Proving Ground Safety Manual

Proving Ground Boxberg

BOSCH
Technik fürs Leben

Welcome to Bosch Proving Ground Boxberg

The cornerstone for the founding of the proving ground was laid in the development of systems for active safety which aids the stabilising of vehicles leading to the avoidance of accidents.

Please read through the following Proving Ground Safety Manual carefully to assure a problem-free time and maximum safety for your tests. The following rules are binding for all users.

We reserve the right to enforce our rules and take appropriate action in cases of non-compliance.

Every user must read the Proving Ground Safety Manual and must inform themselves of changes or new editions. The newest editions or changes are available through the web portal.

The PBX Team wish you much success and a safe, accident-free stay during your testing-time on the proving ground!

Contacts

Contact persons PBX		Dial: 07930-600
Technical Management Joachim.Schorr@bosch.com		-220
Commercial Management Andreas.Wachter@bosch.com		-257
Marketing and customer services Boxberg.Customerservice@bosch.com	▶ Bookings and control of exclusive tests (events) ▶ Invoices ▶ Bids and rate options ▶ Video and photo permit	-256 -233 -365
Secretary Office Lea.Weckesser@bosch.com	▶ Assistant	-225
Control Centre Boxberg.Pruefzentrum@bosch.com	▶ Standard bookings (Testing) ▶ Track and facility availability ▶ Control and regulation of testing ▶ Serving counter for work equipment (e.g., On-Board-Unit) ▶ Delivery and pickup of vehicles ▶ Control of watering and gates ▶ Regulation operating modes Normal-/Special-/Exclusive-Mode	-210 
FDF-Control	▶ Control and regulation of testing ▶ Intervention in case of non-compliances ▶ Control of watering and gates ▶ Regulation operating modes Normal-/Special-/Exclusive-Mode	
Service Workshops Boxberg.Workshop@bosch.com	Services: ▶ Assemblies and changes on vehicles ▶ Safety checks ▶ Repairs ▶ Use and explanation of hired garages	-258 -294
Test and Safety Services Boxberg.Safety@bosch.com	▶ Coordination of special tests ▶ Risk assessments ▶ Track safety	-359
Engineering Services Michael.Karl@bosch.com	Organisation and services for customer specific test drives, e.g. ▶ Verification programs ▶ Driving procedure (e.g. brake bedding procedures) ▶ Standard evaluation tests ▶ Test drives according to test programs	-338 -357 -361
ES (Responsible Electrical Safety) markus.rheinhold@bosch.com	▶ Support for vehicles with alternative drives ▶ Charging infrastructure	-215

Preselection for external calls

▶ 01-

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03	20.08.2019 Flag “Login OBU” added on page 19
04	04.09.2019 “appropriated shoes” in House Rules added on page 67
05	09.10.2019 Registration Utilisation Connecting Road added on page 27
06	09.12.2019 Addition events added in house rules.
07	20.12.2019 Decision guidance exclusive use added on page 23
08	20.12.2019 Safety distance GMS
09	20.19.2019 speed person outside car SWS 1
10	20.19.2019 oversized vehicles – connecting road
11	20.12.2019 no parking in safety zones MFF
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13	19.03.2020 Instructions OBU holder added p. 19
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16	04.05.2020 Report near-misses added p. 19
17	09.06.2020 Safety distances GMS (p.65)/SWS1 (p.51)/HLK (p.47) added.
18	31.07.2020 Overview photos-/film recording added p.7
19	31.07.2020 Requirements track safety briefing (yearly track data) edited p. 20
20	31.07.2020 No parking in front of electric charging stations if no charging p. 11
21	07.10.2020 Temporary changes HGO + driving direction change/passing p. 31ff added.
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28	15.01.2021 120 kph when wet P.31 deleted
29	21.01.2021 Change Overview Access roads/ stop and parking lots
30	01.02.2021 Vehicles with non-serial battery status with lithium cells p. 16
31	26.05.2021 Remark Photos-Film Recording + House Rules according to C/AUP und C/ISP 14.04.2021

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32 06.07.2021 Mail addresses and Responsible Electrical Safety added under “Contacts”.

33 06.07.2021 Changes in chapter “Vehicles with alternative motors” in “Special Vehicles/ Vehicles >7.5 t and “vehicles with non-serial battery status” added.

34 06.07.2021 Changes in chapter “How to get set up” (safety material) in “ Access Control/ On-Board-Unit (OBU) Access Control/ On-Board-Unit (OBU)

35 07.07.2021 Details charging stations added under “Refuelling and electric charging”.

36 07.07.2021 New chapter “Technical Equipment” added.

37 14.07.2021 Information “DPGS Station” added.

38 02.12.2021 Fording and Splash Water Basins: Deviation only after agreement with FDF control

39 02.12.2021 Outriggers during darkness

40 02.12.2021 Additional charging possibilities passenger car workshop

41 02.12.2021 Changing emergency number from 123 to 112

42 09.12.2021 Warning lights via Control Centre.

43 19.01.2022 Chapter OFFROAD PARCOURS added.

44 19.01.2022 Update “Refuelling and electric charging”

45 19.01.2022 Update “Operating Modes”

46 19.05.2022 Update OFFROAD PARCOURS

47 20.05.2022 Parking regulations Update transfer vehicles

48 11.10.2022 Update “Refuelling and electric charging”

49 11.10.2022 Update J-Turn

50 11.10.2022 Update Vehicles with alternative motors

Abbreviations

ACC	Adaptive Cruise Control
ArbSchG	German Occupational Safety Act
BMS	Brake Measurement Track
BSO	Basalt Ost
CIS	Customer Information System
DGPS	Differential Global Positioning System
FDF	Vehicle Dynamic Area
GMS	Noise Measurement Track
GVS	Gravel Track
HGO	High Speed Oval
HLK	Handling Course
HLK1	Outer Handling Course
HLK2	Inner Handling Course
HV	High voltage
ISO	International Organization for Standardization
max	Maximum
MFF	Multi Functional Area
min	Minimum
OBU	On-Board-Unit
PBX	Prüfzentrum Boxberg
PG	Prototype Garage
PSH	Proving Ground Safety Manual
SGH	Hills
StVO	Road Traffic Act
SWS1	Rough Road Track 1
SWS2	Rough Road Track 2
TSS	Test and Safety Service
VEFK	Responsible trained electrician
WDF	Fording and Splash Water Basin
zGG	permissible total weight

GENERAL INFORMATION

1. Opening hours

Monday - Friday: 07:00 - 19:30 Uhr
Track utilisation is possible from 7:30 - 19:00.

Company holidays: 24.12. - 06.01.

Canteen
Monday - Friday: 11:30 -13:00

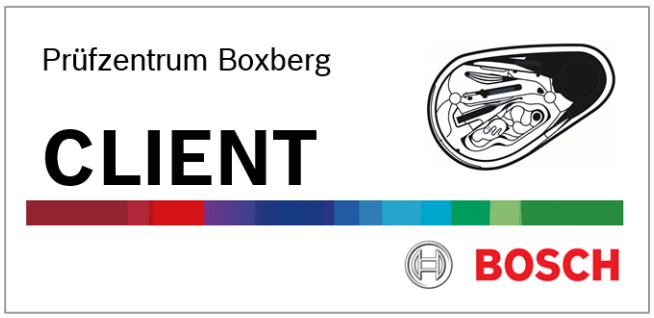
Food orders are possible until 10:00 under http://bit.ly/boxbergspeiseplan or via the ordering service in the control centre area.

2. Access to the proving ground

The following ID's allow entry to the proving ground after registration at the control center:

- Bosch Company ID
- ID for external users and visitors

Your badge must be visible at all times.



3. Visitors

- Visitors must always be accompanied by Bosch personnel.
- The visitor ID must be handed in to the control centre upon leaving.

4. Leaving the proving ground

- Check out at the control centre.
- **All** objects you were issued must be returned by the end of the day.

5. Photos-/Film Recording

- Film-/Sound- and Photo recordings are generally prohibited (House Rules).
- Attendance of media representatives or professional film teams needs to be reported in writing at least two weeks before utilization.
- A photo/film permission needs to be requested by the Customer Service.
  See also: http://wbt.bosch-boxberg.de/PSH/photopermission.pdf
- Film recordings usually require an exclusive booking.
- Aerial views need to be announced and confirmed.
- Commercial and private photos/films are not allowed to be published on the internet or in social networks without permission of PBX management.

