TECHNICAL REPORT

OPH-T-01460-00 Rev00 Dated 20.05.2021

Applicant	:	Anadolu Isuzu Otomotiv Sanayi ve Ticaret A.Ş.
Regulatory act	:	Union Internationale des Transports Publics UITP project “E-SORT” – Standardized On Road Test Cycles for buses SORT Addenum (2014)
Type	:	B801

Information regarding approval status:

	First approval application
	Application for extension from
X	Technical report

Information regarding based on the standard:

X	ISO/IEC 17020:2012
	ISO/IEC 17025:2017

0. INDEX

1. ATTACHMENTS

N/A

2. GENERAL INFORMATION

2.1	Make (trade name of manufacturer)	:	ISUZU, ANADOLU ISUZU, AIOS, AOS, TURKUAZ, TURQUOISE, GLOBUS
2.2	Type	:	B801
2.3	Commercial name(s)	:	Novociti Volt
2.4	Means of identification of type, if marked on the vehicle	:	N/A
2.4.1	Location of that marking	:	N/A
2.5	Category of vehicle	:	M_3
2.6	Company name and address of manufacturer	:	Anadolu Isuzu Otomotiv Sanayi ve Ticaret A.Ş. Şekerpınar Mahallesi Otomotiv Caddesi No:2 41435 ÇAYIROVA-KOCAELI TURKEY
2.7	Name(s) and address(es) of assembly plant(s)	:	Anadolu Isuzu Otomotiv Sanayi ve Ticaret A.Ş. Şekerpınar Mahallesi Otomotiv Caddesi No:2 41435 ÇAYIROVA-KOCAELI TURKEY
2.8	Name and address of the manufacturer's representative (if any)	:	N/A

Date	:	18.05.2021
Location	:	Kaynarca road D014, Sakarya/Turkey
Test expert	:	Yunus Emre Baydak

3. REASONS FOR EXTENSION

N/A

4. TEST EQUIPMENT AND CONDITION

4.1. Equipment name	ID Number
V-box	OPH039
Anemometer	OPH014
Tyre inflator	OPH033
Wheel load balances and indicator	OPH018, OPH019, OPH020

5. IDENTIFICATION OF TEST SAMPLE

VIN / ~~Prototype code~~	:	NNAM0BELAGB000001
Commercial name	:	Novociti Volt
Vehicle category	:	M_3

N°	Item		Value	Unit
1.1.1	Vehicle type		B801	
	Commercial name		Novociti Volt	
1.1.2	Length (L)		7957	mm
1.1.3	Width (W)		2463	mm
1.1.4	Height		3250	mm
1.1.5	Empty weight	1.axle	2830	kg
		2.axle	5078	
1.1.6	Mileage		7841	km

Electric Motor	
Types	Permanent Magnet Synchronous Motor (PMSM)
Number	1
Power	255 kW peak power
Weight	212 kg motor + 26 kg inverter

Gearbox	
Item	Value
Is there a gearbox?	Direct Drive
Manufacturer and type	N/A
Programme used	N/A

Tyres		
Item	Value	Unit
Manufacturer and type	LASSA Maxiways 100s	
Dimensions (front axle tyres)	245/70 R17.5	
Dimensions (central axle tyres)	N/A	
Dimensions (rear axle tyres)	245/70 R17.5	
Front axle nominal pressure	8.5	bar
Middle axle nominal pressure	N/A	bar
Rear axle nominal pressure	8.5	bar
Pattern depth of new tyres	16	mm
Actual pattern depth measured	15	mm

Low voltage batteries		
Item	Value	Unit
Type	Yiğit, water type heavy duty battery	
Number	2	Pieces
Nominal Unit Voltage	12	V
Unit Weight	40	kg

Miscellaneous equipment	
Item	Value
Number of doors	2
Retarder	Regenerative Braking(via Electic Motor)
Air conditioning	AC unit contains electrical compressor for cooling and roof top heating by coolant cycle, ES204N-H
Other	N/A

Motor Axle	
Item	Value
Manufacturer and type	Brist-RDA 65-17.5/A90
Reduction ratio	5,13

Rechargable Energy Storage Systems (RESS)	
Types	LFP
Nominal tension	600,00 V
Power	211 kW
Weight	1530 kg
Capacity C3	211 (usable 190) kWh
Minimum SOC level	0,00 %
Warning SOC level	10,00 %
Maximum SOC level	100,00 %
RESS temperature before test	23,00 ^{o}C
RESS temperature after test	26,00 ^{o}C

	Test Weight
1st axle	3620
2nd axle	5760
Total (kg)	9380

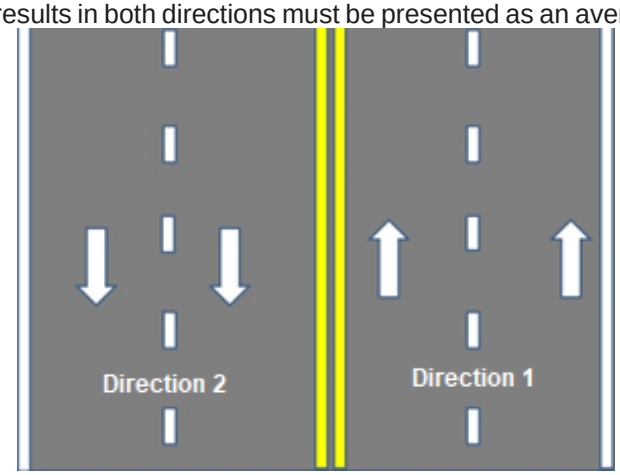
6. REQUIREMENTS AND TEST RESULTS

1. Street Conditions

1.1 The track chosen will be in good condition with no potholes, raised sections or loose surface impediments and the test track surface shall be dry. **In conformity**

Item	Value	Unit
State of track surface	Dry	
Max. longitudinal gradient	+/- 0,2	%
Track altitude	10	m
Min. radius	--	m
Track length	1.500	m
Place of test	Open road D014 (Kaynarca, Sakarya, Turkey)	N/A

1.2 The track will be horizontal with a max. gradient of 1,5 %. Tests must be carried out in both directions. The results in both directions must be presented as an average. **In conformity**



