



MINISTÈRE DES ARMÉES

*Liberté
Égalité
Fraternité*

CERAH

1, Bellevue - BP 50719
57147 WOIPPY Cedex
Tel. 03 87 51 30 30
<https://cerahtec.invalides.fr>



INSTITUTION
NATIONALE DES
INVALIDES

TEST REPORT NO. 23-065- A

Page 1/14

APPLICANT

ELI INNOVATION FRANCE
341, route de Vienne
69200 VENISSIEUX
FRANCE

PRODUCT

Freeli

MANUFACTURER

ELI INNOVATION FRANCE
341, route de Vienne
69200 VENISSIEUX
FRANCE

REFERENCE TEXT

SPECIFICATIONS TECHNIQUES OF THE VEHICLES FOR DISABLED PEOPLE PHYSICS.
Order of June 26, 2003 (Official Journal of September 6, 2003). Title IV of the List of Reimbursable Products and Services (LPPR). provided for in Article L. 165-1 of the Social Security Code. Chapter I - Wheelchairs. B - Wheelchairs with electric motor propulsion. D - Additions common to manual wheelchairs. Electric motor propulsion device

The tests to be carried out are specified in the test program on page 2.

All THE uncertainties of measure are data with A postman of enlargement of $k=2$.

Conformities or non-conformities are given without taking into account uncertainties.

This report consists of 14 pages. Issue date: 06-15-2023

The Test Manager

The Head of the Expertise Unit
Responsible Equipment of
service Tests

Martin SCHMITT

Alain PAWLOWSKI



ACCREDITATION No. 1-
2266 RANGE AVAILABLE
ON
WWW.COFRAC.FR

COFRAC accreditation attests to the competence of laboratories for the tests covered by the accreditation only. Reproduction of this test report is only permitted in the form of a full facsimile. The results recorded in this report are certified only for the sample submitted for testing.
COFRAC is a signatory to the multilateral agreement of EA (European co-operation for Accreditation) and ILAC (International Laboratory Accreditation Cooperation) for recognition of the equivalence of test reports.

REQUEST FOR TESTS

The tests are carried out according to the provisional test program annexed to agreement No. 23-065 .

Nature of the test	To be done
Dimensional characteristics and adjustment	Yes
Static stability test	Yes
Measurement of thrust and clutch forces	Yes
Dynamic stability test	Yes
Obstacle crossing test	Yes
Measuring speed and stopping distance	Yes
Measuring autonomy	Yes

The results of the above tests preceded by the * sign are not covered by COFRAC accreditation.

DATE OF RECEIPT OF SAMPLE

Inventory number	Date of receipt
23-065-01	Tuesday, May 23, 2023

DEFINITION OF THE SAMPLE

The sample defined below East tested following THE program trial No. 23-065-A-PROG1102 from 05/23/2023 to 05/26/2023

Code	Designation	Kind	Seizure
Product			
	Update date	Text	01-06- 2023
	Manufacturer	Text	ELI INNOVATION FRANCE
	Distributer	Text	ELI INNOVATION FRANCE
	Product name	Text	Freeli
	Copyright		
	Product reference	Text	
	ISO code	Text	
	Serial number	Text	
	CERAH inventory number	Text	23-065-01
2	HPV type		
2.1	Wheelchair	Yes / No	Yes
3	Mode of propulsion		
3.16	By electric motor	Yes / No	Yes
3.18	front -wheel drive	Yes / No	Yes
4	Environment for electric propulsion		
4.23	Intended use class A	Yes / No	Yes
5	Chassis		
5.26	Maximum user weight (kg)	Interval	35
5.35	Designed to be transported empty in a motor vehicle (tie-down system)	Yes / No	Yes
6	Case		
6.56	Rigid plate with cushion	Yes / No	Yes
6.60	Backrest height in range (cm)	Interval	43
6.63	Reclining	Yes / No	Yes
6.64	Tilt range of the range (°)	Interval	1.8 to 32
6.68	Tilt by direct control from the attendant	Yes / No	Yes
6.69	Tilt type	Text	notched plate with retractable pin
6.70	Angle from vertical (°)	Text	1.8, 16.8, 32.3
6.84	Folding	Yes / No	Yes
6.87	Lateral trunk support	Yes / No	Yes
6.89	Height -adjustable headrest	Yes / No	Yes
7	Seat		
7.104	Rigid plate with cushion	Yes / No	Yes
7.110	Seat width (cm)	Text	30
7.111	Useful width (cm)	Interval	30
7.112	Floor/seat height at the front (cm)	Interval	38, 39, 40
7.113	Floor/seat height at the back (cm)	Interval	38, 39, 40
7.114	Adjustable depth	Yes / No	Yes
7.116	Seat depth (cm)	Interval	17 to 35 in 1.5 cm steps
8	Footrest set - Stem		
8.139	Fixed	Yes / No	Yes
8.150	Stem angle measurement (°)	Interval	90
9	Footrest set - Palette		
9.169	One-piece (monobloc)	Yes / No	Yes
9.170	Pallet seat height (cm)	Text	21.5 to 29.5