6. Building Plan (Building 101)

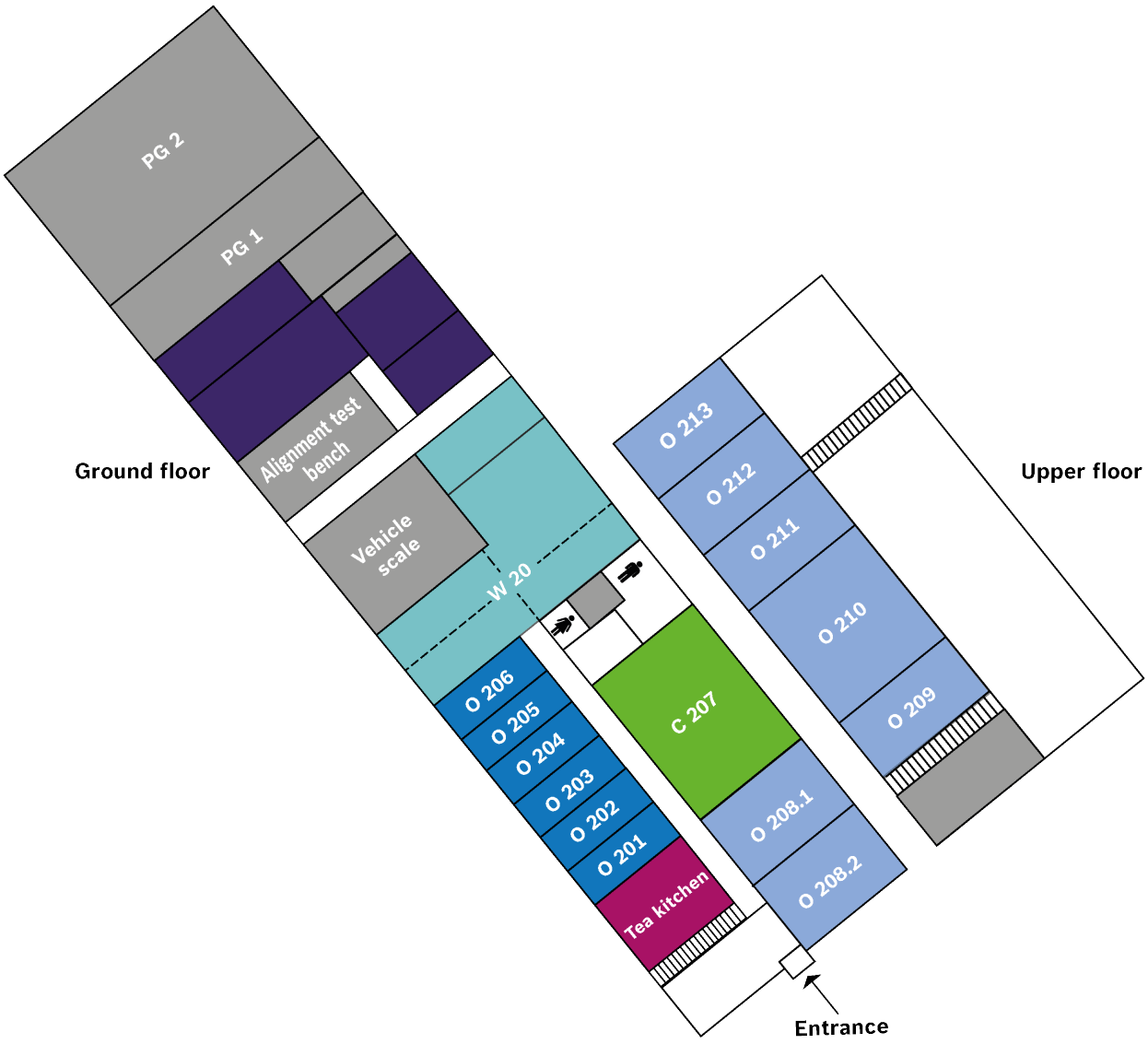
Operating Room	
C 101.1 C 101.2	Commercial Management/ Customer Service
O 102	Test and Safety Service
O 103	Technical Management
O 111	
O 112	
O 113	Engineering Service
O 114	Service Workshop
W 8	Service Workshop

Workshops	
W1-W3, W6	2 cars
W 4, W 5	1 car
W 7	Long-term rental
W 9	Truck workshop with pit
W 10	Truck workshop with brake test bench
Brake TB	Brake test bench
LA	Levelling area

Conference	
C 100	Up to 100 pers.: row seating Up to 50 pers.: table seating
0 105, 0 106	Up to 10 pers.
C 108	Up to 18 pers.

Offices	
O 104 , O 107	Up to 4 pers.
O 109	Up to 8 pers.
O 110	Long-term rental
O 115 - O 121	Long-term rental

Building Plan (Building 102)



Workshop	
W 20	Long-term rental

Conference	
C 207	Up to 25 pers.: table seating

Offices	
O 201 - O 206	Up to 2 pers.
O 208 - O 213	Long-term rental

Rules for the entire building area

On streets in the building area

No testing allowed

Use of sidewalk is mandatory

7. Internet access

- DSL-Access for free use is available in all office rooms.
- Wi-Fi login data is available at the control centre.
- Network and extension cables are available at the control centre.

8. Customer Information System (CIS)

The following information can be found on the CIS in the entrance area:

- Actual use of the different tracks as well as closures
- Times for normal, special and exclusive mode
- Weather data
- Other information

9. DPGS Station

- Sender is located on the FDF-building.

Technical Information	
Data Format	RTCM3 1
Lateral	49,450 861 90
Longitudinal	9,636 901 40
Height	373.220
Frequency	447,96250

10. Workshops

- All work and safety instructions must be followed!
- If you have questions contact the service workshop

11. Vehicle Cleaning

- A pressure washer is available in the fuel-filling-point/car wash area.
- Cleaning tokens are available at the control center.

12. Truck Hall

- The truck hall can be used on a per hour basis after registration at the control centre or workshop.
- For short term use of the truck hall please fill in the yellow forms „Belegungserfassung Nfz-Halle“.

13. Work Safety

- The work safety rules of the different work areas must be followed (e.g. working instructions, safety rules, etc.)

14. Dangerous Substances

- A planned use of hazardous substances, as well as the carrying of hazardous substances greater than customary quantities (for example > 5 litres of engine oil) must be reported with the booking.

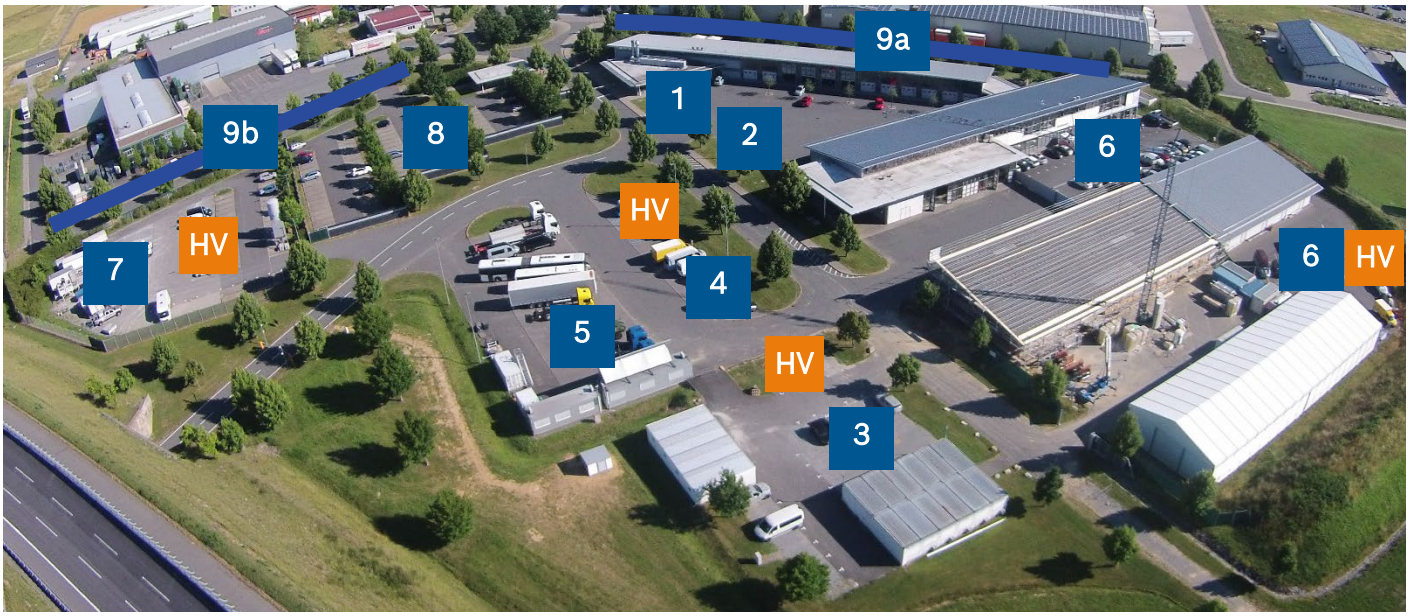
15. Parking regulations

Rules of parking

- Only specially designated areas can be used as parking places.
- Vehicles must be identifiable at all times (e.g., with business card).
- Parking within the building courtyard is only allowed if the vehicle is not a hindrance or a danger to other users.
- Private and transfer vehicles of customers are to be parked at the visitors‘ parking only.

No Parking

- in front of the workshops (exempt booking is existing).
- near the refuelling station.
- In front of electric charging stations, when no charging and on weekends
- near the fire fighters‘ exit.
- on the weekends in the building area or courtyard.