1.3 The altitude of the track is closely interlinked with the atmospheric pressure. **In conformity**

1.4 The test is normally performed on a straight track. **In conformity**

1.5 The track must be at least long enough to perform one full cycle. **In conformity**

2. Weather Conditions

2.1 Wind speed will be below 3 m/s. Short wind gusts of up to 8 m/s are acceptable. **In conformity**

2.2 Wind direction is not relevant since tests must be carried out in both directions. The results in both directions must be presented as an average. **In conformity**

2.3 External temperature will range between 0 and 30° C. The actual test temperature will be mentioned in the test protocol (sheet 3). Later a possible confirmation test will be performed within a +/- 5°C margin compared to this reference temperature. **In conformity**

2.4 Humidity level will be below 95 %. **In conformity**

2.5 The acceptable pressure is as described in DIN 70030-1, ambient temperature and pressure are measured. These data enables one to calculate the air density according to a given formula. The result must be within a +/- 7.5% margin of the reference pressure of 1 bar. **In conformity**

Calculation of the load characteristics CL of the tested vehicle.

Item	Value		Unit
Load factor CL (load)	CL = 116,19 x (L – 1,20) x W	1933,69	kg

Optional equipment

Item	Weight to deduct from lump load	Unit
Air-conditioning	160	kg
Ramp for wheelchair users	-	kg
Ticketing equipment (excluding pay desk)	-	kg
Automatic vehicle monitoring system (AVM)	20	kg
Information equipment	-	kg
Video camera equipment	-	kg
Security driver cabin	-	kg
Double glazing	-	kg
Exhaust filters	-	kg
Other equipment	-	kg
(1)Total weight to be deducted from lump load	**180**	kg

Other factors to take into account

Item	Actual weight (A)	Reference weight (B)	Difference (A - B)
Seats			
Load factor Cs (seats)	CS = the integer of {1,09 x (L-1,20) x W}		
N is the actual number of seats in the tested vehicle	N x 10 kg	CS x 10 kg	(CS – N) x 10 kg
Calculated values:	250 kg	181 kg	69 kg
Fuel tank capacity (litres x 0.840)			
Load factor Cf (fuel volume)	CF = 7,26 x (L-1,20) x W		
V is the actual volume of fuel tank of the tested vehicle	V x 0,840	CF x 0,840	(CF-V)x 0,84 kg
Calculated values	0 kg	0 kg	0 kg
On-board persons (number Y) excluding the driver		Real weight measured	200 kg
Fuel measuring equipment		None	30 kg
		Additional tank for heating system, capacity (litres x 0.840)	
Total weight of other factors			**298,6 kg**

SORT Weight

Item	Value		
Empty weight	7908		kg
Lump load	1933,69		kg
Optional equipment (1)	180		kg
Other factors (2)	298,6		kg
(3) = CL -(1)-(2)	1455,09		kg
Empty weight + load(3)	Calculated	9363,09	kg

Test cycle SORT 1:

Test 1:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	21,3°C	100,2 kPa	1,4 m/s	55 %

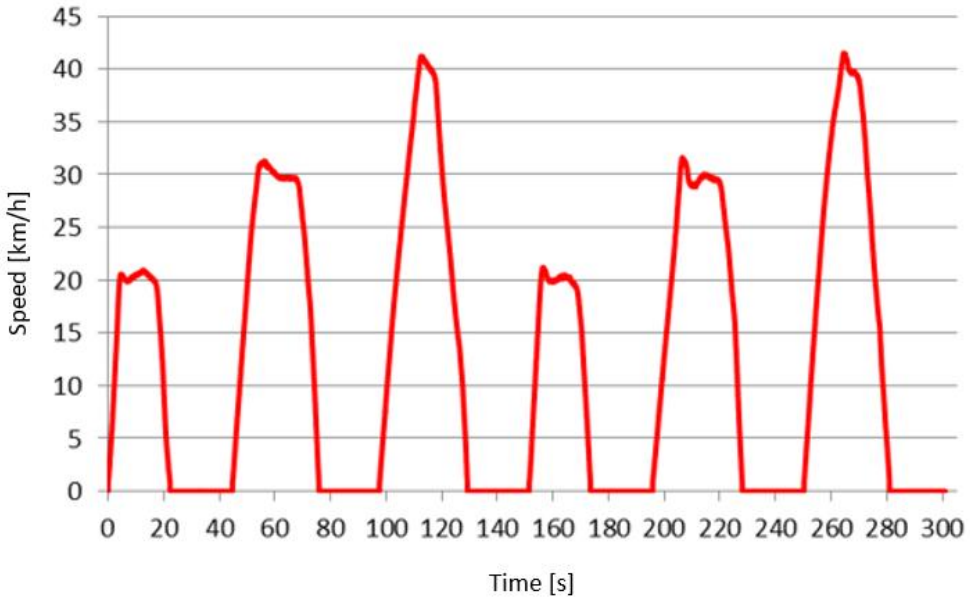


Figure 1: Speed vs time graph at direction 1

Total distance (m)	1043
Total time (s)	297
Energy consumption (kWh/100 km)	59,26
Average speed (km/h)	12,67

Test 1:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	21,3°C	100,2 kPa	1,4 m/s	55 %

