Bazet, February 13th 2018

TEST REPORT N° 1897a-18

CORONA TEST ON B380 BALISOR SYSTEM FOR 380 kV LINE

This test report replaces and cancels the test report N° 1897-17

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Test Supervisor

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Laboratory Manager

Test ref.: 4292

Customer: OBSTA (Reims, France).

The tests were performed in Centre d'Essais de Bazet (France) on November 21st 2017 and were witnessed by Mr Alban Royer and Mr Benjamin Filleul (Obsta, France).

CONTENTS

PHOTO OF THE MOUNTING ARRANGEMENT

1 – TESTED MATERIAL

B380 balisor system manufactured by Obsta (Reims, France).

See Obsta drawing N° CO.9705 Rev. B on page 7
See photo on page 8

2 – TYPE OF TEST

- Corona

3 – SPECIFICATION

- IEC 60060-1/ 2010

4 – UNCERTAINTY OF MEASUREMENT

With a 95% interval confidence

$V_{peak} / \sqrt{2}$ (kV)	< 3 %
Pa (hPa)	< 2 hPa
T (°C)	< 1 °C
Hr (%)	< 2 %Hr
Dimensions (m)	< 1 %

The test results and declaration of compliance are given without taking into account the measurement uncertainties shown above.

5 – TEST CIRCUIT

See LTHT 3357 on page 6

Voltage circuit calibration

The HAEFELY damped capacitive divider 4000 kV was checked with the FLUKE voltage calibrator 5500 and 5725 A type, calibrated by FLUKE, RvA accredited laboratory.

Certificates N° 1722708A & 1722709A of September 13th 2016, validity 2 years

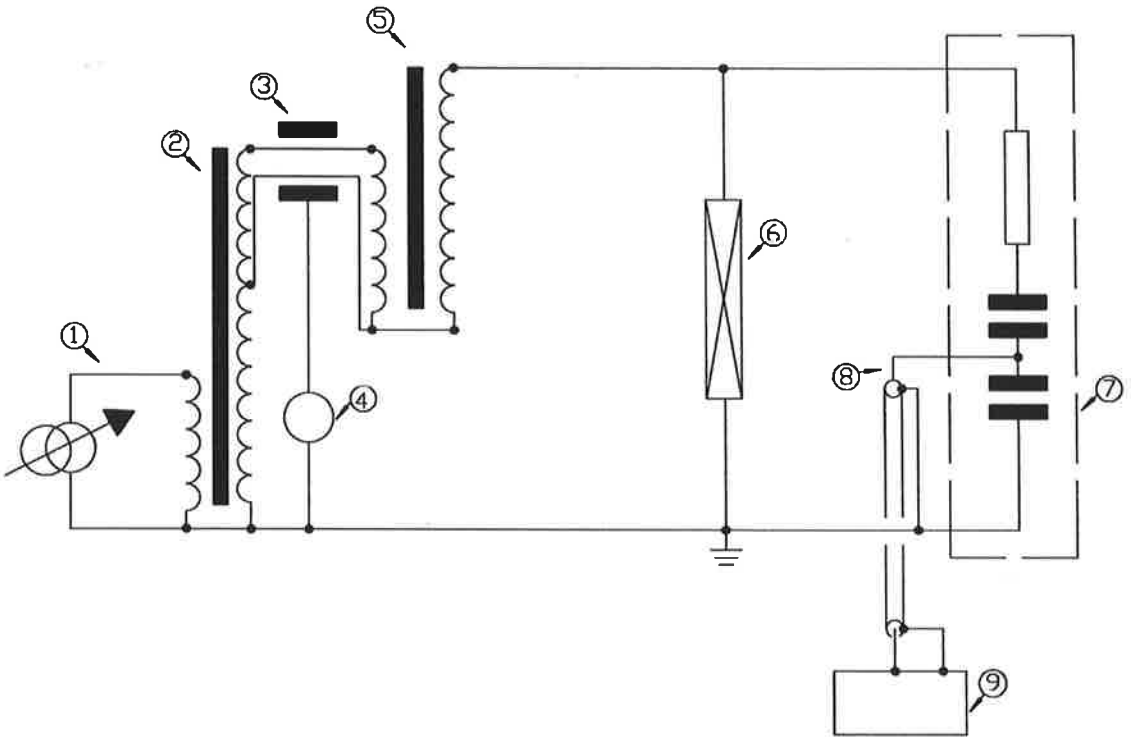
The HAEFELY voltmeter DMI 551 type used was also checked with the FLUKE voltage calibrator 5500 type.