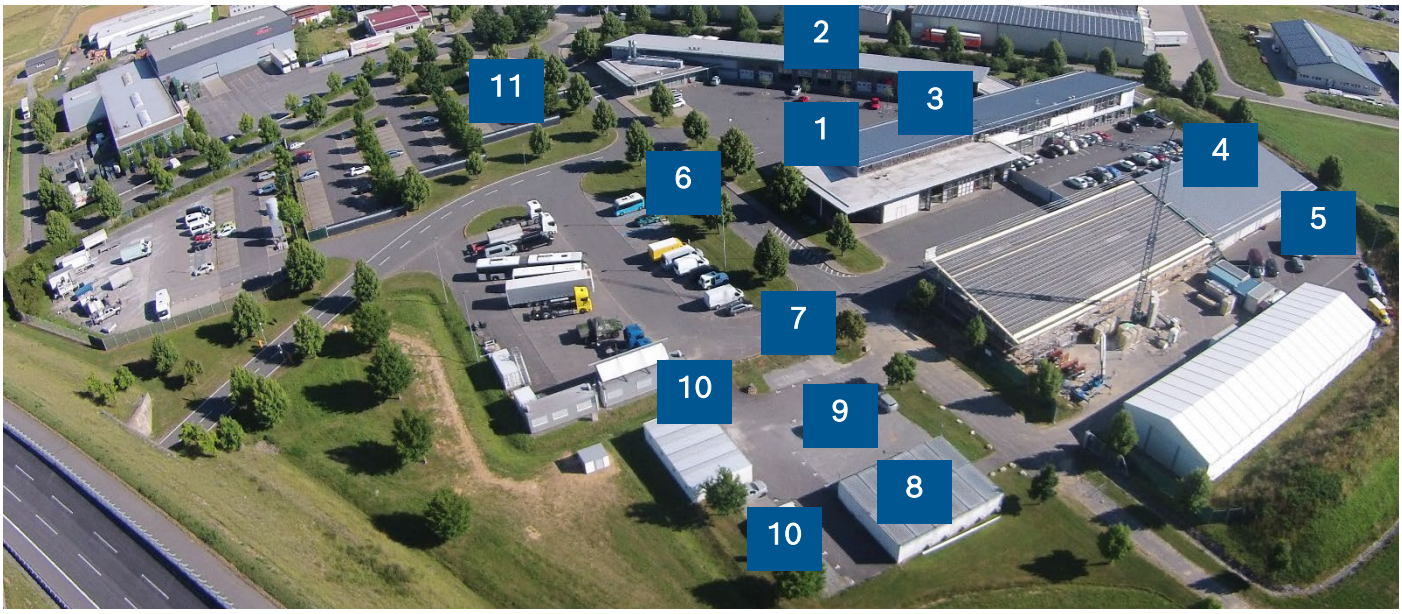
Parking plan

Nr.	Parking areas PBX	
1	Short-time parking	
2	Short-time parking	
3	General parking area	HV
4	General parking area	HV
5	General parking area (trucks only)	
6	Only for prototypes of Robert Bosch GmbH (CC and BEG)	HV
7	Additional parking (cars and trucks)	HV
8	Visitors‘ parking (cars only)	
Nr.	Alternative parking areas	
9a	Werner from Siemens Street along the fence	
9b	Robert-Bosch-Street along the sidewalk company Dölzer	

HV = High Voltage

16. Refuelling and electric charging

- For testing vehicles from Bosch: with the fuel card of the testing vehicle.
- For external testing vehicles: fuel card available at the control centre.
- The technical manager must authorize test vehicle refuelling outside of the fuel or E-loading stations.
- Users have to provide all needed adapters for electric charging.



Nr.	Location	Fuel/port
1	PBX-fuel station	Diesel/ Super Plus (98 ROZ)
2	in all passenger vehicles workshops (*)	1x 16A / 400V (per lane) multiple 16A / 230V Schuko 1x 32A/400V
3	Truck-Hall (*)	multiple 16A / 230V Schuko multiple 16A / 400V CEE 1x 32A / 400V CEE (lane 8.1) 2x 63A / 400V CEE (lane 8.1 + 9.1) 2x 125A / 400V CEE (lane 8.1 + 10.2)
4	CC-Hall (*) (Robert Bosch GmbH only)	1x 16A / 400V CEE 3x 16A / 230V Schuko 1x 32A / 400V CEE 1x 63A / 400V CEE
5	Electric charging station (*) (Robert Bosch GmbH only)	1x DC CCS2 1x DC chademo 1x AC Type 2
6	2 Electric charching stations (*), per station	2x Type 2 plug
7	2 Electric charging stations, per station	1x DC CCS2 1x DC chademo 1x AC Type 2
8	2 Supercharger, per station	1x DC CCS2 – max. 350 kW up to 950 V
9	2 Alpitronics, per station	2 x max. 150 kW up to 950 V 2 x CCS + AC 1 x CCS + GB/T + AC
10	8 Prototype garages (*), per garage	1x 16A / 400V CEE 1x 32A / 400V CEE 2x 16A / 230V Schuko
11	2 Electric charging stations (*) Visitor parking	2x Type 2 plug

(*) → Charging sockets – bring your own charging cables/adapters

1. PBX fuel station

2. Charging plug in all passenger car service workshops

Quantity	Technical data
1	16A / 400V (per lane)
multiple	16A / 230V Schuko plug

3. Charging plug in the Truck Hall

Quantity	Technical data
Multiple	16A / 230V Schuko
Multiple	16A / 400V CEE
1	32A / 400V CEE (Lane 8.1)
2	63A / 400V CEE (Lane 8.1 + 9.1)
2	125A / 400V CEE (Lane 8.1 + 10.2)

4. Mobile charging unit 400V in the CC-Hall – for Robert Bosch GmbH only (secured area)

Technical Details
Charging capacity: 11-44 KW, 400V
Plug types: CCS, Chademo, Type 1

2 Mobile charging units up to 1000V

Technical Details
Charging capacity: 11-44 KW, up to 1000V
Plug types: CCS, Type 1

5. Electric charging station in prototype area - for Robert Bosch GmbH only (secured area)

Quantity	Technical data	
1	DC CCS (Combined Charging System – Type 2-plugs with additional leads)	
1	DC CHAdeMO	
1	AC Type 2 - plug	

6. Electric charging station on the truck parking lot

Quantity	Technical data	
2	AC Type 2 plug – station 1	
2	AC Type 2 plug – station 2	

7. Electric charging station at the prototype garage

Quantity	Technical data	
2	DC CCS (Combined Charging System – Type 2-plugs with additional leads)	
2	DC CHAdeMO	
2	AC Type 2 - plug	

8. Supercharger at the prototype garage

Quantity	Technical data	
2	DC CCS (Combined Charging System – Type 2-plug with additional leads)	

9. Alpitronics up to 950 V

Quantity	Technical data	
2	2 x 150 kW up to 950 V 2 x CCS + AC 1 x CCS + GB/T + AC	

10. Prototype garage with charging plugs

Quantity	Technical data
1	16A / 400V CEE
1	32A / 400V CEE
2	16A / 230V Schuko

11. Elektroladesäulen Besucherparkplatz

Quantity	Technical data	
2x2	AC Type 2 plug	

SAFETY AND REGULATIONS

Emergency and firefighters at the proving ground Boxberg

To ensure the highest degree of safety, special active and passive safety methods have been developed for the proving ground in Boxberg. These include physical building measures such as guard railings, tyre barriers, safety zones, as well as organisational measures such as access control or the coordination of special tests.

- The PBX firefighters and emergency crews are always ready to offer technical help, medical first-aid and to fight fires.
- With the PBX Safety Car the testing is being watched and controlled.
- Cleaning vehicles helps to ensure that the tracks are always in good condition.

Note: Despite the existing wide ranging active and passive safety installations the utilisation of the Proving Ground Boxberg can entail a remaining risk, especially in case of non-compliances.

17. Checklist - Access to testing area

In General

- ☑ Test registration (with complete data of all users) and booking confirmation.
- ☑ User is in possession of a risk assessment according to §§ 5, 6 ArbSchG (Working Conditions Act).
- ☑ User has been instructed according to §12 ArbSchG (Working Conditions Act).
- ☑ Special tests: registration and coordination through Test and Safety Services.

User

- ☑ Valid driver's licence (for relevant vehicle category)
- ☑ User is at least 18 years old
- ☑ Minimum driver's qualification (equiv. Bosch-Basic-Training)
- ☑ Valid Track Safety Briefing (Part 2)
- ☑ Successful participation in the Web-based-training (Part 1)
- ☑ Adequate German or English skills
- ☑ G25 recommended (preventive medical check-up)

In the case of justified suspicion of reduced driving ability PBX reserves the right to control or exclude users from testing!

If the user does not fulfil these requirements, a briefing must take place in order to gain a "limited driving authorisation"*. Therefore the following additional requirements must be met:

- ☑ Valid driver's license for relevant vehicle category (driver and co-driver).
- ☑ The co-driver fulfils requirements above.
- ☑ Co-driver is responsible for the safety briefing according to the document "limited driving authorisation" and compliance with the rules.

Note: This regulation is valid for all tracks, with exception of the high-speed oval (HGO) and the Handling course (HLK). Driving on the HGO and on the HLK if the requirements are not met is only possible in exclusive use with a valid driver's license for the relevant vehicle category. Driving without fulfilled requirements in standard use is strictly forbidden!

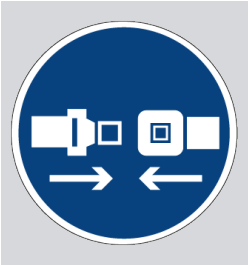
Vehicle

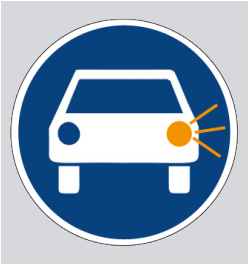
- ☑ The vehicle must be equipped with an on-board-unit (check battery status).
- ☑ The vehicle's safety must be checked prior to and during testing by the driver and accident prevention regulations must be followed at all times e.g. checking the tyre pressure, tyre profile, lights, etc.
- ☑ Vehicle must be equipped with safety vests for every passenger.
- ☑ The vehicle must have up-to-date insurance.
- ☑ Testing with vehicles that are designed for passenger transport, is allowed so long a driver's license according to the actual total weight of the vehicle is existing and there is no other occupants than the operator of the measurement instruments.