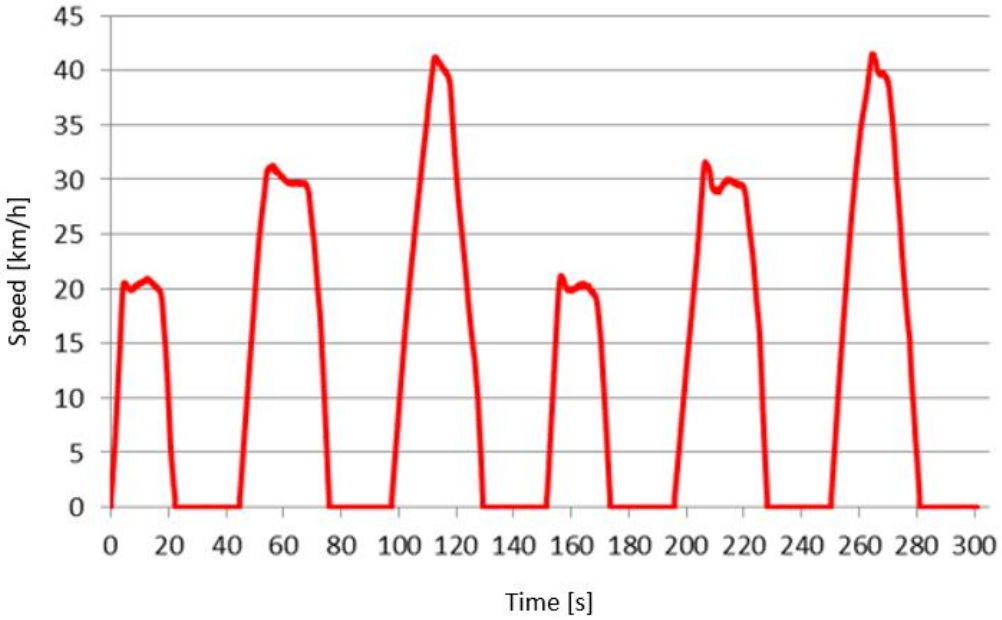


Figure 2: Speed vs time graph at direction 2

Total distance (m)	1043,55
Total time (s)	302
Energy consumption (kWh/100 km)	61,62
Average speed (km/h)	12,45

Test 2:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	21,3°C	100,2 kPa	1,4 m/s	55 %

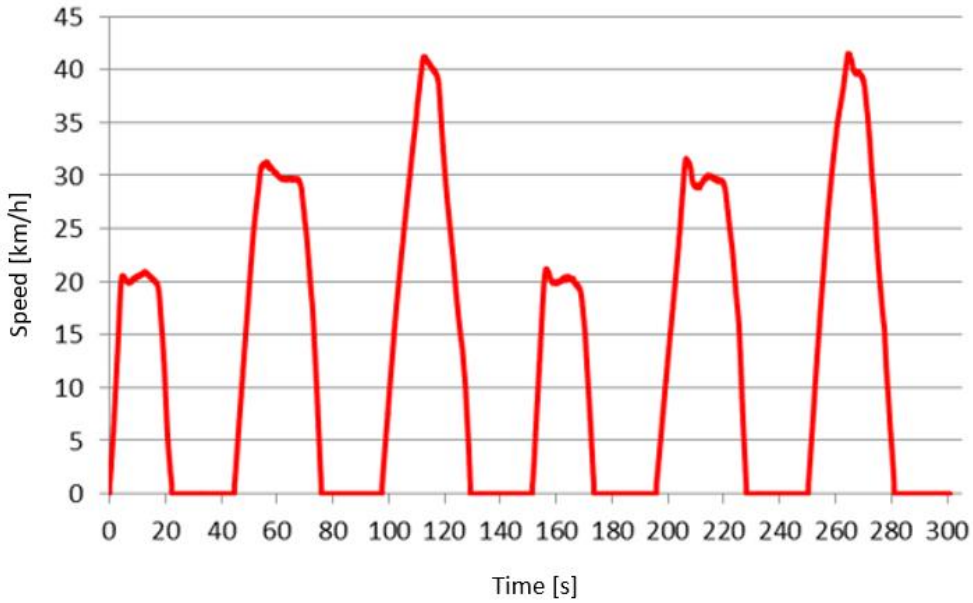


Figure 3: Speed vs time graph at direction 1

Total distance (m)	1042,38
Total time (s)	303
Energy consumption (kWh/100 km)	59,48
Average speed (km/h)	12,44

Test 2:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	21,3°C	100,2 kPa	1,4 m/s	55 %

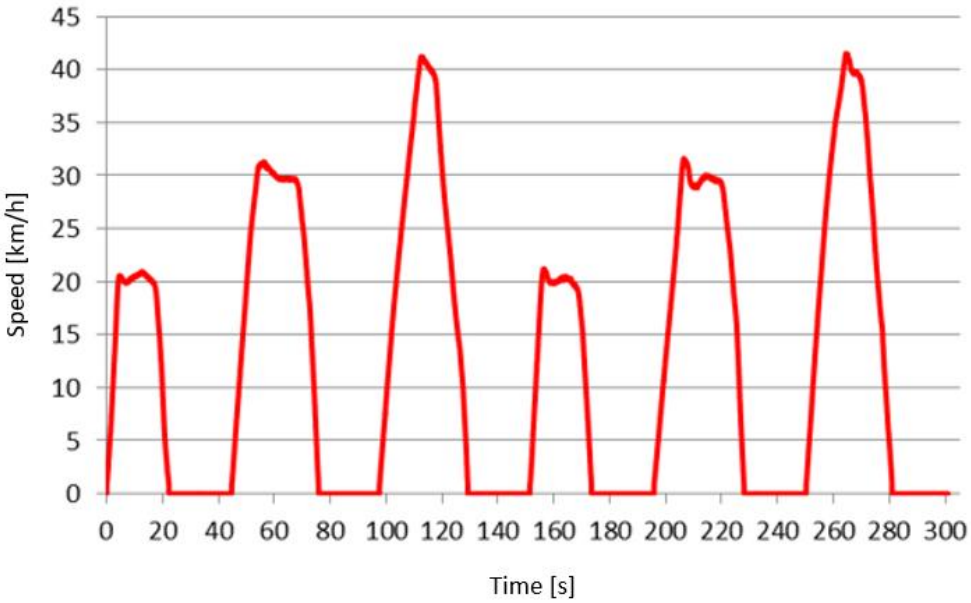


Figure 4: Speed vs time graph at direction 2

Total distance (m)	1043,71
Total time (s)	302
Energy consumption (kWh/100 km)	62,28
Average speed (km/h)	12,47

Test 3:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	21,3°C	100,2 kPa	1,4 m/s	55 %