9,171	Height adjustable	Yes / No	Yes
9,172	Liftable	Yes / No	Yes
11	Armrest		
11,195	Short	Yes / No	Yes
11,198	Retractable "completely freeing the side of the seat "	Yes / No	Yes
11,200	Adjustable spacing	Yes / No	Yes
11,201	Width between armrests (cm)	Text	16 to 26.5
11,202	Cuff	Yes / No	Yes
11,204	Tool -free height-adjustable cuff	Yes / No	Yes
11,205	Height of the cuff from the seat (cm)	Text	10 to 25
12	Body support system		
12,229	Reclining	Yes / No	Yes
12,230	Possible tilt range (°)	Interval	-1 to 10.5
12,234	Assisted tilting by direct control from the attendant	Yes / No	Yes
12,235	Direct order type by the attendant	Text	Rack and pinion
12,236	Angle from horizontal (°)	Text	-1, 1.5, 3.9, 5.6, 7.5, 10.5
13	Drive wheels		
13,260	Available diameters	Text	9 in
13,261	Available widths	Text	54 mm
13,264	Equipped with bandage	Yes / No	Yes
13,272	Mudguard or fairing	Yes / No	Yes
13,278	Equipment equipped with 4 wheels, 2 of which are directional	Yes / No	Yes
14	Steering wheels		
14,279	Available diameters	Text	232 mm
14,280	Available widths	Text	45 mm
14,281	Equipped with bandage	Yes / No	Yes
14,296	Equipment equipped with 4 wheels, 2 of which are directional	Yes / No	Yes
15	Immobilization and braking system		
15,307	Progressive action brake acting on the drive wheels (engine brake)	Yes / No	Yes
16	Driving and/or control system		
16,319	posterior control box	Yes / No	Yes
16,321	Control box can be positioned on the right or left	Yes / No	Yes
16,323	Retractable box	Yes / No	Yes
16,324	Type of retraction	Text	Pantograph
16,328	Planned location	Text	File amounts
19	Clutch release system		
19,363	electromagnetic brake	Yes / No	Yes
20	Other values		
20,368	Autonomy according to standard EN 12184 (km)	Text	37
20,369	Safety slope according to standard EN 12184 (°)	Text	6
20,370	Static stability slope according to standard EN 12184 (°)	Text	10
20,371	Maximum speed according to standard EN 12184 (km/h)	Text	6
20,372	Minimum speed according to standard EN 12184 (km/h)	Text	1
20,373	Overall width depending on seat width LS (cm)	Text	LS + 30
20,374	Overall width (cm)	Text	60
20,375	Overall length (cm)	Text	75
20,376	Overall height (cm)	Text	101
20,378	Weight of equipment from (kg)	Text	40
21	Electrical parts - Programmer		
21,379	Brand	Text	Lunyee Industries Development Co.Limited
21,380	Kind	Text	M7084Driver