*Not applicable for vehicle categories that do not allow a co-driver (e.g. Two-wheelers)

18. General safety rules

- The rules of the StVO (German Road Traffic Act) are binding (follow possible exceptions of PXB).
- Constant attention and consideration for other users.
- Driving according to weather and traffic conditions.
- Consider personal driving limits and the limits of the vehicle (e.g. slowly get accustomed to higher speeds).
- Only test in areas that provide appropriate safety zones - consider possible system failures.
- Adequate safety distance must be kept at all times.
- Safety belt/occupants' passive safety protection must be worn at all times.
- Occupants need the necessary protection for certain testing (e.g. helmets, fireproof clothing).
- Dipped headlights must be on at all times. Check also after re-starting the vehicle.
- Use of high beam lights only if explicit permission is granted.
- Do not leave the vehicle at any time unless it is in designated stop areas.
- When leaving the vehicle in the case of emergency, the safety vest must be worn and seek protection behind guardrails if possible.
- Use of electronic devices (such as smartphones or tablets) by the driver are only allowed when it can be operated hands free and device usage is limited for a short time, such as looking at the display for start/stop.
- When driving in reverse, the driver must make sure there are no other vehicles, persons or obstacles in the area.
- Measuring instruments must be safely fastened and shouldn't limit the driver's sight.
- Load (e.g. sandbags) needs to be fastened correctly and securely fastened. Sliding, tipping or turning of goods needs to be prevented.
- Number of vehicle occupants must be kept to an absolute minimum. Passengers who don't have a relevant task, are only permitted in exceptional circumstances (e.g. teaching new staff).
- Driving through or shifting of barriers (cones, stop barriers, signs) is forbidden.
- Repair work or changes on the test tracks are forbidden.
- The driver must use their turn signal to indicate their intentions according to German Road Traffic Act.
- Special care must be taken while driving in or out of modules, stopping areas and turning areas.
- Warning, forbidden, or command signs must be followed.
- Take regular breaks and ensure optimal personal health (e.g., hydration).
- No physical or mental limitations that might influence the driving are permitted.
- Users need to inform themselves about actual conditions of the track.
- Drinking or eating while driving is not permitted.
- Do not throw any objects from the vehicle.





19. Special Vehicles/ Vehicles >7.5 t

Automated vehicles/ Vehicles with steering machines

- Must be registered when booking.
- Require a driver in the vehicle, who can take over control at any time.

Prototype vehicles

- The prototype driver is responsible for following the security rules of prototype vehicles. Special requests of the manufacturer or of the project manager must be reported to the PBX staff.
- It is possible to securely park prototypes in the prototype hall or prototype garages after reservation via the Webportal.

Vehicles with alternative motors

- Must be reported when booking.
- A rescue data sheet (example) or a comparable document, which shows the position of relevant components in the vehicle must be provided to the PBX by registration.
- Before using the Proving Ground for the first time, the vehicles need to be presented in the Service-Workshop and marked accordingly.
- In case of safety relevant changes on the system, an updated version of the rescue data sheet has to be provided.
- Special care must be taken in case of an accident.

Danger	Colour markings
High voltage (>30 V AC/>60 V DC)	
Gas (CNG, LPG)	
Hydrogen	

For HV-vehicles:

- A designated person in control of the electrical vehicle system has to be defined.
- Working or modifications on the HV system requires the corresponding qualification of DGUV-I 209-093. Level 2 activities have to be agreed with the Responsible Electrical Safety Boxberg (markus.rheinhold@bosch.com).
- Damaged HV vehicles must be parked outside at a safe place defined by PBX. Access to the vehicle is forbidden until the responsible FHV has checked the vehicle. In case safety of HV system cannot be guaranteed, the FHV has the right to permanently forbid access until the vehicle has been checked by OEM specialist.

Charging of High-Voltage vehicles:

- Maximum of one vehicle per room (workshop, garage, hall).
- Highly flammable materials (e.g., gas or tires) must be kept at least 2.5m away from the vehicle.
- The charging vehicle must be marked with a magnetic marker carrier.
- Overnight charging for HV-vehicles in the prototype garages and at the electric charging stations only.
- Charging only in accordance with the manufacturer’s instructions.

Vehicles with non-serial battery status

- Operating regulations for the vehicle/ the battery are to be followed by the user.
- In case of missing manufacturer information vehicles are only allowed to be parked or charged outside or in the prototype garages.
- In case of an unclear battery status and/or a higher risk of fire, adequate measures and parking area needs to be agreed on with PBX.

Driving on the asphalt roads for commercial vehicles with a weight of > 7.5t

Road temperature	max. allowed axelweight at 40 t zGG	Notice for brake tests
< 40°C	10t	-
≥ 40°C	5t	only allowed when brake measurement tracks are watered

Trucks without steerable double axes

- May not drive on tight curves when it's over 40° C.
- The brake measurement track may not be driven on the return lane, but only on the west tail end of the FDF.

Vehicles with open hood

- Test and Safety Service must agree to driving tests with open hood.

Motorbikes/Vehicles with helmet obligation

- Users who are obliged to wear a helmet need to use a headset to ensure communication via OBU. Headsets are available for rent. Appropriated mounting material is available for rent and has to be used.



Vehicles with interior roll-over bars

- Helmets must be worn for tests or speeds that pose a risk of sustaining a head injury.
- Use neck guard as appropriate.

Vehicles with excess width (≥2,55m)

- Register at the control centre before driving on the test tracks.
- Access to the tracks/driving on connecting roads is only permitted with a support vehicle and emergency lights on.
- Within the vehicle dynamic area and the brake measurement track a PBX support vehicle is not necessary. The Control Center must agree to the use of other tracks or fast accesses on the FDF/BMS.

Vehicles with outriggers

- Driving on the tracks with excess width see “Vehicles with excess width (≥2,55m)”.
- Foldable installations of outriggers are preferred.
- Outriggers or additions must be marked with reflecting foil (see below).
- Reflecting foil and support for application is available in the service-workshop.
- Are only allowed to be used in darkness if additional lights are applied in agreement with the service workshop.



Vehicles with metallic matted windows

- Might need an external GPS- receiver, which is available at the Control Centre.

Rabbit vehicles/ Escort vehicles

- Co-utilisation of one rabbit vehicle/one escort vehicle is free of charge
  All additional vehicles will be charged according to the tariff list.
- Magnetic sign “rabbit vehicle” must be applied (available together with the “escort OBU“ at the control centre).
- Must register as rabbit vehicles/escort vehicles when entering the FDF.

20. Warning lights

- The user is responsible for the installation and turning on of the warning lights according to this manual
- The warning lights are issued via the Control Center.
- In case of special technical requirements or defects please contact the service workshop.

Vehicle type	Meaning/Manoeuvre	Warning light
Emergency vehicle **Fire fighters** **Safety Car**	Clear the way Keep your distance Wait for instructions and follow them	
Vehicle with brake trailer **Slow vehicle** **Decelerating vehicle** **Standing vehicle**	Test drives < 30 km/h Brake tests with decelerations > 5m/s² Brake tests until standstill Attention by blinking emergency lights Keep distance	
Vehicles with swaying trailers **Lane changes**	No passing by blinking emergency lights Keep distance	
Service vehicle	Service work Construction or maintenance work Special caution	
Presentation vehicle	Yield right of way (Regulation serves to have fewer exclusive bookings)	

21. Control and Violation of the Law

For your safety and the safety of others, we must make sure all of the Boxberg Proving Ground rules are followed.

If you do not obey the rules of the Boxberg Proving Ground, you become a danger to yourself and others. Collected data (such as GPS signals from the onboard unit or video recordings) is saved for a short time and can be used for investigation purposes in the event of an accident or other incident.

The Boxberg Proving Ground reserves the right to remove your permissions from the proving ground and inform responsible persons about the incident in the event of Proving Ground Safety Manual violations (examples are speed limit violations or parking in restricted areas).

22. Behaviour in case of an accident, fire and other dangerous situations

Dangerous or suspicious situations must be immediately reported to the Control Centre. The instructions of the Control Centre must be followed.

- **Accidents of all kinds (who?/what?/where?/injuries?)**
  - Press the onboard unit emergency button
  - All users must park their vehicle on the side of the road if possible until the alarm: “Accident! Stop test activity immediately” is cleared.
- Turn on your emergency lights.
- You may exit the vehicle only after receiving permission from the Control Centre or in marked parking locations if there is no danger. Park your vehicle on the side of the road and turn on the emergency lights.
- It is obligatory for all persons involved in an accident to be examined by the paramedic. This is the condition for recognizing the accident as a work accident within the occupational activity.
- **Near-misses (e.g. near-miss collision)**
- **Injuries, medical emergencies**
- **Loss of oil, fuel or chemicals**
  - It is strictly forbidden to continue driving!
- **Smoke or fire**
- **Loss of vehicle parts or dirt on the road**
- **Ice, aquaplaning or other dangerous weather conditions**
- **Vehicle or tire breakdown**
- **Parked vehicles outside the parking areas**
- **Wild animal accidents or wild animal sightings**
- **Illegal actions of other users**

Alarm via OBU

Inform the Control Centre


Turn on your emergency lights

23. Accident/incident report

- Serves the statistical analysis, the inspection and the prevention of such accidents.
- The accident/incident report might be written together with the persons involved.

24. Track Safety Briefing

Daily, at 09:00 and 13:15

- Must be attended before using the track for the first time.
- Must not be repeated, if yearly track data is generated.
- The track safety briefing is not transferable to others.
- Registration through the booking portal or through the control centre.

25. PBX Support Vehicle

- Assists by putting up cones.
- Controls testing on the different modules.
- Support vehicle for vehicles with extra-width.

26. Access Control/ On-Board-Unit (OBU)

- The gates can only be entered one vehicle at a time.
- Modules will be automatically closed if the maximum capacity is reached.
- OBU has to be exchanged when battery is low or be connected to an electric source.
- The number of vehicles on the track depends on how many vehicles are using the track at that time and on the safety requirements of each module.