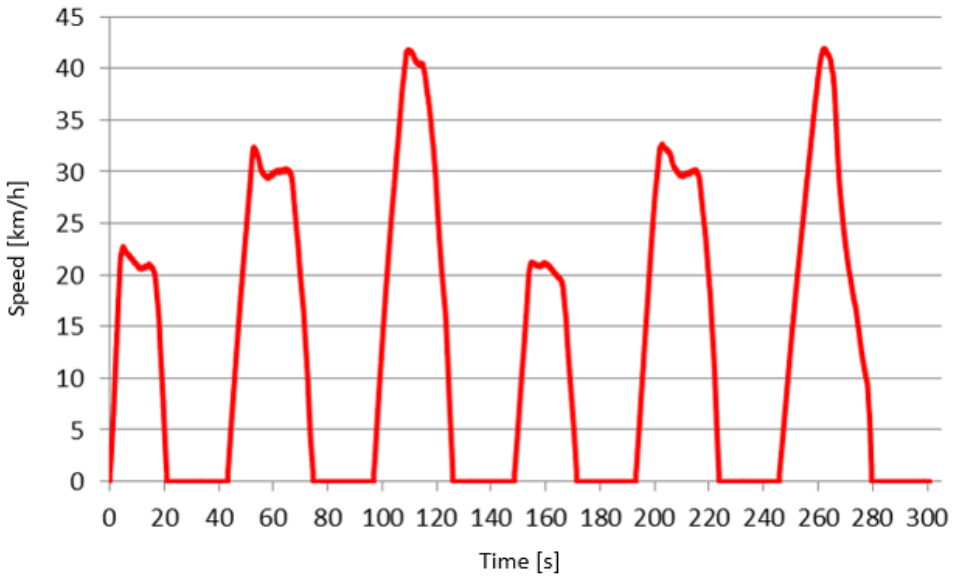


Figure 5: Speed vs time graph at direction 1

Total distance (m)	1042,73
Total time (s)	305
Energy consumption (kWh/100 km)	59,27
Average speed (km/h)	12,36

Test 3:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	21,3°C	100,2 kPa	1,4 m/s	55 %

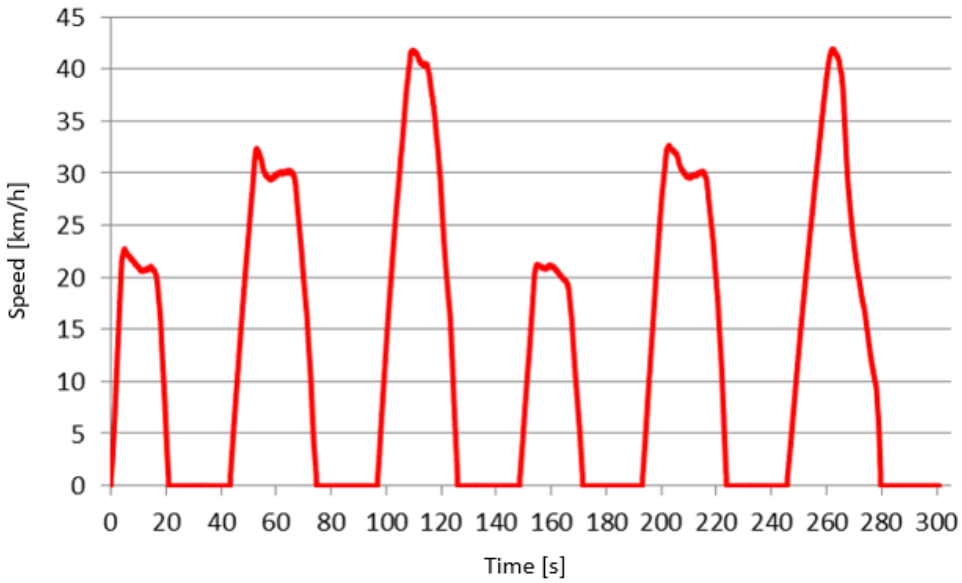


Figure 6: Speed vs time graph at direction 2

Total distance (m)	1043,56
Total time (s)	293
Energy consumption (kWh/100 km)	62
Average speed (km/h)	12,88

Test cycle SORT 2

Test 1:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	22,6°C	100,2 kPa	2,8 m/s	55,4 %

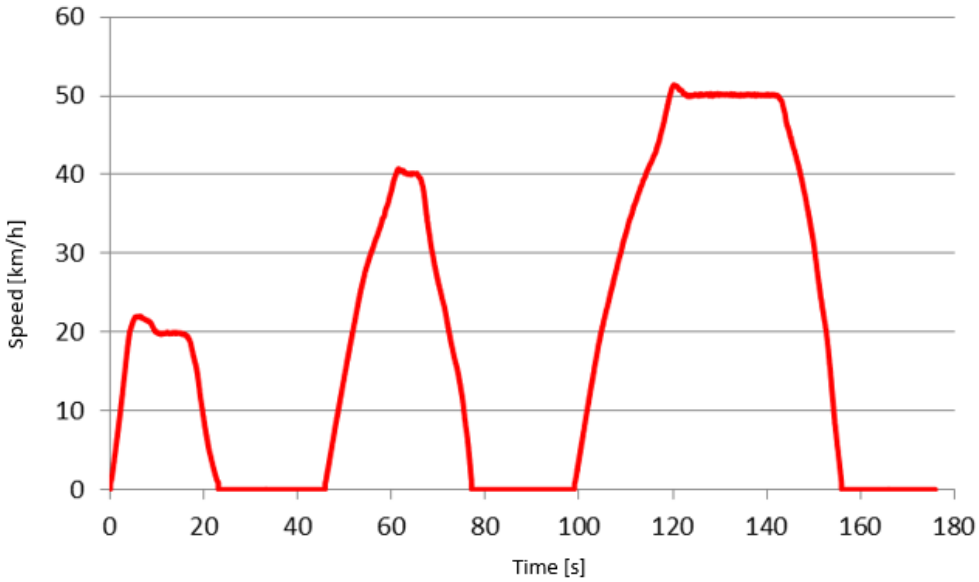


Figure 7: Speed vs time graph at direction 1

Total distance (m)	919,24
Total time (s)	174
Energy consumption (kWh/100 km)	54,61
Average speed (km/h)	19,09

Test 1:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	22,6°C	100,2 kPa	2,8 m/s	55,4 %