6 – CORONA PROCEDURE

The Corona test is performed in complete darkness.
After 5 minutes, allowing the observer's eyes to be accustomed to the darkness conditions, the voltage is increased to the inception level of negative and positive corona.
The voltage is then increased to 291 kV (120% U_m*).
The voltage is then decreased until extinction level of negative and positive corona.
At inception and extinction levels, the voltage level is noted.
Corona photos are taken at 120% U_m and at total extinction.

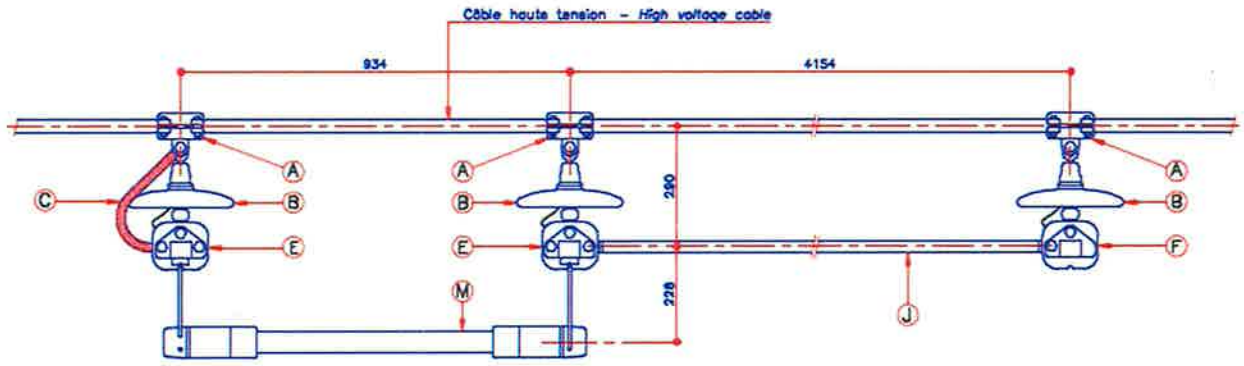
** with $U_m = 420/\sqrt{3} = 242$ kV*

CIRCUIT D'ESSAI A FREQUENCE INDUSTRIELLE
POWER FREQUENCY TEST CIRCUIT



1 - Varivolt BERNARD & BONNEFOND : 0 - 1250 V / 1200 kVA
BERNARD & BONNEFOND varivolt : 0 - 1250 V / 1200 kVA
2 - Transformateur n°1 METROPOLITAN-VICKERS : 650 kV
METROPOLITAN-VICKERS transformer n°1 : 650 kV
3 - Prise capacitive
Capacitive plug
4 - Voltmètre de crête / $\sqrt{2}$
Peak / $\sqrt{2}$ voltmeter
5 - Transformateur n°2 METROPOLITAN-VICKERS : 650 kV
METROPOLITAN-VICKERS transformer n°2 : 650 kV
6 - Objet en essai
Test sample
7 - Diviseur HAEFELY capacitif amortif : 4 MV (C : 200 pF - R : 300 Ω)
HAEFELY damped capacitive divider : 4 MV (C : 200 pF - R : 300 Ω)
8 - Câble coaxial
Coaxial cable
9 - Voltmètre de crête / $\sqrt{2}$
Peak / $\sqrt{2}$ voltmeter

Bazet, 23/11/2017
LTHT 3357



Tension de ligne: ⩾ 360 kV.
Intensité lumineuse ⩾ 10 Cd.
Lumière rouge aviation.
Recommandé par l'OACI (aérodromes)
4ème partie – Aides visuelles à la navigation.

Line voltage: ⩾ 360 kV.
Luminous intensity ⩾ 10 Cd.
Aviation red light.
ICAO Recommended (aerodrome design manual)
Part 4 – Visual aids.

All dimensions are in mm.