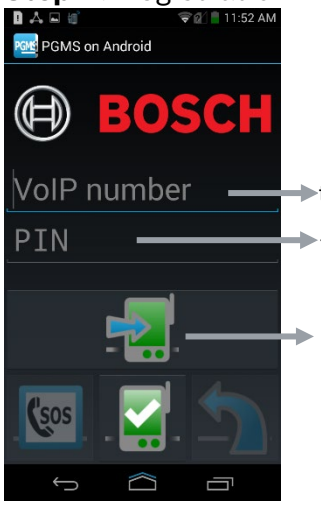
How to get set up

All drivers must login with their personal VoIP-number and PIN. It is not allowed to share this data.

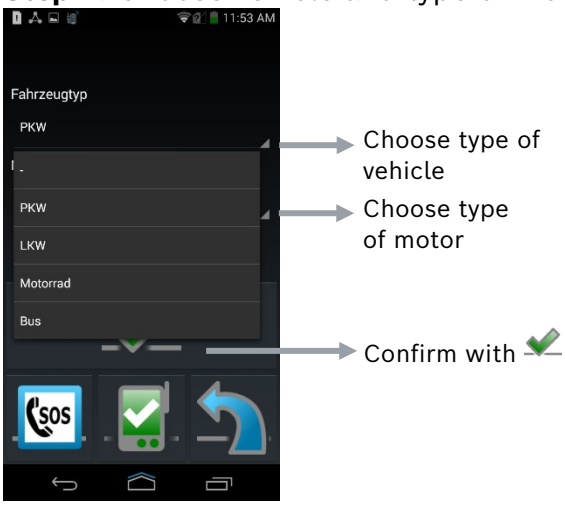
- The OBU must be placed in the special holder on the windshield with suction cups.
- The OBU must be placed and operated so that it doesn't limit the sight of the driver.
- To speak in the OBU it must be turned towards the driver.
- Follow the instructions on the OBU-holder for a safe application.
- In case the risk assessment for tests of the user shows an increased risk due to the OBU-holder, various additional safety material is provided in the service-workshop.

Start the PGMS Application before driving

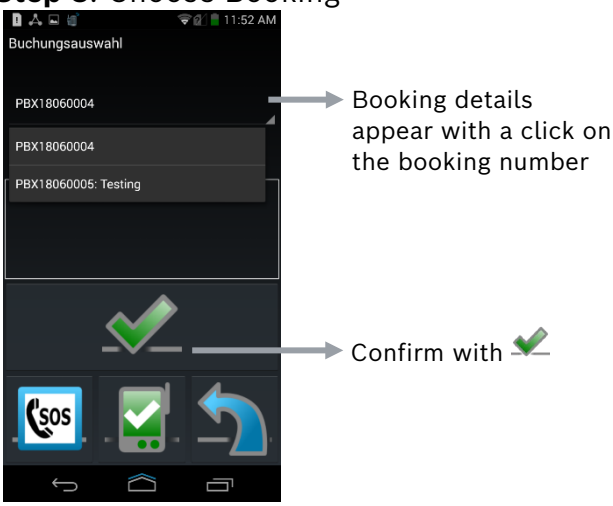
Step 1: Registration with VoIP-Nummer/ PIN



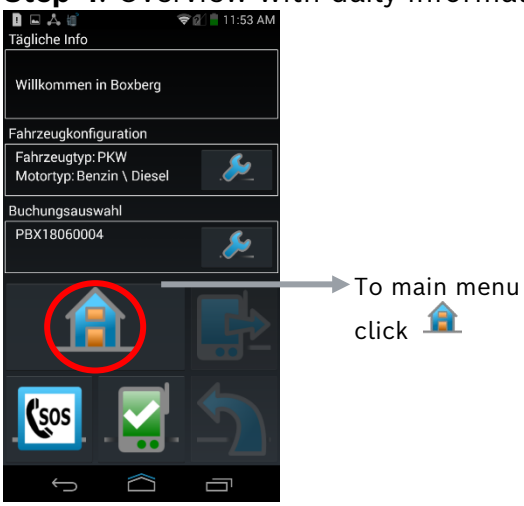
Step 2: Choose vehicle and type of motor



Step 3: Choose Booking

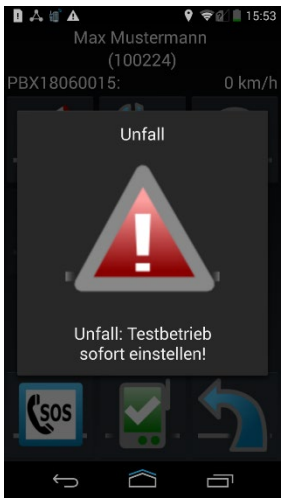


Step 4: Overview with daily information



Main Menu

Alarms



Access Authorisation/ Occupancy

COLOR CODE:

You have the right to drive here, track has available capacity

Entrance not possible, maximum capacity of track is reached

No access authorisation to drive on this module

„i“ stands for information, e.g. different modes on the FDF or closures

More functions


Emergency call to control centre / FDF Operator


Diagnosis: System is ready


Warning (touch for details)


Diagnosis: Error


Menu layer change to top


Access Authorisation and Occupancies


Phone Menu


New text message


Alarm Overview


Vehicle too slow


Vehicle too fast


Do not stop


Wrong direction


Forbidden area


Important message


Accident


Call Control Centre


Call FDF Operator


Dial


Announcement to all users of the module


Telephone book

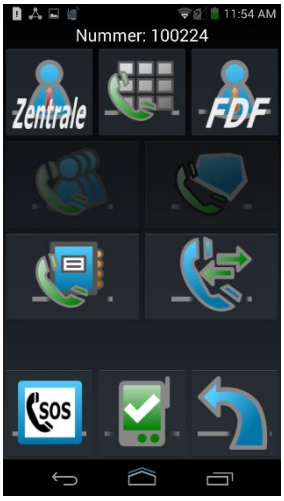

Call list

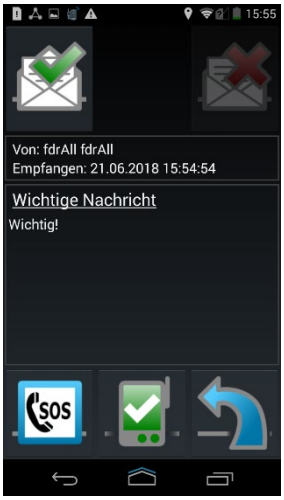

Message read


Message with confirmation of receipt


Message deleted

Phone





27. Operating Modes

The classification of tests is taken from the registration information of the users.

Normal Mode
The normal mode includes all the rules for test drives that are described in the Proving Ground Safety Manual (PSH). If test contents don't match the rules described in the PSH they have to be coordinated by the Test and Safety Services.

Special Mode
The special mode includes all test drives that are not described in the Proving Ground Safety Manual (special tests). The rules for tests in special mode are determined individually in agreement with all participants and staff of PBX in advance. Different aspects must be considered (e.g. the number of participants, speed differences, etc.). Before the special test can be carried out, all participants must take part in a coordination briefing.
The individual rules of the special mode are an addition to the normal mode and reduce the danger of accidents for risky tests. Before special tests are carried out the tracks are closed for standard testing. Vehicles driving on track are asked to leave the module.
Note: Deviations of the PSH, that only require a short timeframe (e.g. 5 sequential stops on the HGO), it is down to the Control Center to coordinate these tests autonomously or after a short consultation with the Test and Safety Service. This process is only possible in case of free capacities on the modules and can't be guaranteed due to requirements of other customers.

Times and Registration for Special Tests

The number of users and times for special tests are limited. Please note, that a registration via the webportal "new booking request- special mode" is needed **(at least 48h before the tests).**