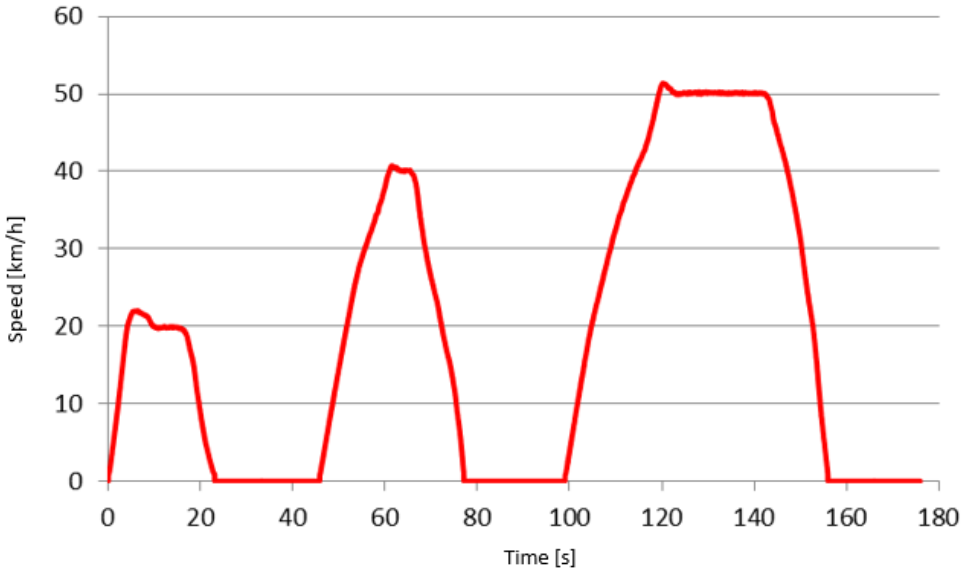


Figure 8: Speed vs time graph at direction 2

Total distance (m)	922,86
Total time (s)	174
Energy consumption (kWh/100 km)	56,13
Average speed (km/h)	19,16

Test 2:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	22,6°C	100,2 kPa	2,8 m/s	55,4 %

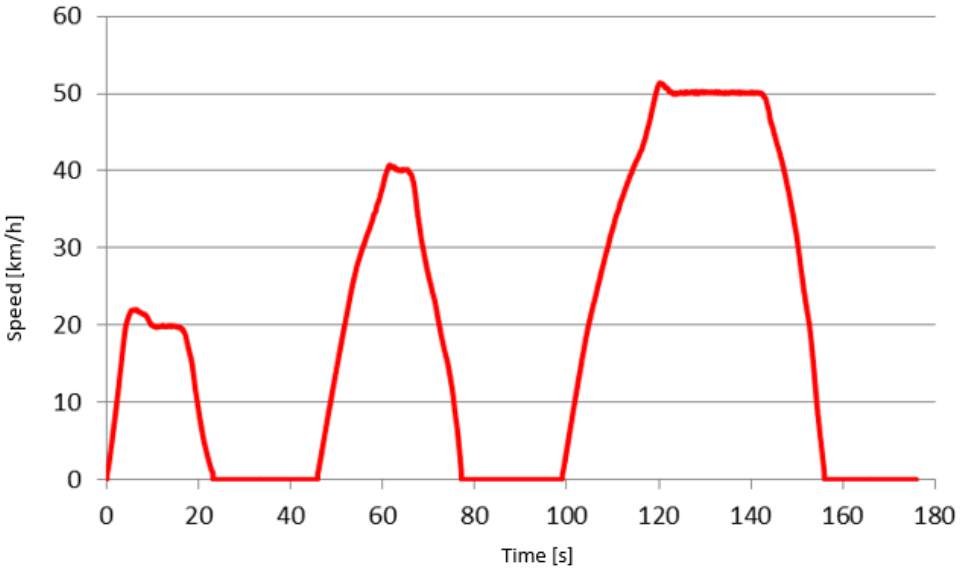


Figure 9: Speed vs time graph at direction 1

Total distance (m)	919,91
Total time (s)	174
Energy consumption (kWh/100 km)	54,46
Average speed (km/h)	19,09

Test 2:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	22,6°C	100,2 kPa	2,8 m/s	55,4 %

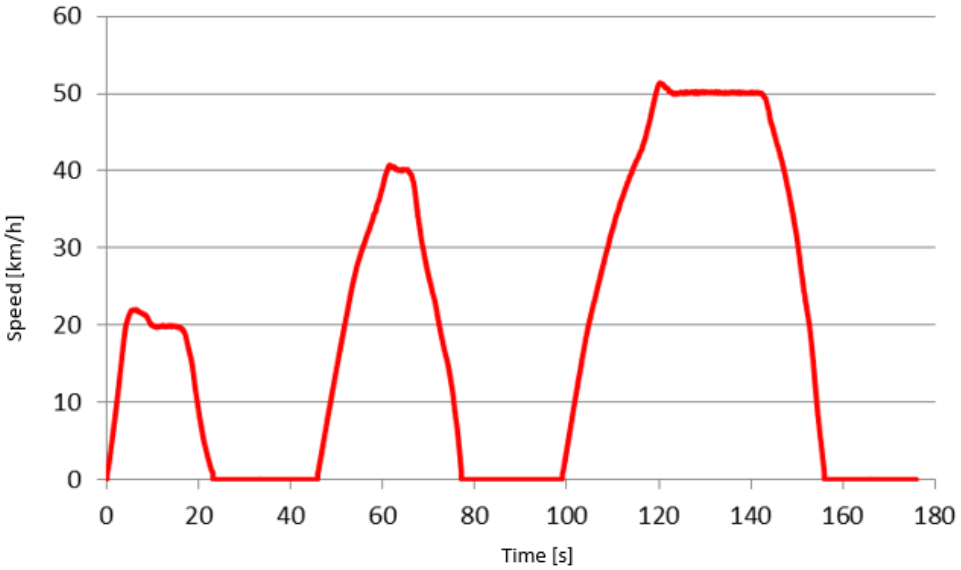


Figure 10: Speed vs time graph at direction 2

Total distance (m)	922,94
Total time (s)	177
Energy consumption (kWh/100 km)	56,56
Average speed (km/h)	18,80

Test 3:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	22,6°C	100,2 kPa	2,8 m/s	55,4 %

