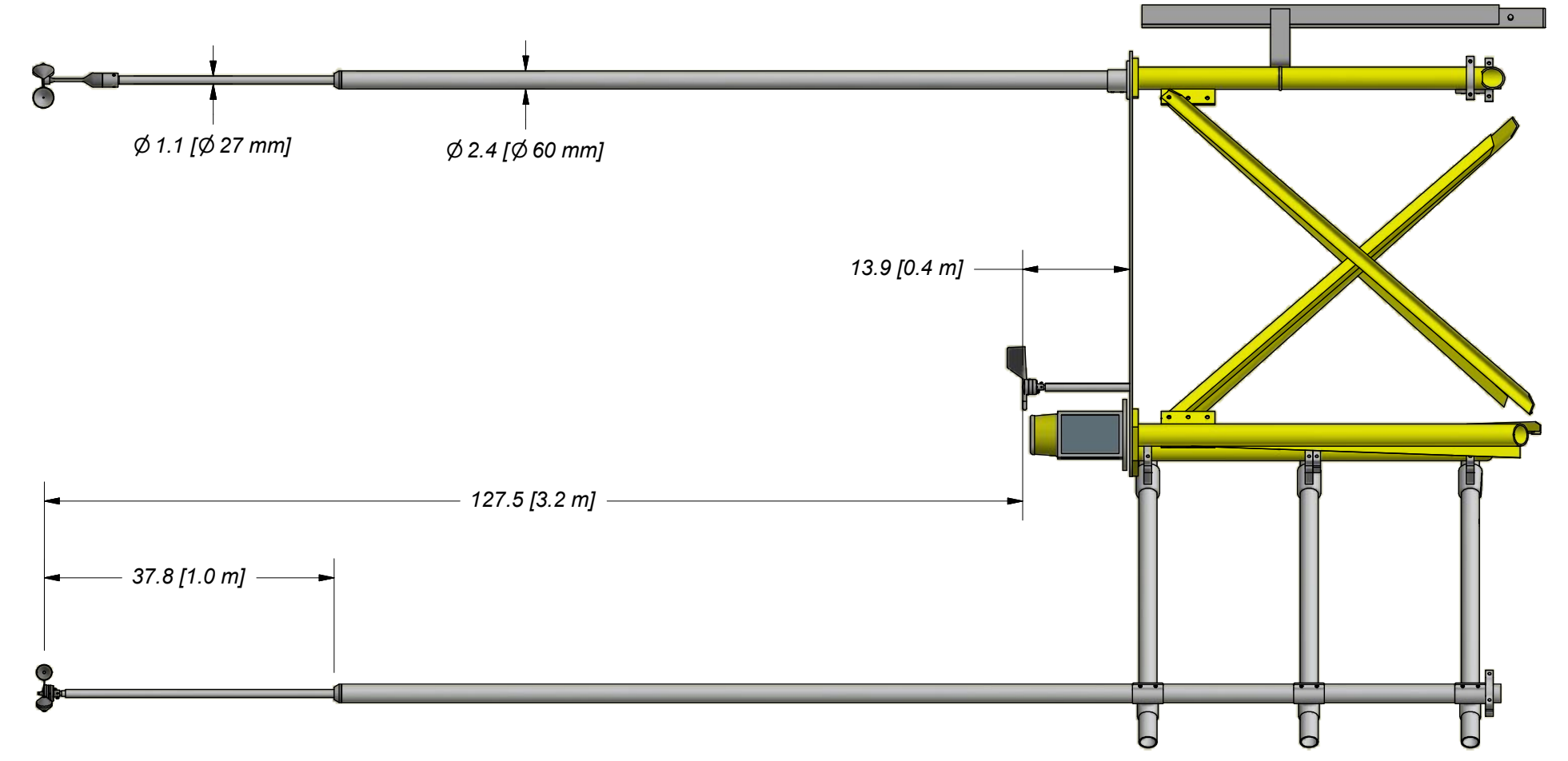
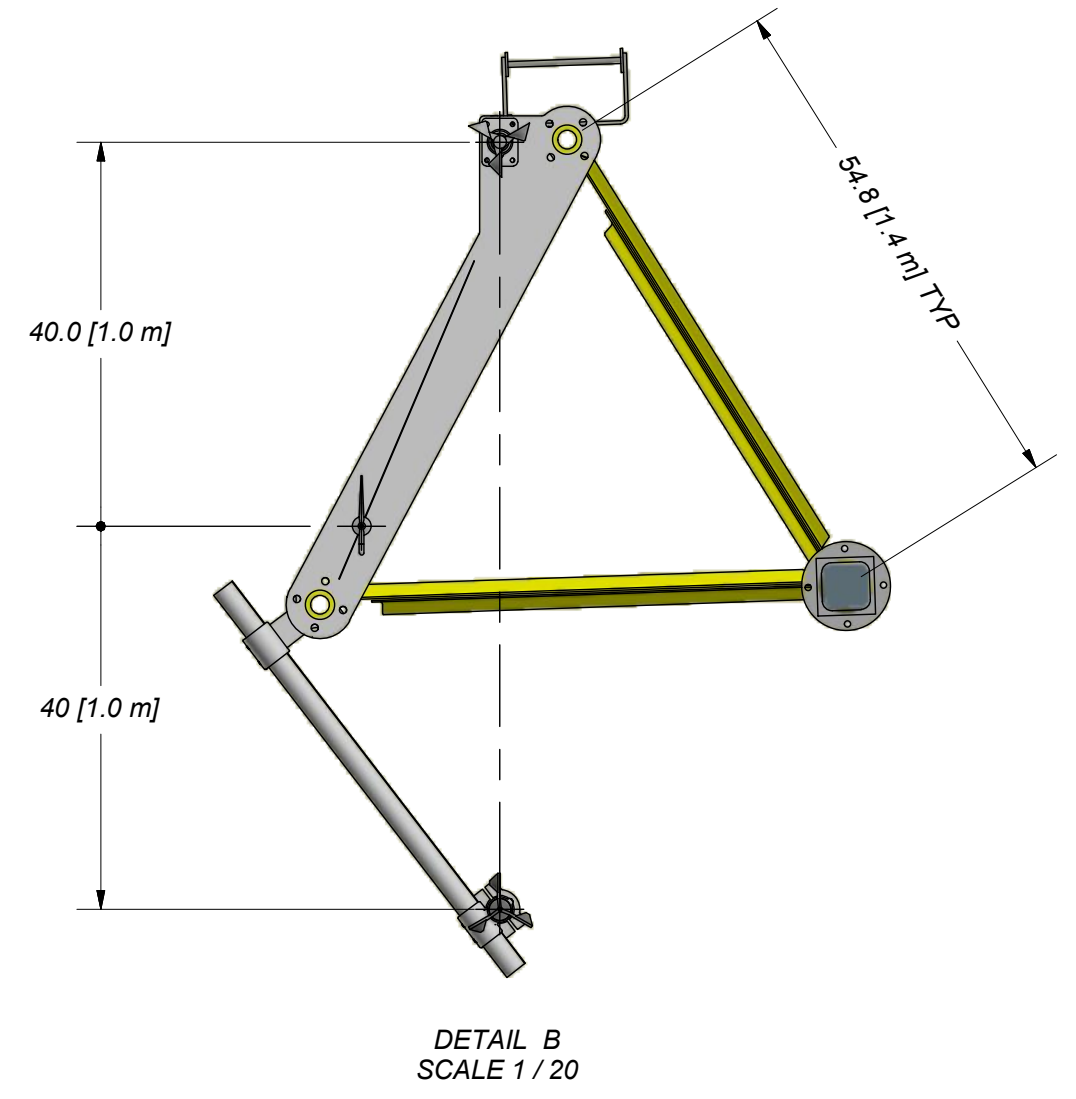
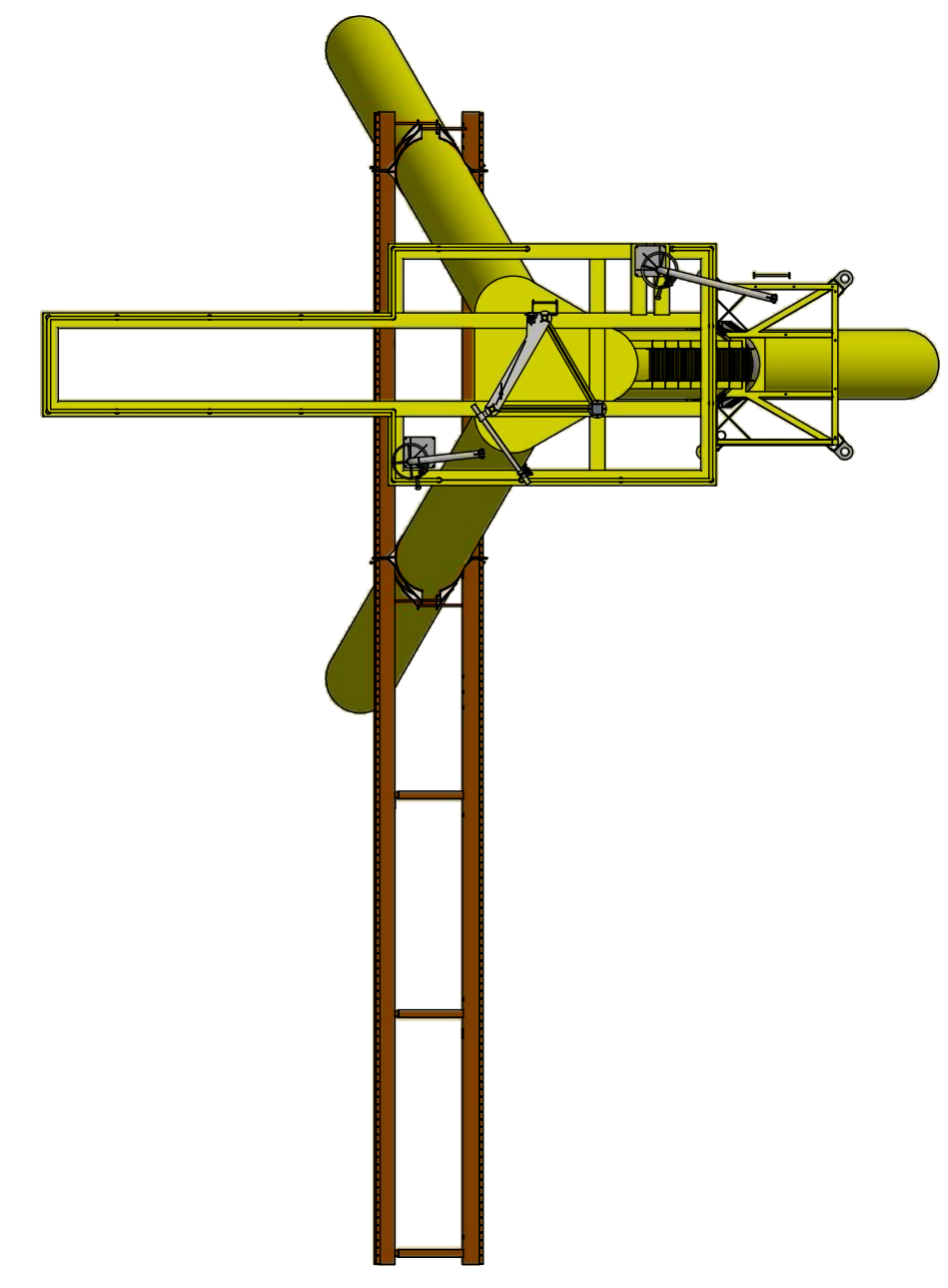