22	Electrical parts - Motorization		
22,381	Brand	Text	Lunye Industries Development Co.Limited
22,382	Kind	Text	ZW 1012L4- S
22,383	Power supply (V)	Text	24
22,384	Power (W)	Text	200
22,385	Equipped with an automatic power cut-off brake (electromagnetic brake)	Yes / No	Yes
23	Control box		
23,387	Brand	Text	Lunye Industries Development Co.Limited
23,388	Kind	Text	M70884 Joystick
23,389	Hand protection system	Yes / No	Yes
23,390	Gear selector	Yes / No	Yes
23,391	Off button	Yes / No	Yes
24	Electrical parts - Electronics		
24,393	Brand	Text	Lunye Industries Development Co.Limited
24,394	Kind	Text	M7084- WB
25	Electrical parts - Battery		
25,396	Brand	Text	Himax Electronics
25,397	Kind	Text	Lifepo4
25,398	Category	Text	Lithium
25,399	Power supply (V)	Text	25.6
25,400	Capacity (A/h)	Text	28
25,401	Number	Text	1
26	Battery charger		
26,402	Brand	Text	Himax Electronics
26,403	Kind	Text	AP- PN120CH02880040
26,404	Output amperage	Text	4
26,405	Charge indicator	Yes / No	Yes
26,406	Automatic shutdown at the end of charging	Yes / No	Yes
26,407	Comes with hardware	Yes / No	Yes
28	Additional information		
28,413	Guarantee	Text	2 years
28,414	Use and Maintenance Guide	Yes / No	Yes
28,415	Illustrated use and maintenance guide in French	Yes / No	Yes
29	Rates		
29,416	Recommended retail price including VAT excluding options or additions (€)	Text	8500.00
29,417	VAT (%)	Text	5.5
29,418	LPPR support	Text	Yes
30	Cerahlab Information - Request Processing		
30,419	CE marking on commercial documentation	Yes / No	Yes
31	Manufacturer's plate		
31,425	CE marking	Yes / No	Yes
31,426	Manufacturer name	Yes / No	Yes
31,427	Manufacturer 's contact details	Yes / No	Yes
31,428	Vehicle range name	Yes / No	Yes
31,429	Product reference	Yes / No	Yes
31,430	Serial number	Yes / No	Yes
31,431	Maximum user mass	Yes / No	Yes
31,432	Tamper-proof (indelible and irremovable - if stuck, unusable after removal)	Yes / No	Yes

Dimensional characteristics and adjustment

Worksheet No. 23-065-A-FICT108 of program 23-065-A- PROG1102

Test Manager	Martin Schmitt	Trial date	from 05/24/2023 to 05/26/2023
Test bench	None	Validity date	Not applicable

Conclusion

Les dimensions pour lesquelles des exigences sont demandées sont conformes.

Measures

Piece adjustable	Settings recommended	Value measured on the sample	Beach of setting of the sample	Uncertainty (±)
------------------	----------------------	------------------------------	--------------------------------	-----------------

Features of case

Height (mm)	Position median	420	No adjustable	0.5
Angle/vertical (°)	10° (0° +3°)	1.83	1.83/16.8/32.3	0.8

Features of the footrest

Height seat/pallet (mm)	/	295	215 has 295	0.5
Clearance footrest/floor (mm)	THE more close of 50 mm but not lower	80	80 to 160	0.5
Corner leg rest/surface of seat (°)	Next to 90° but not lower	88.9	No adjustable	0.8
Corner footrest/legrest (°)	Next to 90° but not lower	92	74 to 110	0.8

Dimensions And features of the wheels

Diameter wheels guidelines (mm)	/	192.9	/	0.04
Pressure air steering wheels (bar)	By THE manufacturer Otherwise pressure max tire	Bandage	/	
Diameter wheels motors (mm)	/	232	/	0.06
Pressure air wheels motors (bar)	By THE manufacturer Otherwise pressure max tire	Bandage	/	
Corner axis fork/ground (°)	Vertical	87.2	/	0.8
Position horizontal of the wheels guidelines	Position median (±3 mm)	- 190	/	0.5
Position vertical of the wheels guidelines	Position median (±3 mm)	310	/	0.5
Position horizontal of the wheels motors	Position median (±3 mm)	275	/	0.5
Position vertical of the wheels motors	Position median (±3 mm)	280	/	0.5

Dimensions overall

Length (mm)	/	755	/	0.5
Width (mm)	/	600	/	0.5
Height (mm)	/	1005	/	0.5

Features of seat

Width (mm)		300	230 And 300	0.5
Width between armrests (mm)	Position median	265	160 has 265	0.5
Depth (mm)	Position median	245	13 positions (Mini155 Maxi350)	0.5
Angle/horizontal (°)	8° (0°+ 3°)	7.48	/	0.8
Height floor/front seat (mm)		400	400/390/380	0.5
Height floor/seat back (mm)	Position median	400	Idem setting Before	0.5