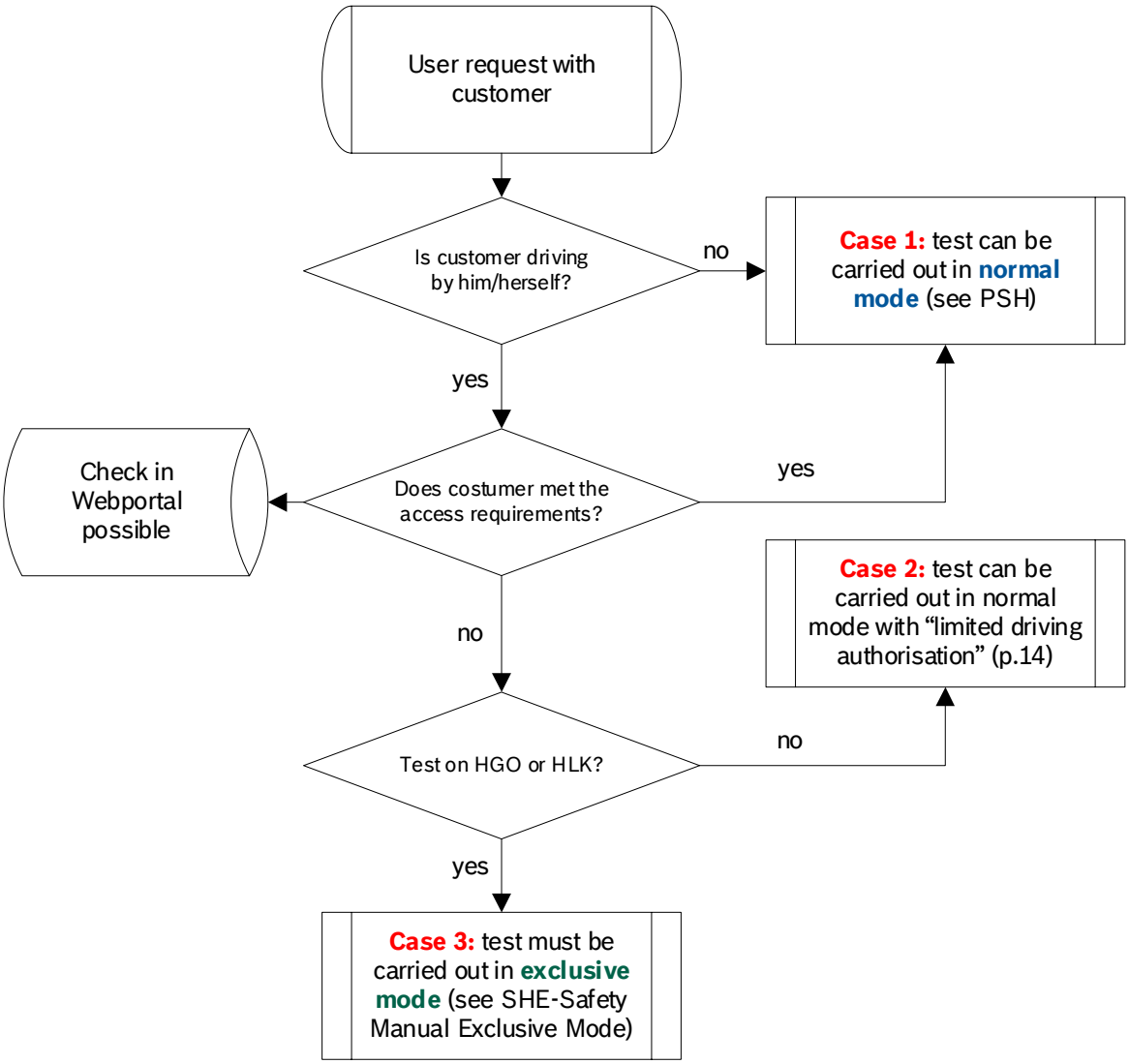
Times for special tests HGO (daily)
07:30 - 9:30
16:30 - 19:00

Times for special tests on other modules on demand.

If you are not sure whether test contents are possible to be carried out in normal mode or special mode, please contact the Test and Safety Service: Boxberg.Safety@bosch.com.

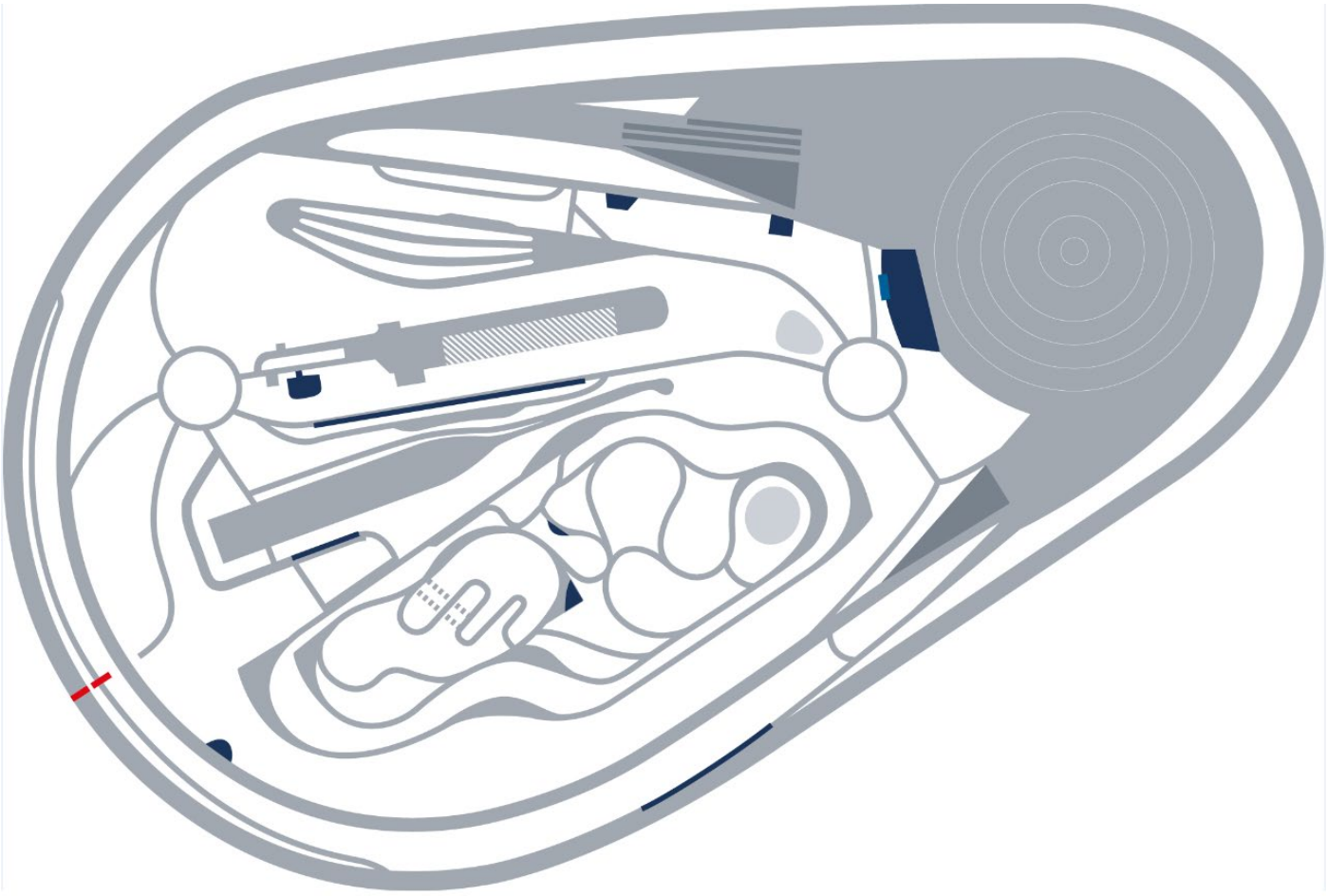
Exclusive Mode

An exclusive mode usually takes place because of security or safety reasons or when tests cannot be realised in normal or special mode testing. The team leader/event manager/team/ in charge is responsible for the coordination and safety of the exclusive used module or area (rules of the Safety Manual – Exclusive are applicable). Please use following decision guidance to find out if your test needs to take place in exclusive mode testing. Of course there is always the possibility to book tracks exclusively for events. Please get in contact with the customer service: Boxberg.Customerservice@bosch.com.



ACCESS ROADS/ STOP AND PARKING LOTS

Color	Access roads/ Stop and parking lots
	Tunnel
	Designated stop and parking lots
	Connection Roads

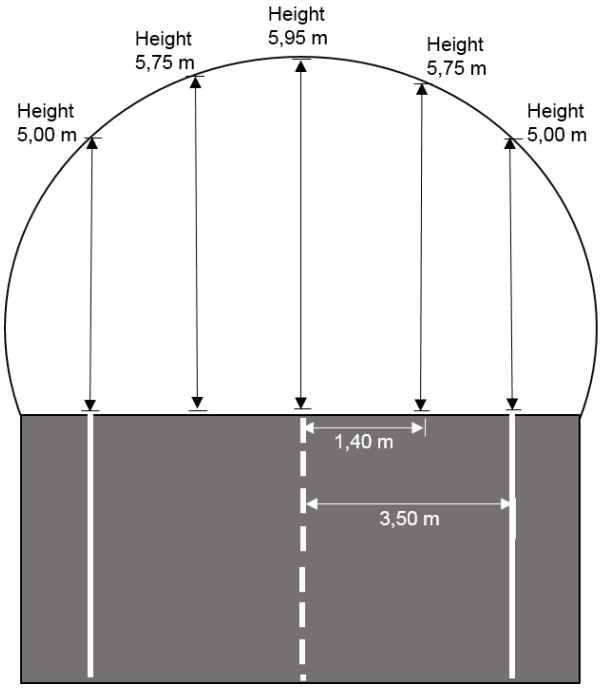


For operating a shuttle from one track to another an appropriate and valid driver licenses as well as a complete track safety briefing is required, a minimum driver's qualification is not needed.