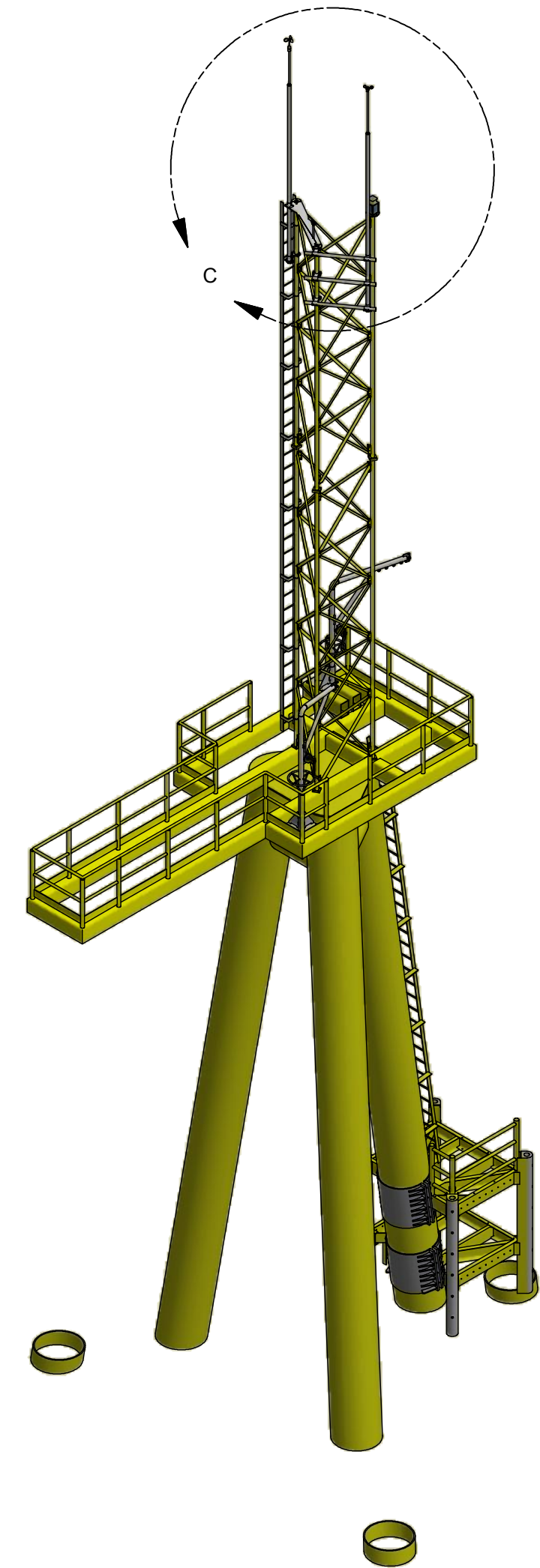
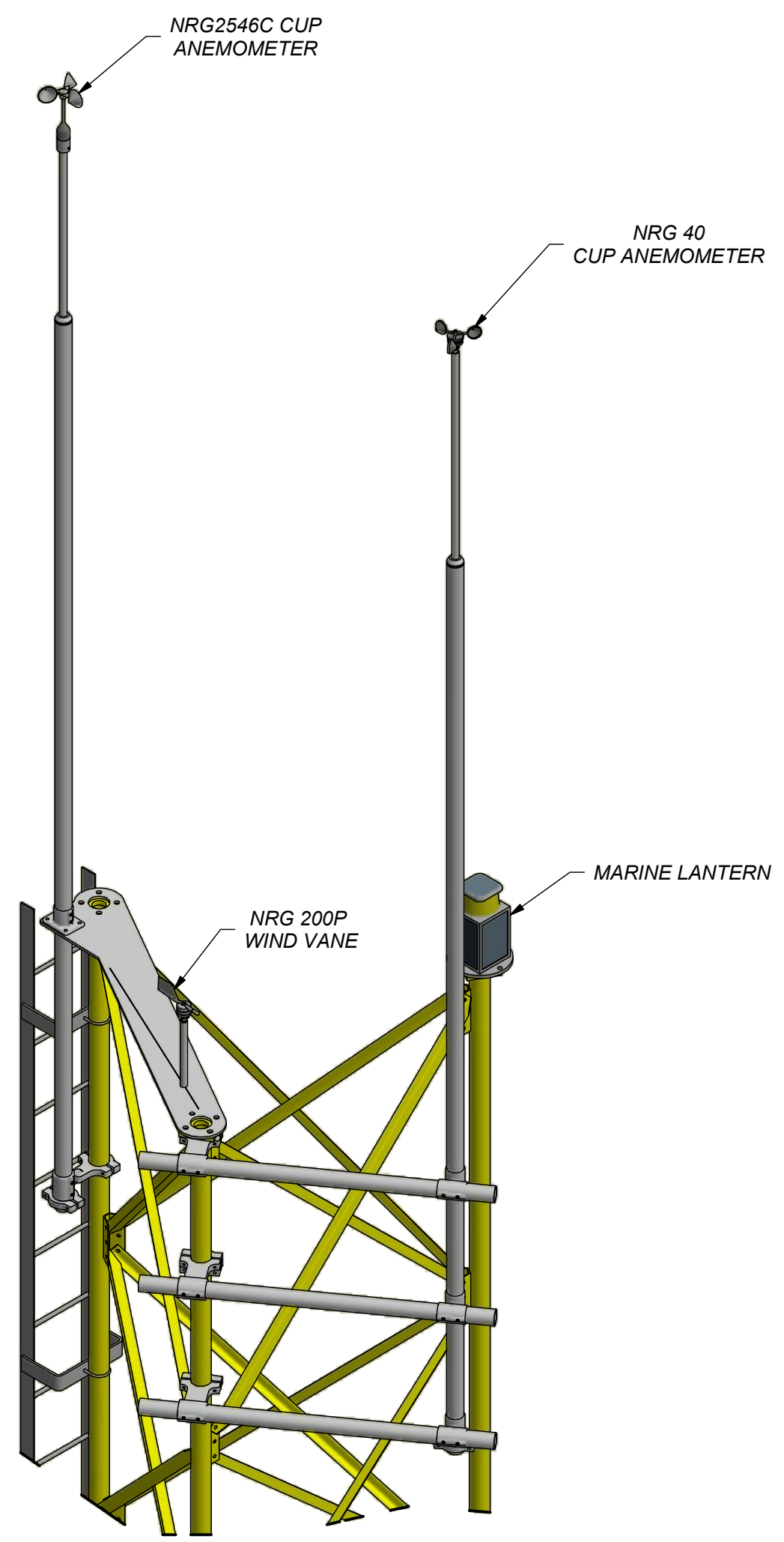


Photo of the wind tunnel setup. The cross-sectional