COMPOSITION DU BALISOR B380
B380 BALISOR COMPONENTS

REPERE *REFERENCE*	QUANTITE *QUANTITY*	CODE *PART NUMBER*	DESIGNATION *DESIGNATION*	POIDS en Kg *WEIGHT in Kg*
A	3	00637	MACHOIRE EQUIPEE * *CLAMP •*	0,850
B	3	00621	ISOLATEUR EQUIPE *INSULATOR*	3,500
C	1	00636	TRESSE DE SHUNTAGE *SHUNT BRAID*	0,100
E	2	00631	PALONNIER PORTEUR LAMPE *LAMP HOLDER*	2,000
F	1	00632	PALONNIER PORTEUR DERIVE *AUXILIARY TUBING HOLDER*	1,350
J	1	00623	ELEMENT CAPACITIF *AUXILIARY TUBING*	1,900
M	1	00618	LAMPE B *B LAMP*	4,700

* Le diamètre de la ligne à baliser nous est indispensable pour honorer toute commande.
* When order, please state the cable diameter.

INDICE	DATE	NATURE DE LA MODIFICATION
B	08.03.01	Tension de ligne: de 380 à 500 kV devient ⩾ 360 kV.
A	03.09.98	Tension de ligne: de 380 à 400 kV devient 380 à 500 kV.

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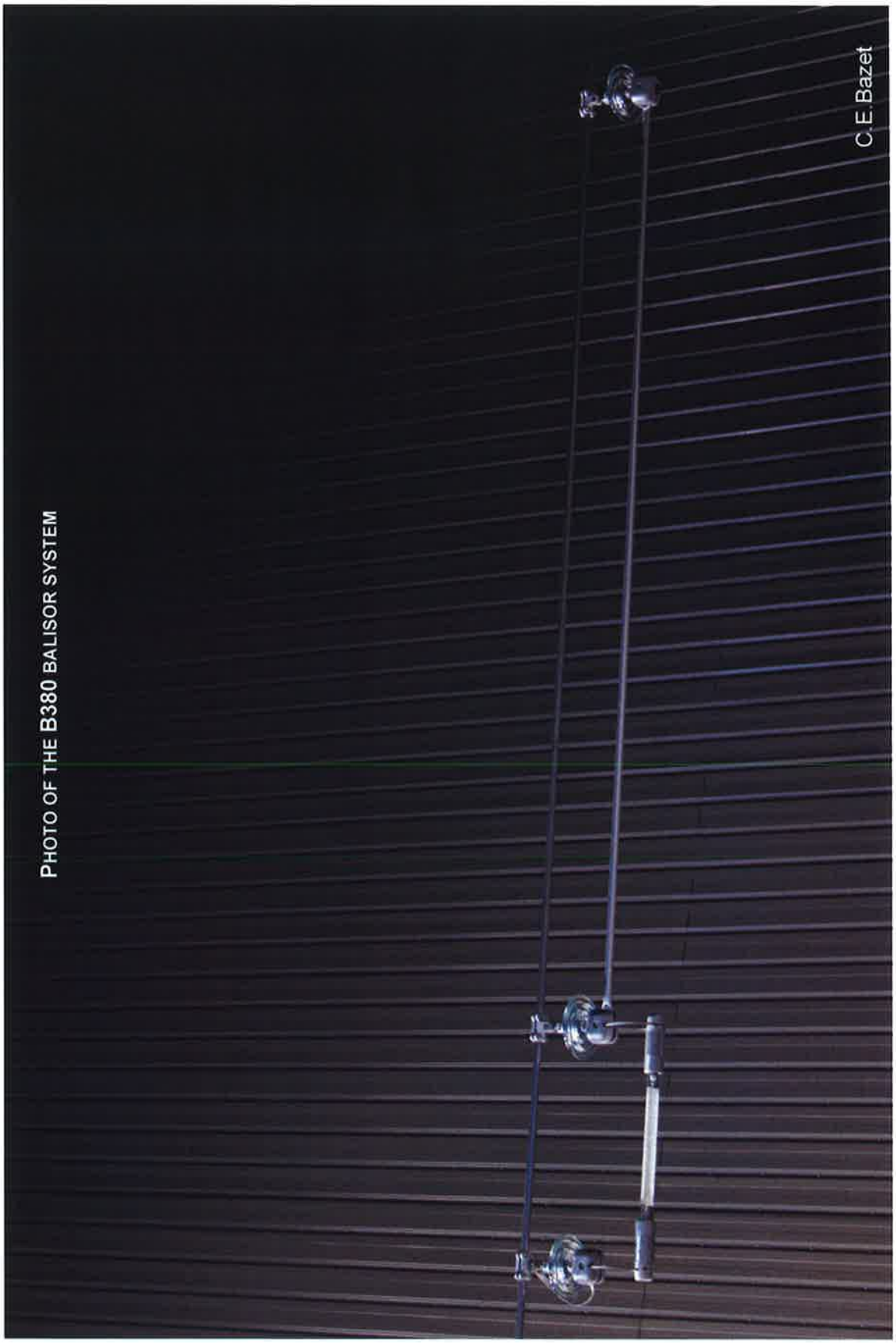
ENSEMBLE DU BALISOR B380
B380 BALISOR SYSTEM