System of support of body Pushing

Angle (°)	/	7,48	-0,97/1,50/3,88/5,63/7,50/10,50	0,8
-----------	---	------	---------------------------------	-----

device

Hauteur / sol (mm)	/	S.O / N.A	/	
--------------------	---	-----------	---	--

Caractéristiques dimensionnelles de l'échantillon en configuration d'essais

Répartition des masses				
Échantillon à vide (kg)	/	42,1	/	0,11
Poids total lesté (kg)	/	77,5	/	0,11
Poids sur train avant (kg)	/	47,45	/	0,11
Poids sur train arrière (kg)	/	30,35	/	0,11

Dimensions base de sustentation

Empattement (mm)	/	465	/	0,5
Voie avant (mm)	/	550	/	0,5
Voie arrière (mm)	/	475	/	0,5

Centre de gravité

Position / à l'axe des roues arrière (mm)	/	/	284,7	9,0
---	---	---	-------	-----

NR : No Adjustable**Together electronic And engine**

No. of series motorcycle reducer	Engine G : GM-2302221069 Engine D : GM- 2302221067
Serial number control electronics	Not of indication
Serial number power electronics	M7084- WB

Dimensional characteristics and adjustment (continued)

Worksheet No. 23-065-A-FICT108 of program 23-065-A- PROG1102			
Test Manager	Martin Schmitt	Trial date	from 05/24/2023 to 05/26/2023
Test bench	None	Validity date	Not applicable

No. of series programmer	Console of programming Micon		
No. of series of charger	PN120CH02880040		
Settings of conduct recognized conform			
Speed maximum forward speed	170/250	Speed maximum reverse gear	90/250
Cornering speed	50/250	Acceleration Before	40/250
Acceleration back	/	Acceleration in turn	/
Forward deceleration	50/250	Rear deceleration	/
Deceleration turn	/	Point depreciation	/

Static stability test

Worksheet No. 23-065-A-FICT109 of program 23-065-A- PROG1102

Test Manager	Martin Schmitt	Trial date	from 23-05-2023 to 24-05-2023
Test bench	M09	Validity date	12-12- 2025

Conclusion

L'échantillon répond aux exigences de stabilité statique des spécifications techniques et des informations données par le fabricant.

Settings trial

Element adjustable of armchair		Stability minimal	
Stability Before			
Position of the wheels back, setting Before back		Towards the front	
Fixing of the casters swivel At chassis, setting Before back		Towards the back	
Position of seat, setting Before back		Towards the front	
Position of seat, setting vertical		High	
Position of case, setting Before back		Towards the front	
Position of case, inclination		Right	
Position of seat, tipping		Right	
Elevation of the leg rest		high	
Stability back			
Position of the wheels back, setting Before back		Towards the front	
Fixing of the casters swivel At chassis, setting Before back		Towards the back	
Position of seat, setting Before back		Towards the back	
Position of seat, setting vertical		High	
Position of case, inclination		Towards the back	
Position of seat, tipping		Towards the back	
Position of case, setting Before back		Towards the back	
Stability lateral			
Position of the wheels back, camber		Way there more narrow	
Fixing of the casters swivel At chassis, setting Before back		Towards the back	
Fixing of the casters swivel At chassis has the interior Or has the outside of chassis		Inside	
Position of seat, setting Before back		Towards the front	
Position of seat, setting vertical		High	
Position of seat, tipping		Right	
Position of case, inclination		Right	
	class HAS	class B	class C
Angle requirement following standard EN 12184 (°)	6	9	15
Value of stability data by THE manufacturer	10		
Class of armchair	HAS		

Essay

Corner measure (°)	position sitting	other *	uncertainty ± (°)
Stability Before			
Wheels Before blocked	12.6	/	0.1
Wheels Before No blocked	17.4	/	
Device anti -tilt	/	/	
Stability back			
Wheels back blocked	19.9	/	0.1
Wheels back No blocked	19.9	/	
Device anti -tilt	/	/	
Stability lateral			
LEFT	>20	/	0.1
RIGHT	>20	/	
* SO (Without Object)			

Measurement of thrust and clutch forces

Worksheet No. 23-065-A-FICT110 of program 23-065-A- PROG1102			
Test Manager	Martin Schmitt	Trial date	from 05/23/2023 to 05/26/2023
Test bench	M08	Validity date	29-08- 2025