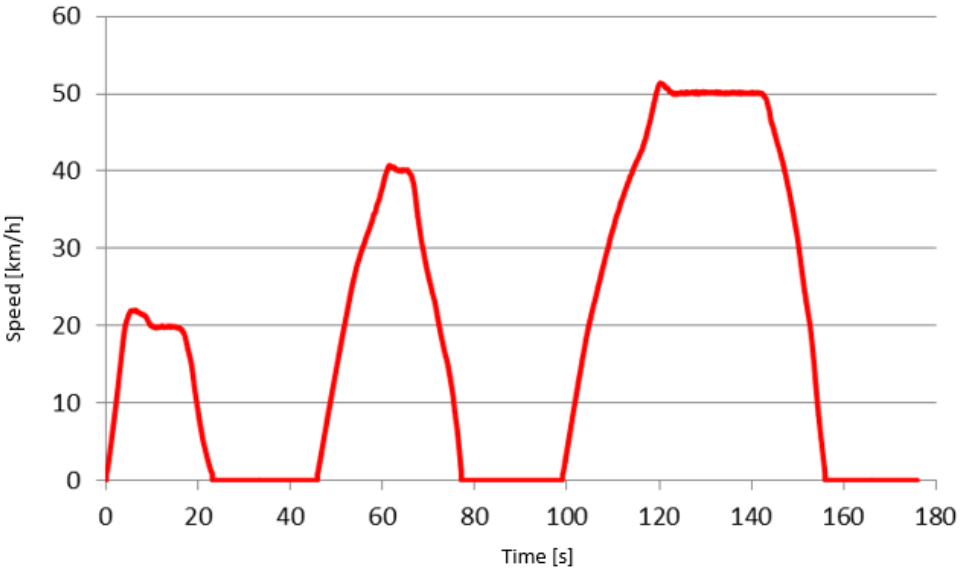


Figure 11: Speed vs time graph at direction 1

Total distance (m)	919,76
Total time (s)	176
Energy consumption (kWh/100 km)	54,80
Average speed (km/h)	18,89

Test 3:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	22,6°C	100,2 kPa	2,8 m/s	55,4 %

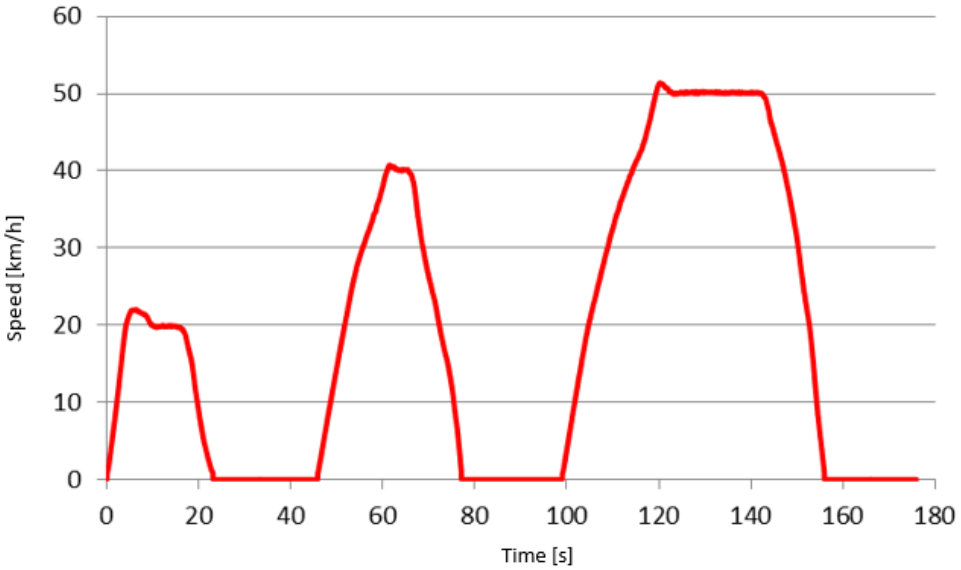


Figure 12: Speed vs time graph at direction 2

Total distance (m)	922,55
Total time (s)	174
Energy consumption (kWh/100 km)	56,36
Average speed (km/h)	19,09

Test cycle SORT 3

Test 1:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	29,1°C	100,3 kPa	2,4 m/s	37,6 %

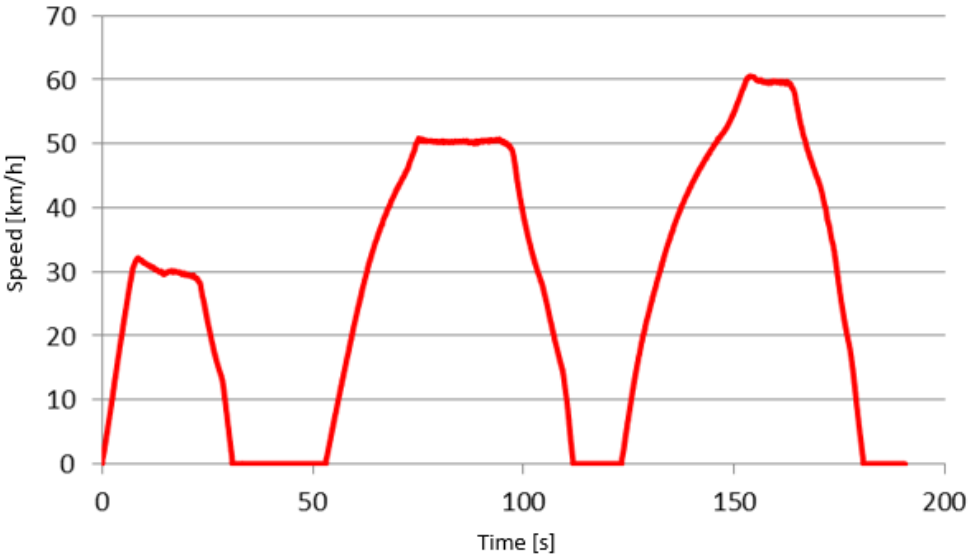


Figure 13: Speed vs time graph at direction 1

Total distance (m)	1449,66
Total time (s)	188
Energy consumption (kWh/100 km)	51,87
Average speed (km/h)	27,75

Test 1:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	29,1°C	100,3 kPa	2,4 m/s	37,6 %