CODE: PLAN: C0.9705 A B

ECHELLE:	TOLERANCES	MATIERE:	ANNULE ET REMPLACE
1/10	GENERALES		Plan C0.9705/A

DESSINE PAR:	DATE:	VERIFIE PAR:	DATE:	APPROUVE PAR:	DATE:
PORET	27.01.97				

PHOTO OF THE B380 BALISOR SYSTEM

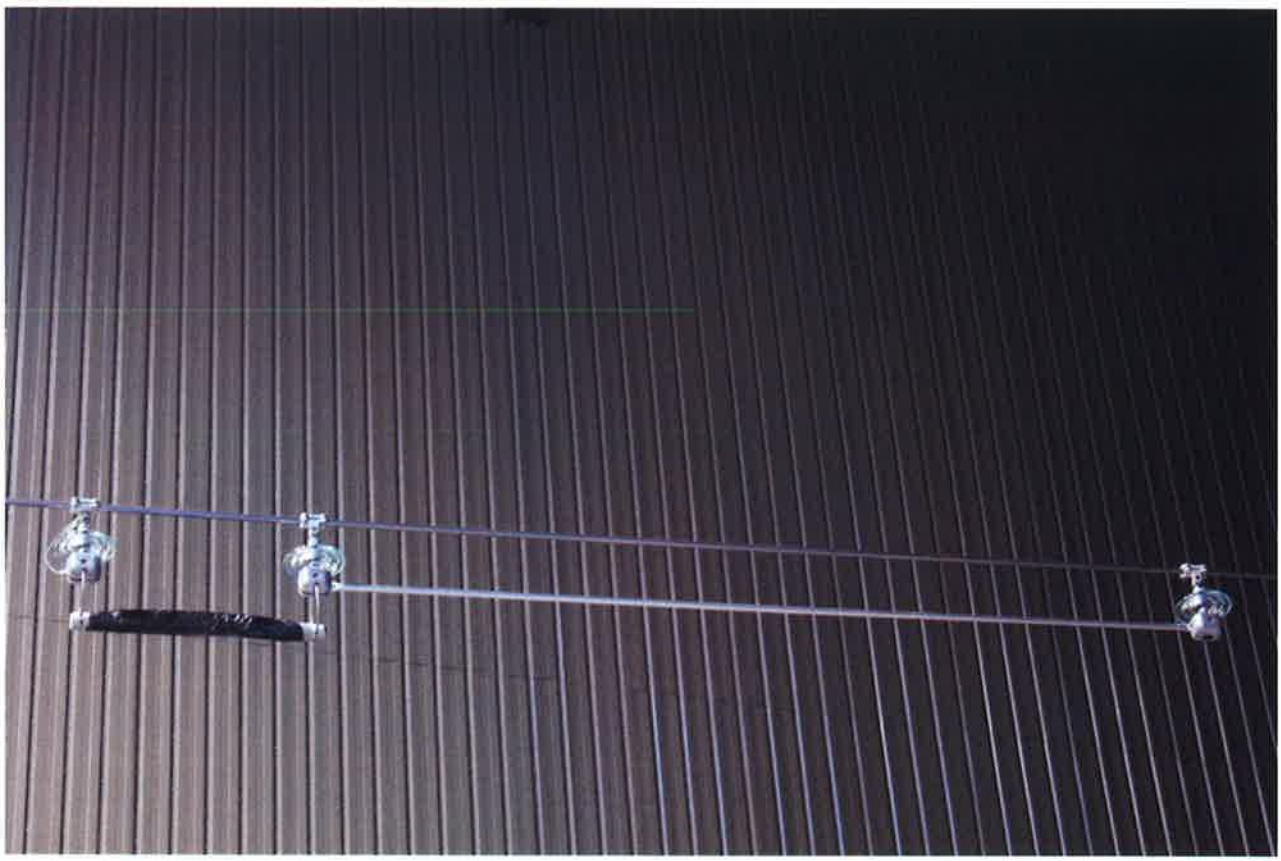


7 – MOUNTING ARRANGEMENT

See Obsta drawing N° CO.9705 Rev. B on page 7
See photo on page 8

The balisor is mounted on a conductor simulated by a metallic tube (∅ **30 mm**, length = **24.00 m**), located **11.50 m** above the ground, connected to the High Voltage and protected at each end by a double ring (∅ **660 mm x 110 mm**).