Conclusion

L'échantillon répond aux exigences des forces de poussée des spécifications techniques
 L'échantillon répond aux exigences des forces de débrayage des spécifications techniques

Settings Uncertainty test

Mass of model trial (kg)	35.4	0.11
Mass maximum claimed by THE manufacturer (kg)	35	
Requirement maxi For there strength of thrust (N)	86	
Requirement maxi For there strength of clutch (N)		
with there hand And THE arm	Yes	60
with there hand	No	13.5
with A finger	No	5
in pushing with THE foot	No	100
in pulling with THE foot	No	60

Essay

Sense of there strength of clutch	Compression	
	Strength of clutch (N)	Strength of thrust (N)
Essay 1	12.40	42.00
Essay 2	12.80	37.50
Essay 3	12.70	36.60
Average	12.63	38.70
Uncertainty (±)	3.95	3.95

Dynamic stability test

Worksheet No. 23-065-B-FICT111 of program 23-065-A- PROG1102

Test Manager	Martin Schmitt	Trial date	from 23-05-2023 to 24-05-2023
Test bench	M08	Validity date	29-08- 2025

Conclusion

L'échantillon répond aux exigences de stabilité dynamique des spécifications techniques.

Réalisation tableau charge :

Validation à 35kg pour une profondeur Maxi (prof 350mm) jusqu'au 7ième trou (prof 260mm) en partant de l'arrière.

Validation à 23kg pour une profondeur du 8ième trou (prof 250mm) jusqu'au dernier trou (prof 160mm) en partant de l'arrière

Settings trial

Classe du fauteuil		A	Incertitude (±)
Référence du mannequin		AM08	
Masse du mannequin (kg)		35,4	0,11
Résultat noté dans le tableau		Réponse dynamique observée	
0 : Basculement complet		Le fauteuil roulant se renverse complètement	
1 : Immobilisation sur le dispositif antibasculement		Toutes les roues se soulèvent, les antibasculs entrent en contact avec le sol et le fauteuil demeure immobile sur les antibasculs	
2 : Basculement temporaire		Toutes les roues perdent le contact, puis retombent, que les antibasculs entrent ou non en contact	
3 : Absence de basculement		Au moins une roue susceptible de décoller demeure sur le plan d'essai	
Conformément à la norme NF EN 12184 l'exigence de résultat est 2 ou 3 pour l'angle minimum de pente donnée suivant la classe du fauteuil			
classe A		3°	
classe B		6°	
classe C		10°	

Essay

Essay			Tilt in degree	
				Others positions
method ISO 7176-2 (§)	device anti- tip	method of slow-down	3°	so
Stability dynamic towards the back				
(8.2) Startup towards the front		with	/	/
		without	3	/
(8.3) Stop after a route forward		with	relaxation	/
			food cut off	/
			inversion of order	/
		without	relaxation	3
			food cut off	3
			inversion of order	3
(8.4) Braking At course of a route backwards		with	relaxation	/
			food cut off	/
			inversion of order	/
		without	relaxation	3
			food cut off	3
			inversion of order	3
Stability dynamic towards the front				
(9.2) Braking At course of a route forward		relaxation	2	/
		food cut off	2	/
		inversion of order	3	/
Stability dynamic on THE sides				
(10.4) Stability For A turn sudden has speed maximum			YES	

Setting of armchair For essay following ISO 7176-2**Stability Before**

Position of the wheels back, setting Before back	Stability minimal Towards the front
Fixing of the casters swivel At chassis, setting Before back	Towards the back
Position of seat, setting Before back	Towards the front
Position of seat, setting vertical	High

Dynamic stability test (continued)

Worksheet No. 23-065-B-FICT111 of program 23-065-A- PROG1102			
Test Manager	Martin Schmitt	Trial date	from 05/23/2023 to 05/24/2023
Test bench	M08	Validity date	29-08- 2025

Position of case, setting Before back	Towards the front
Position of case, inclination	Right
Position of seat, tipping	Right
Elevation of the leg rest	high
Stability back	
Position of the wheels back, setting Before back	Towards the front
Fixing of the casters swivel At chassis, setting Before back	Towards the back
Position of seat, setting Before back	Towards the back
Position of seat, setting vertical	High
Position of case, inclination	Towards the back
Position of seat, tipping	Towards the back
Position of case, setting Before back	Towards the back