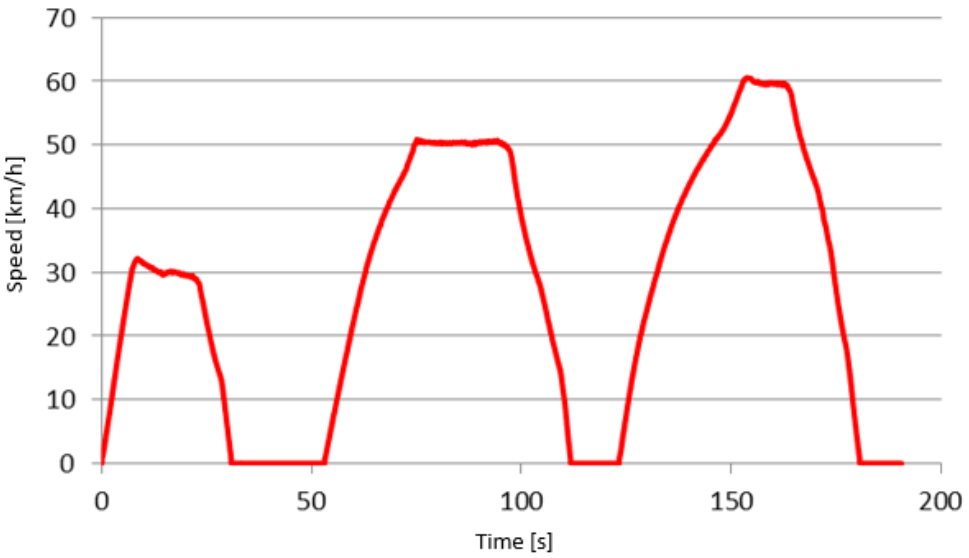


Figure 14: Speed vs time graph at direction 2

Total distance (m)	1455
Total time (s)	195
Energy consumption (kWh/100 km)	52,03
Average speed (km/h)	26,88

Test 2:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	29,1°C	100,3 kPa	2,4 m/s	37,6 %

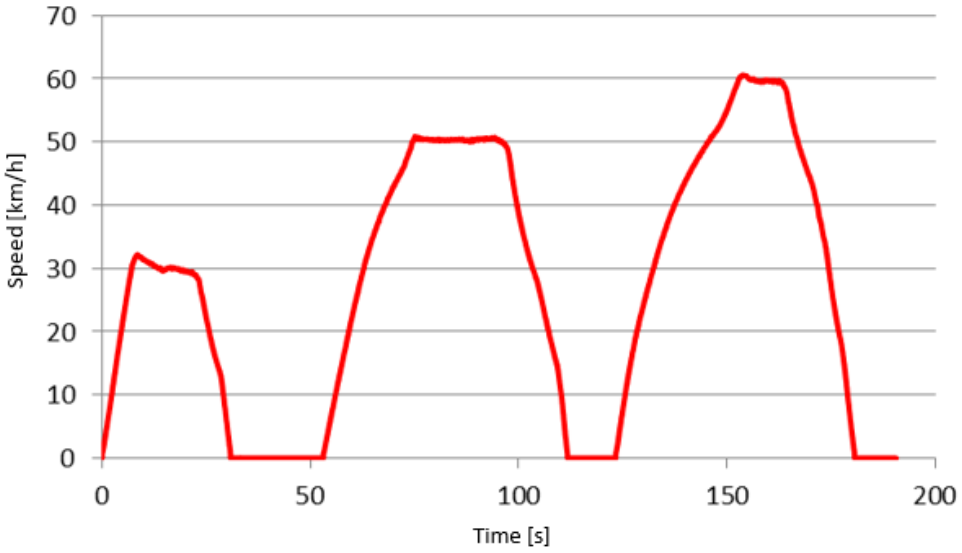


Figure 15: Speed vs time graph at direction 1

Total distance (m)	1449,66
Total time (s)	190
Energy consumption (kWh/100 km)	51,52
Average speed (km/h)	27,49

Test 2:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	29,1°C	100,3 kPa	2,4 m/s	37,6 %

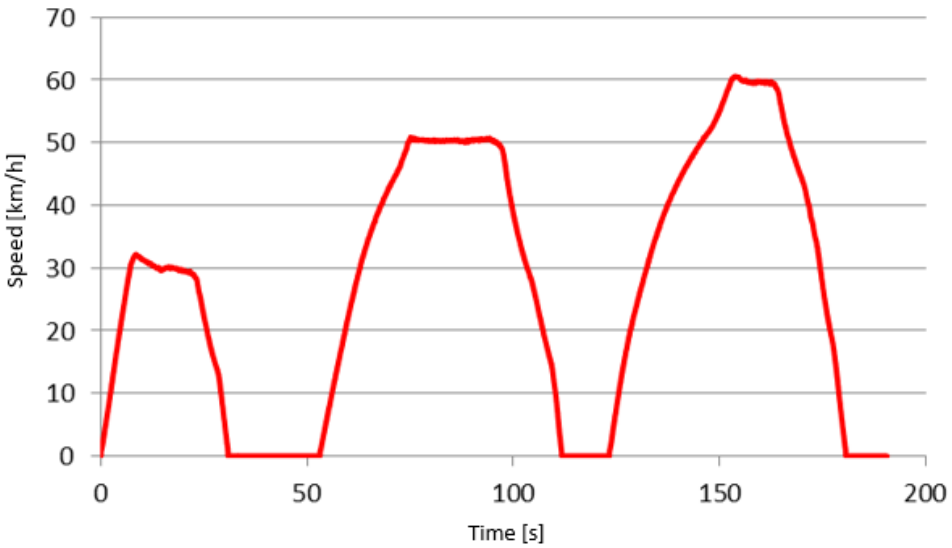


Figure 16: Speed vs time graph at direction 2

Total distance (m)	1454,92
Total time (s)	190
Energy consumption (kWh/100 km)	51,69
Average speed (km/h)	27,31

Test 3:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	29,1°C	100,3 kPa	2,4 m/s	37,6 %