The lamp (model B49) is covered with black plastic *(see photo below)* in order to avoid any light leak.



8 – CORONA TEST RESULTS

Atmospheric conditions

Barometric pressure = 987.4 hPa

Ambient temperature = 16.3 °C

Relative humidity = 45.0 %

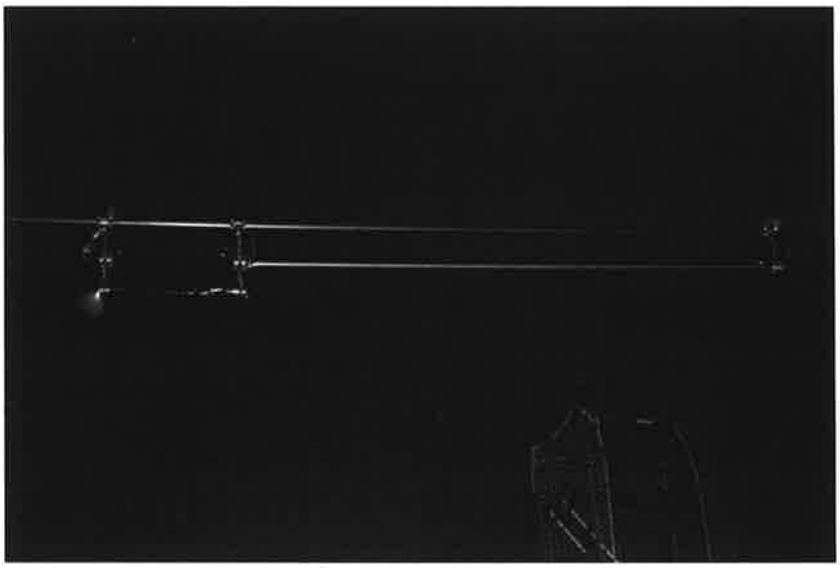
Corrections were applied in accordance with IEC 60060-1.

Corona test result

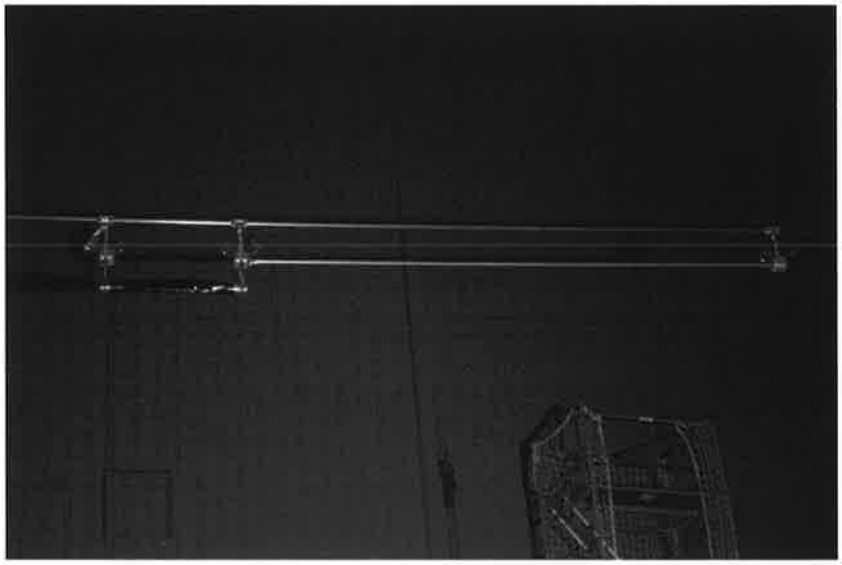
Voltage (kV)		Observations
Phase-Phase	Phase-Earth	
298	172	Negative corona inception
420	242	Positive corona inception
504 (120% U_m)	291	Positive and negative corona
420 (U_m)	242	Positive and negative corona
405	234	Positive corona extinction
380 (U_n)	219	Negative corona
263	152	Total extinction

See photos on page 11

CORONA PHOTOS



291 kV : corona localization



152 kV : total extinction