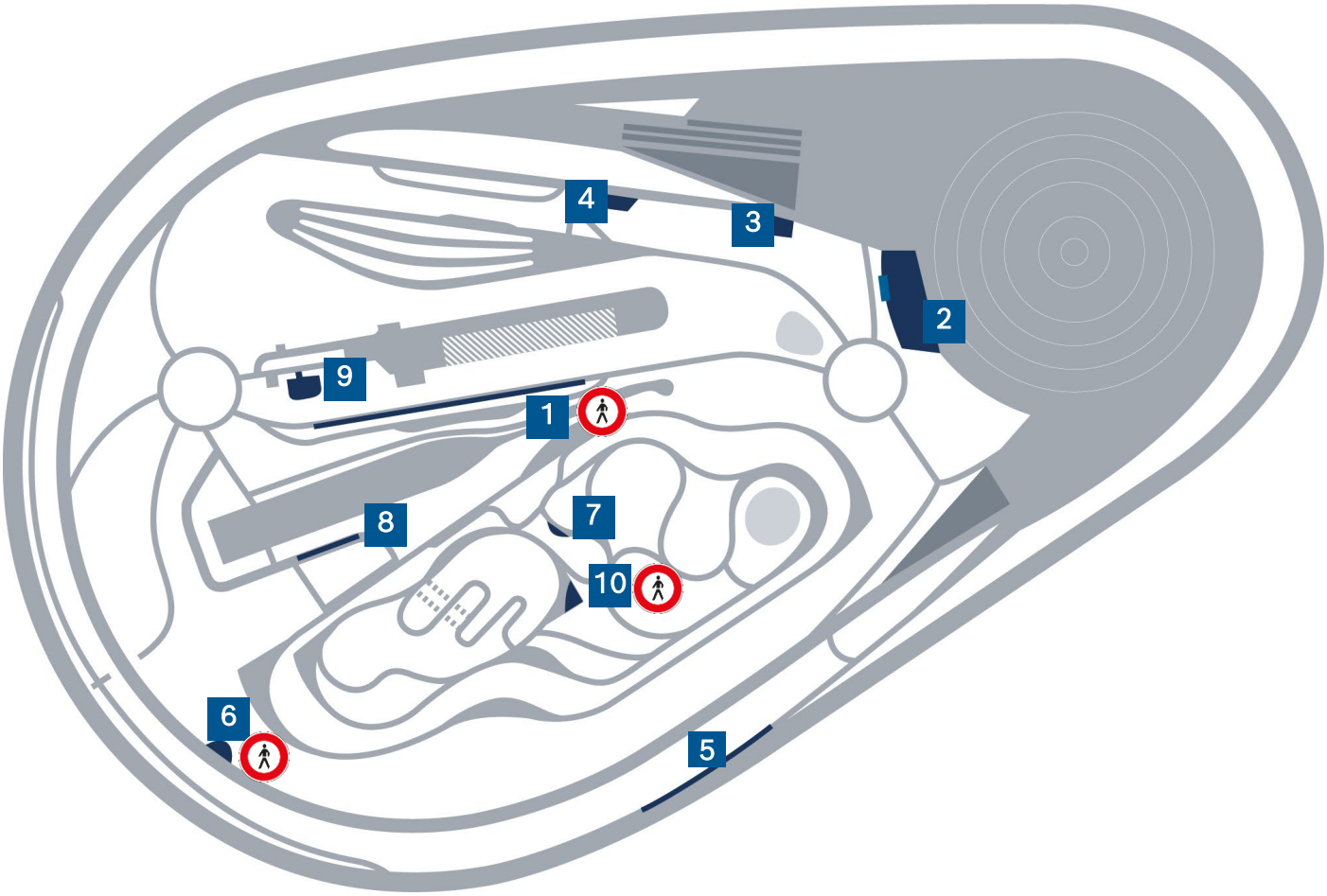
1. Tunnel Portal

- Access to the proving ground is through the tunnel portal only.
- Check size of your vehicle before entering through the tunnel.
- Vehicles greater than 2.55m (excess width) must be announced by the control centre.

Dimension Tunnel



2. Designated stop and parking lots



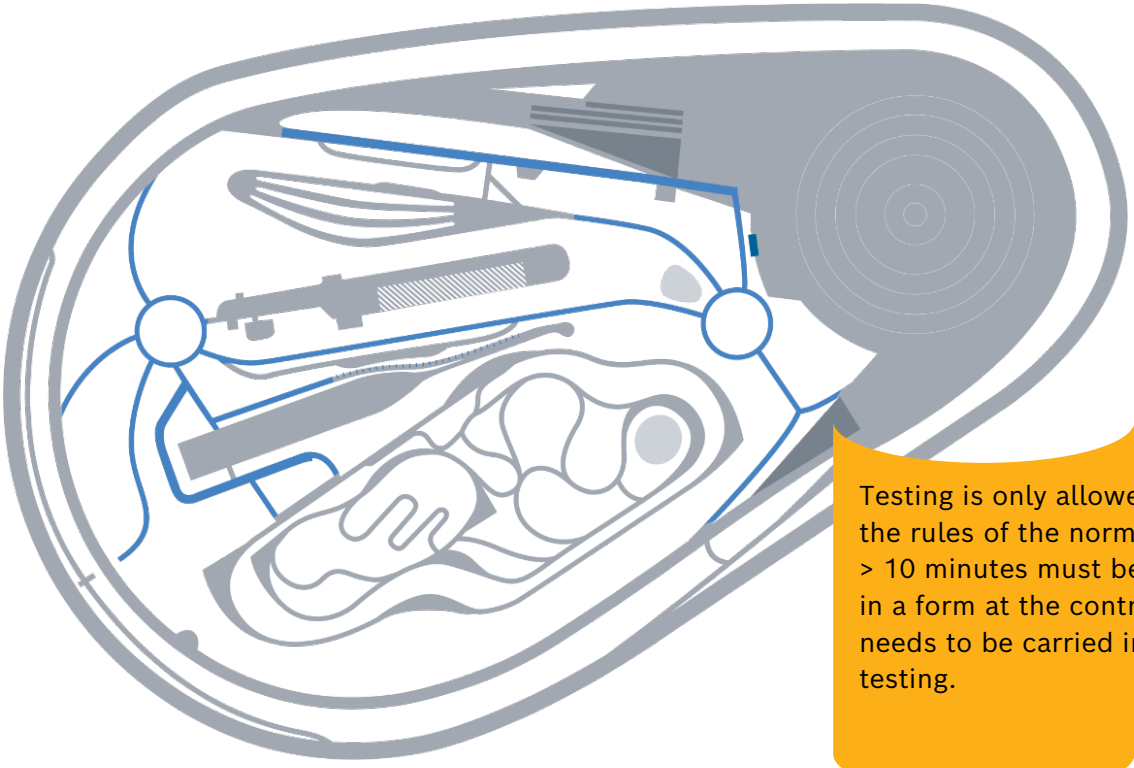
Nr.	Position
1	Measuring strip along the connecting road
2	FDF Parking lot
3	Evaluation Parking 1 BMS
4	Evaluation Parking 2 BMS
5	Evaluation Parking HGO
6	Turning area extension FDF/BSO
7	Stopping space HLK
8	Evaluation Parking HLK
9	Evaluation Parking SWS 1
10	Evaluation Parking HLK2

*Evaluation Parking HLK2 (3) prior for trucks. With vehicles, that could limit the sight of bypassing vehicles (e.g. due to covered side windows) the evaluation parkings FDF Parking lot (2) or the evaluation parking 2 BMS (4) are to be used alternatively.

3. Connecting Roads

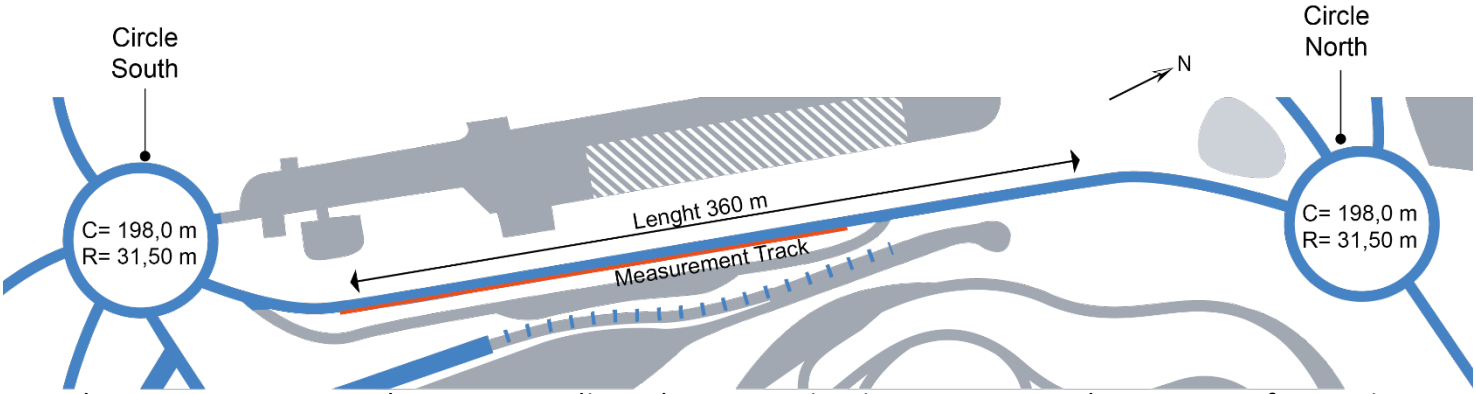
 Normal mode	 Use up to 10 min. free of charge (tunnel portal to circle North)	 No drive-off tests, no brake tests	 Do not leave the vehicle

- By following alarm “Vehicle with access width is entering/leaving the testing area”, all vehicles need to stop at the side of the road and let the vehicle pass.