area is 2.5 x 2.5 m.

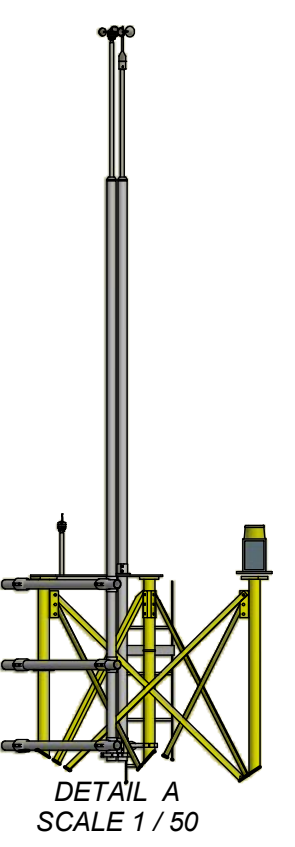
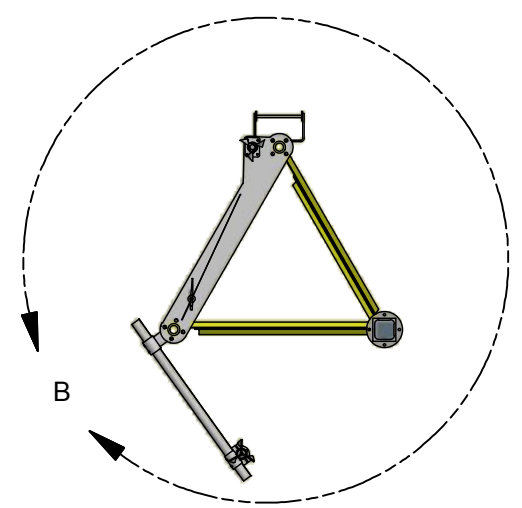
UNCERTAINTIES

The documented uncertainty is the total combined uncertainty at 95% confidence level ($k=2$) in accordance with EA-4/02. The uncertainty at 10 m/s comply with the requirements in the IEC 61400-12-1:2005 procedure. See Document US.12.01.004 for further details.