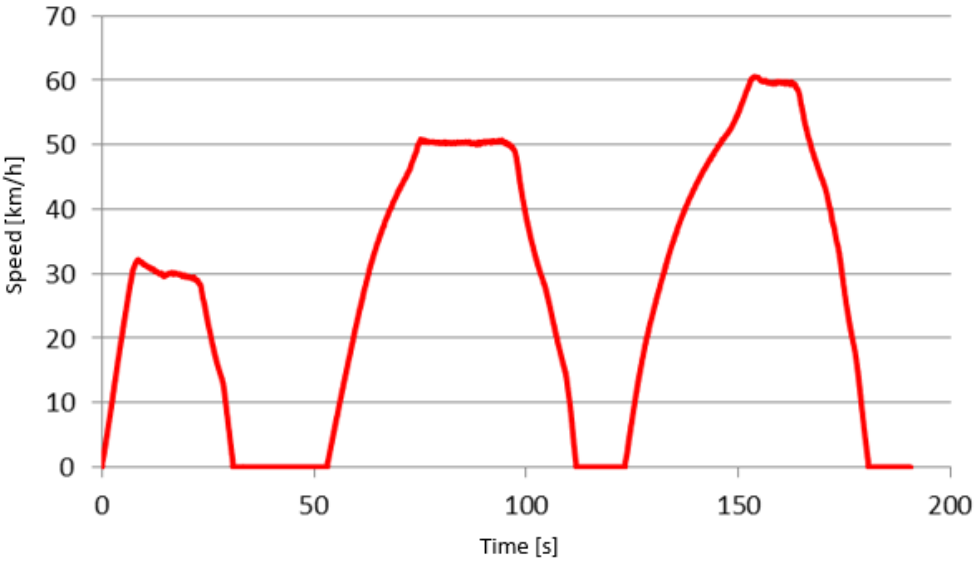


Figure 17: Speed vs time graph at direction 1

Total distance (m)	1450,43
Total time (s)	192
Energy consumption (kWh/100 km)	51,29
Average speed (km/h)	27,29

Test 3:

Date	Ambient T.	Pressure	Wind Speed	Relative Humidity
18.05.2021	29,1°C	100,3 kPa	2,4 m/s	37,6 %

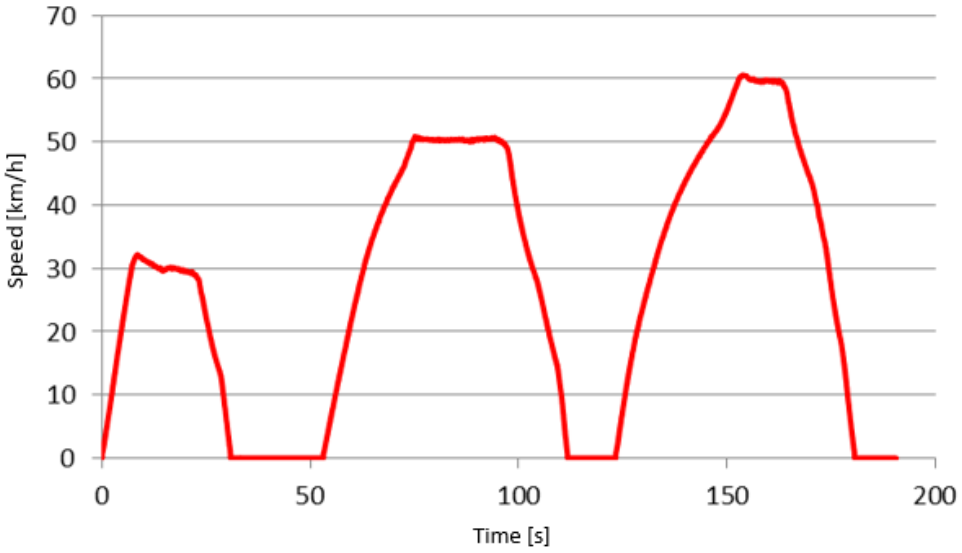


Figure 18: Speed vs time graph at direction 2

Total distance (m)	1454,64
Total time (s)	191
Energy consumption (kWh/100 km)	51,83
Average speed (km/h)	27,39

Energy Consumption

SORT 1		
Test 1	Average Speed (km/h)	12,56
	Energy consumption (kWh/100 km)	60,44
Test 2	Average Speed (km/h)	12,46
	Energy consumption (kWh/100 km)	60,88
Test 3	Average Speed (km/h)	12,62
	Energy consumption (kWh/100 km)	60,63

SORT 2		
Test 1	Average Speed (km/h)	19,13
	Energy consumption (kWh/100 km)	55,37
Test 2	Average Speed (km/h)	18,95
	Energy consumption (kWh/100 km)	55,51
Test 3	Average Speed (km/h)	18,99
	Energy consumption (kWh/100 km)	55,58

SORT 3		
Test 1	Average Speed (km/h)	27,32
	Energy consumption (kWh/100 km)	51,95
Test 2	Average Speed (km/h)	27,40
	Energy consumption (kWh/100 km)	51,60
Test 3	Average Speed (km/h)	27,34
	Energy consumption (kWh/100 km)	51,56

	Average Speed (km/h)	**Energy consumption (kWh/100 km)**
SORT 1	12,55	60,65
SORT 2	19,02	55,49
SORT 3	27,35	51,70

Performance Measurements		
Acceleration	Time elapsed (s) Direction A	Time elapsed (s) Direction B
from 0 to 50 metres	7,78	7,03
from 0 to 100 metres	11,06	10,26
from 0 to 200 metres	16,22	15,39
from 0 to 300 metres	20,56	19,73
from 0 to 400 metres	N/A	N/A
from 0 to 500 metres	N/A	N/A
from 0 to 30 km/h	4,90	3,79
from 0 to 50 km/h	8,28	7,23
from 30 to 50 km/h	3,38	3,44

7. CONCLUSION AND STATEMENT OF CONFORMITY

The vehicle for which the identification number is given on the cover page was tested according to SORT 2014. There is no pass/fail criteria for SORT testing and the results are given within the report.

Remarks: N/A

Authorized expert
H.Anıl Kolukırık

OPTİVAL BELGELENDİRME HİZMETLERİ A.Ş.
Evliya Çelebi Mh. Küme Sk.
Tuzla Ticaret Merkezi Sit. No: 2C/15 Tuzla/İST.
Tuzla V.D: 544 078 0129

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