Determination of there ability to climb the nominal slope**Conclusion**

L'échantillon est conforme à la valeur revendiquée par le fabricant pour la capacité à gravir la pente nominale

Settings trial

Class of armchair	HAS
Value claimed by THE manufacturer (°)	6
Slope of plan trial (°)	6
Matrix of programming conforms to "specifications techniques"	
Setting of armchair For essay following there standard ISO 7176-8 § 6.1, 6.2 and 6.3	
Configuration following recommendations of builder For there conduct Or has default average configuration of adjustable elements	

Essay

	Mes.1	Mes.2	Mes.3	Average	uncertainty (±)
Speed (km/h) (minimum required 2km/h)	4.41	4.46	4.45	4.44	0.031
Distance traveled (m)	5.00				0.113

Obstacle crossing test

Worksheet No. 23-065-A-FICT112 of program 23-065-A- PROG1102			
Test Manager	Martin Schmitt	Trial date	from 23-05-2023 to 23-05-2023
Test bench	M07	Validity date	17-11- 2023

Conclusion

L'échantillon répond aux exigences de capacité de franchissement d'obstacles donnés par le fabricant.

Settings trial

Class of armchair	HAS	Uncertainty
Mass of mannequin (kg)	35.4	0.11
Batteries of armchair in full charge		
Wheels guidelines in position normal back		
Distance approach with momentum (m)	0.5	
Distance approach without momentum (m)	0	
Corner of incidence (°)	90	
Requirement of height of crossing For there standard NF IN 12184 following there class of armchair (mm)		
class HAS	class B	class C
15	50	100

Essay

		value measured (mm)	value manufacturer (mm)
Walk Before	without momentum	30	/
	with momentum	50	50
Walk back	without momentum	40	/
	with momentum	40	/
Uncertainty (±) in mm		-	

Measuring speed and stopping distance

Worksheet No. 23-065-A-FICT113 of program 23-065-A- PROG1102			
Test Manager	Martin Schmitt	Trial date	from 05/23/2023 to 05/26/2023
Test bench	M33	Validity date	31-07-2024

Conclusion

L'échantillon répond aux exigences conformément aux spécifications techniques

Settings trial

Reference model	Value measured (Kg)	uncertainty (±)
AM08	35.4	0.11

Batteries of armchair in full charge

Armchair conduit has speed maximum in walk Before on a track horizontal

Bench trial speed **M45**

Requirement of there distance stop in function of there speed maximum (NF IN 12184 : 2009)

Speed (km/h)	4	5	6	7	8	9	10
Distance (m) lower has	0.6	0.8	1	1.2	1.5	1.8	2.1
Speed maximum tolerated (km/h)				10			
Maximum tolerated For there more small speed (km/h)				3			

Essay

	Meas. 1	Meas. 2	Meas. 3	Average	Uncertainty (±)
Speed minimal (km/h)	2.87	2.87	2.95	2.90	0.09
Speed maximum (km/h)	5.88	5.80	5.78	5.82	0.11
Distance stop (m)	0.93	0.99	0.94	0.95	0.06

Measuring autonomy

Worksheet No. 23-065-A-FICT114 of program 23-065-A- PROG1102			
Test Manager	Martin Schmitt	Trial date	from 23-05-2023 to 25-05-2023
Test bench	M05	Validity date	Not applicable

Conclusion

L'échantillon répond aux exigences de mesure d'autonomie des spécifications techniques

Settings of the test

Operator	MS	Temperature during of the test (°C)	21.6
Mass of the operator (kg)	/	Mass additional (kg)	35.4
Size of the operator (m)	/		

Batteries of armchair in full charge			
Armchair conduit has speed maximum in walk Before on a track horizontal			
Minimum autonomy requirement according to EN 12184 standard (km)	Class HAS	Class B	Class C
	15	25	35
Minimum autonomy requirement according to technical specifications (km)	12		

Class of armchair	HAS
Speed maximum After setting (km/h)	5.8

Results of the test

Energie consommée E_c (Wh)	39,4	Distance parcourue D_c (m)	2037,6
Consommation d'énergie spécifique $e_c = \frac{1000 * E_c}{D_c}$		19,4 Wh	
Energie des batteries retenue E_{bat} (wh)	717		
Distance théorique $R_c = \frac{E_{bat}}{e_c}$		37,03 Km	