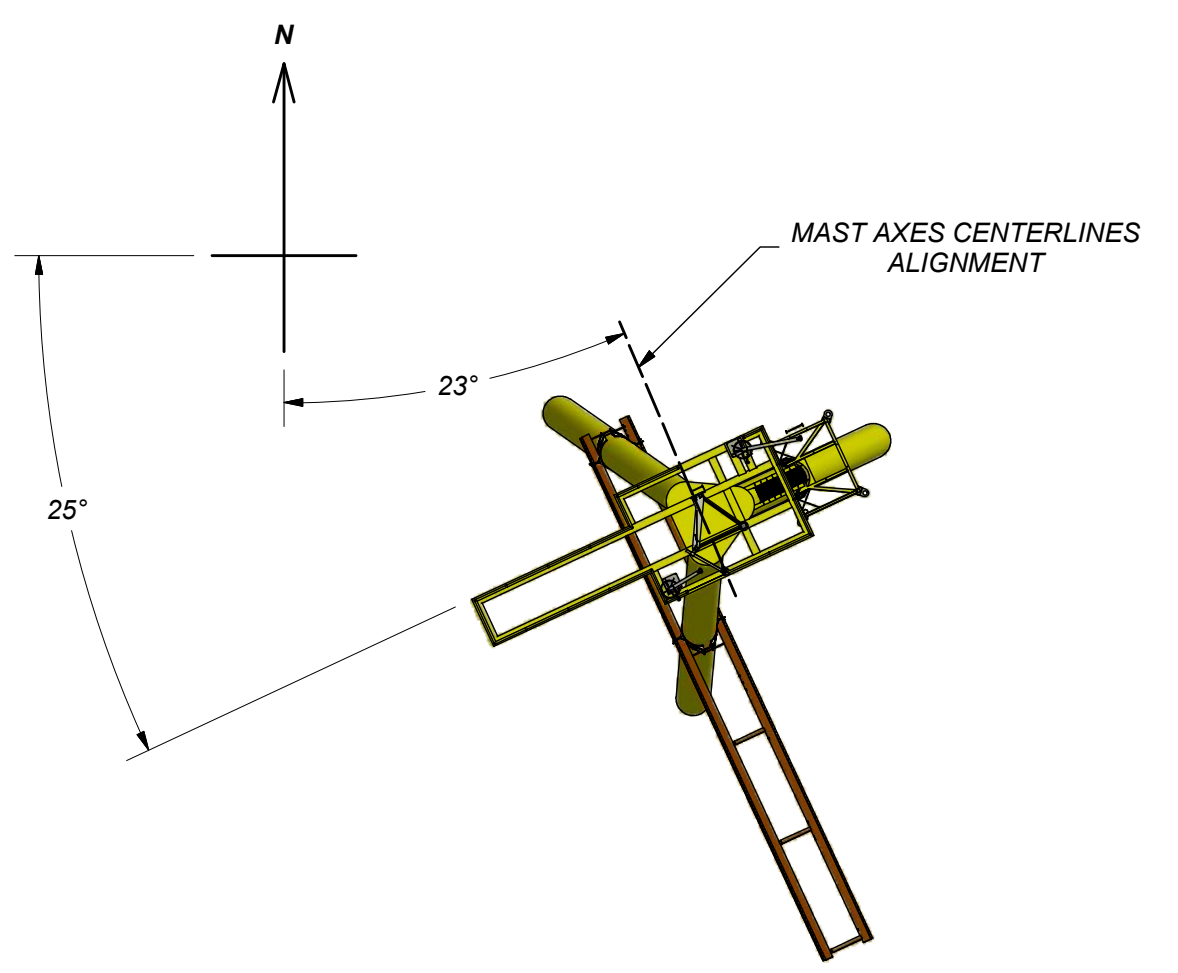
Certificate number: 16.US2.09747



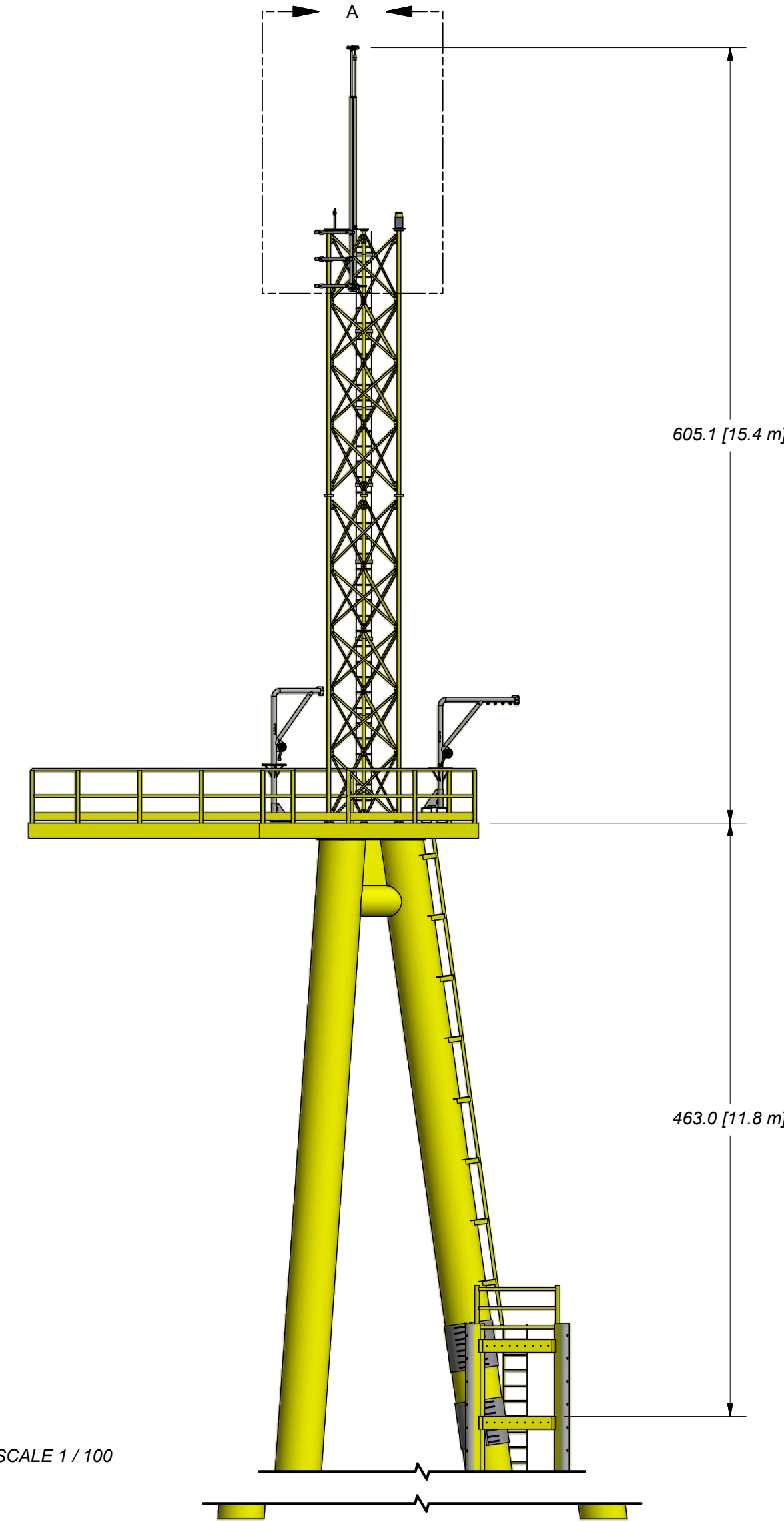
DETAIL C
SCALE 1 / 20



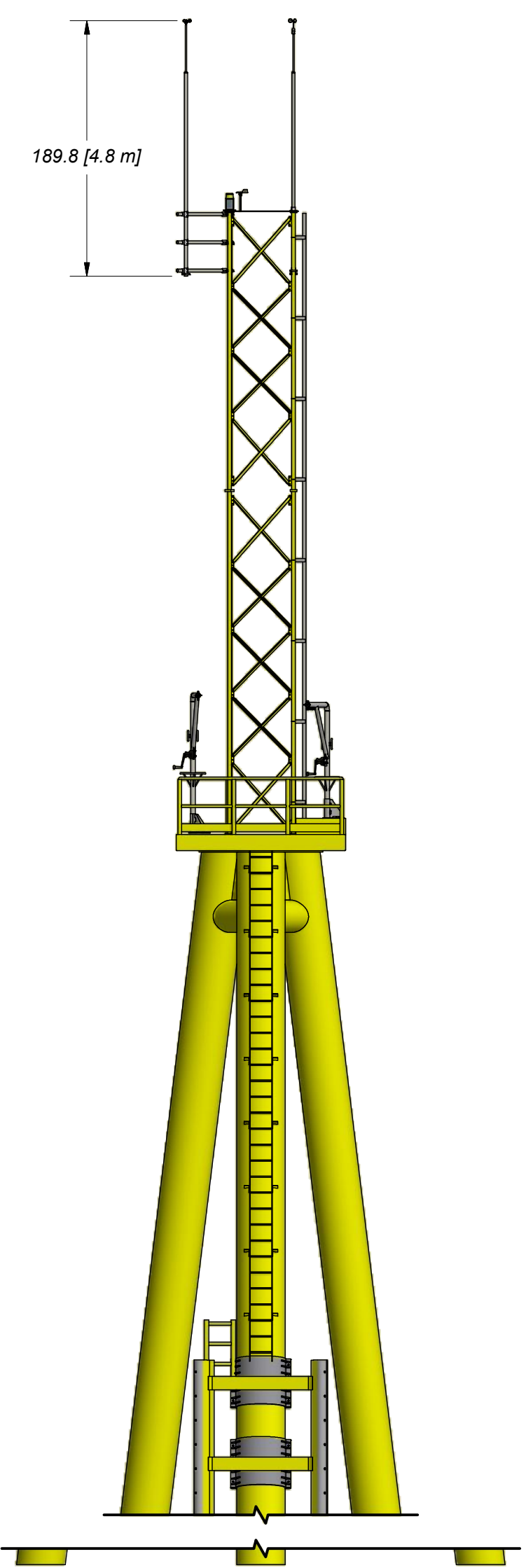
DETAIL A
SCALE 1 / 50



SCALE 1 / 200



SCALE 1 / 100



UNLESS OTHERWISE NOTED: DIMENSIONS IN INCHES TOLERANCES:		DESIGN	DATE	WOODS HOLE OCEANOGRAPHIC INSTITUTION APPLIED OCEAN PHYSICS & ENGINEERING 86 WATER STREET, WOODS HOLE, MA, 02543
DECIMAL	ANGULAR	J. SISSON	10/19/2015	
xx ± 0.01	± 1.0 deg	ENGINEER		TITLE
xxx ± 0.005		CHECKED		MET OCEAN
MATERIAL		WORK ORDER		SIZE
SEE APPLICABLE NOTES		PROJECT		D
FILE				DWG NO
metocean3.dwg				metocean3
				REV
				1