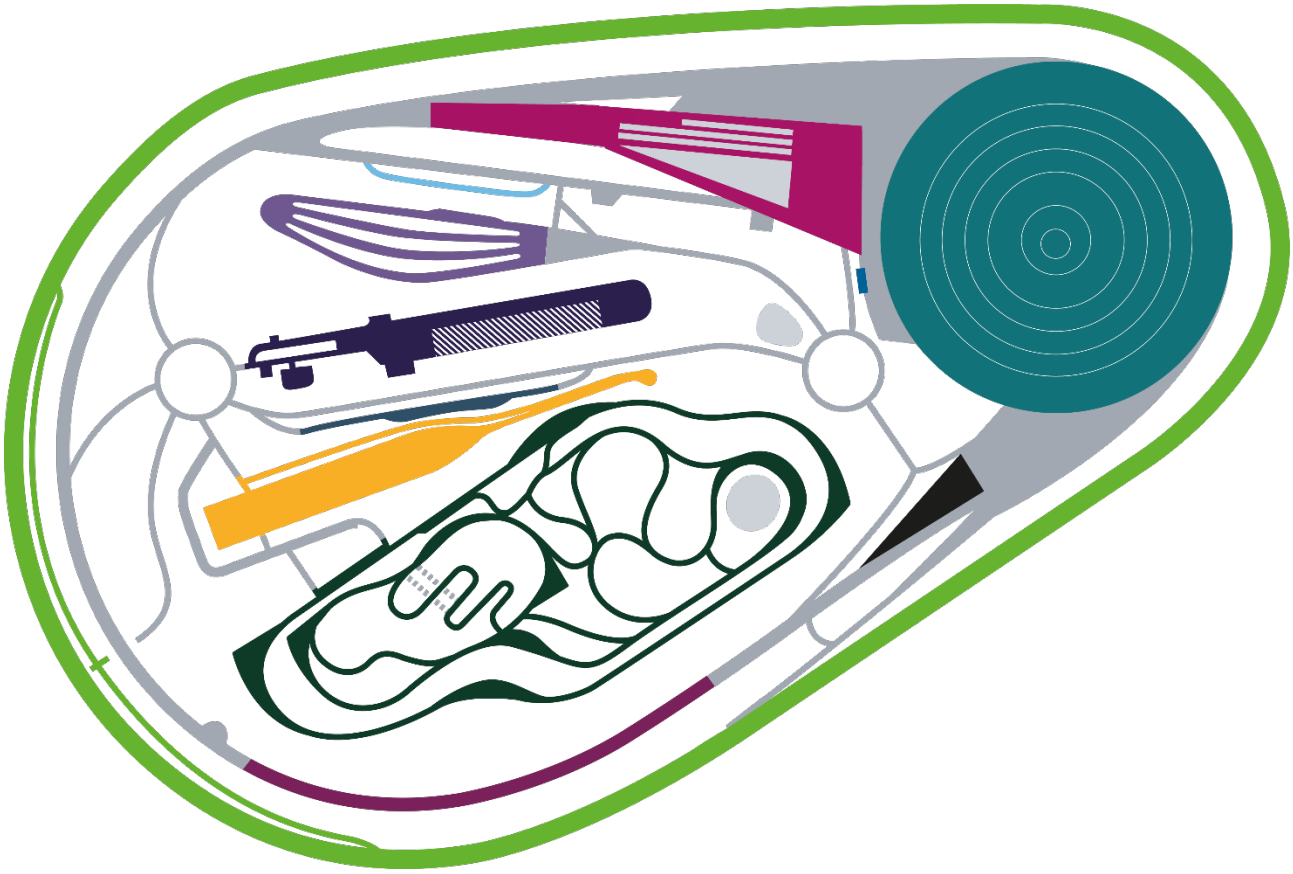
Testing is only allowed, when tests match the rules of the normal mode. Utilisation > 10 minutes must be requested by filling in a form at the control centre. The form needs to be carried in the vehicle during testing.

Circle South, Circle North and Measurement Track



The measurement track serves to adjust the measuring instruments and to prepare for testing.

TRACK MODULES

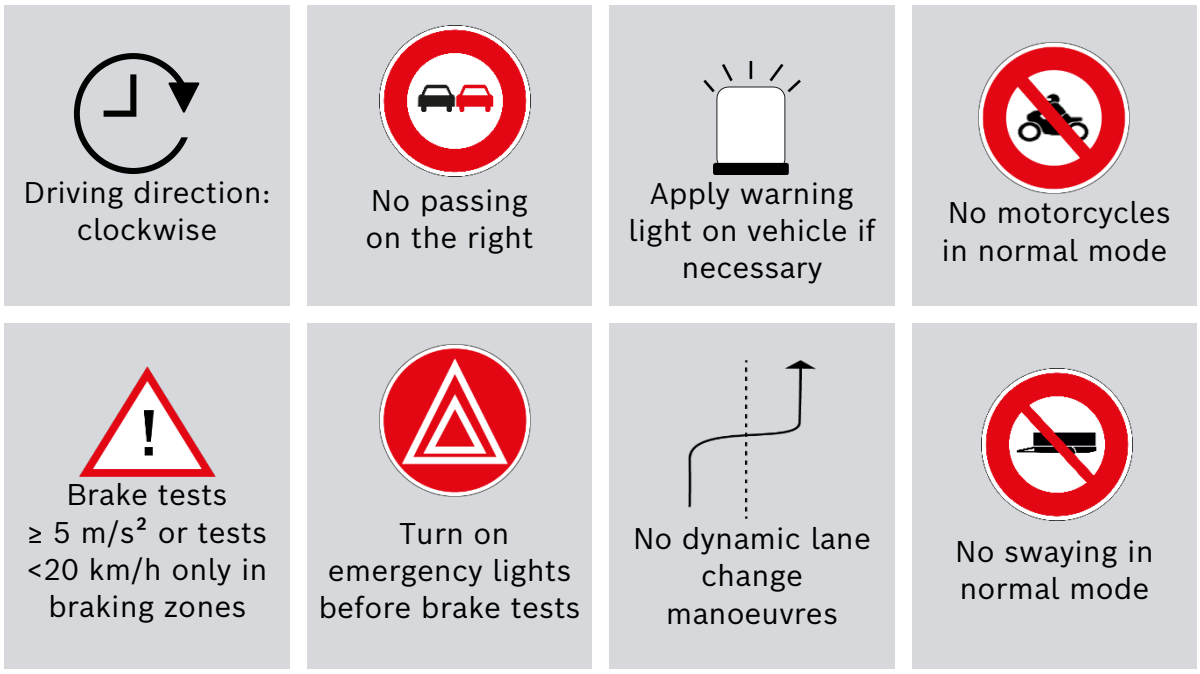


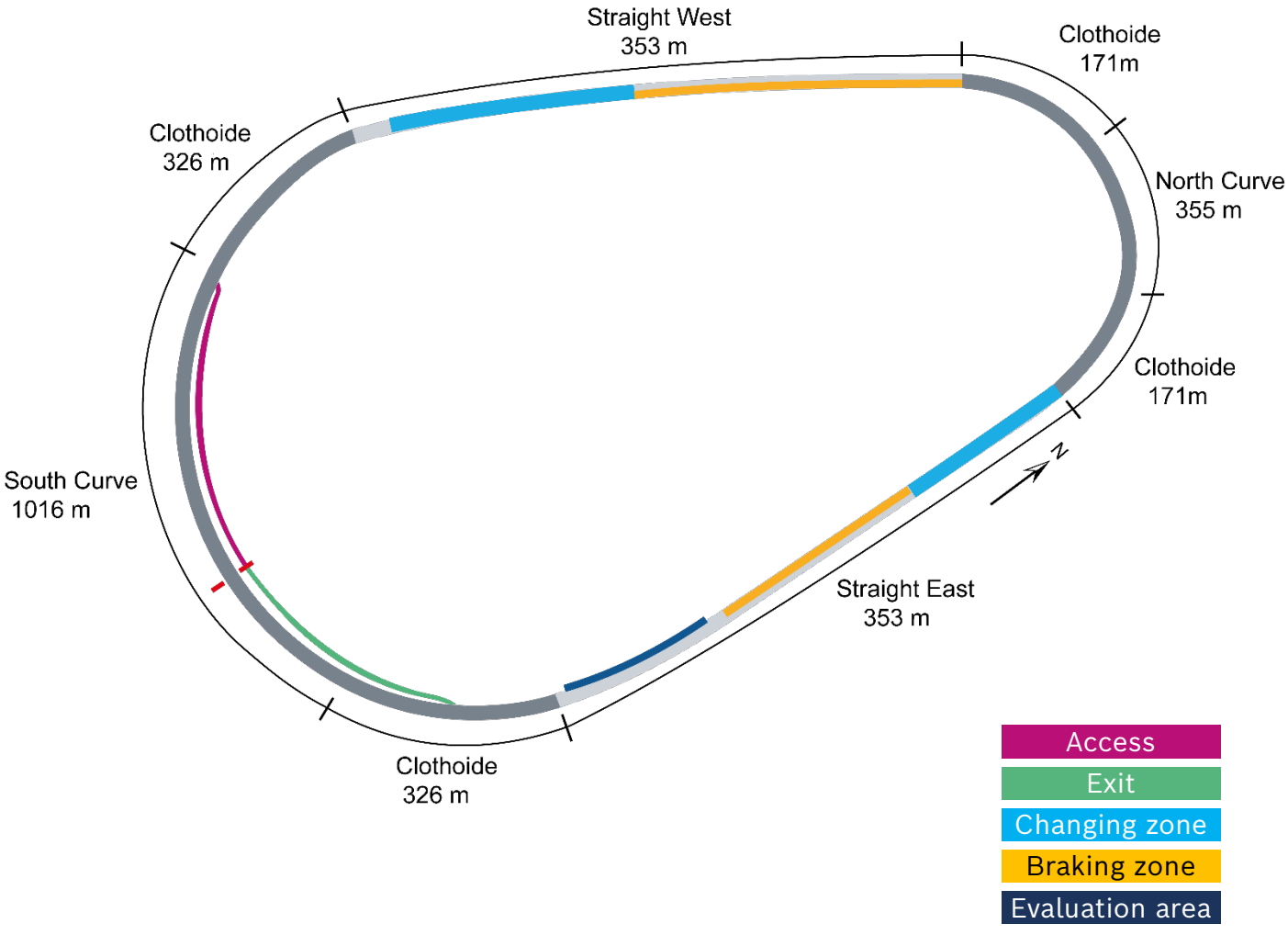
Nr.	Track Modules
1	High Speed Oval (HGO)
2	Dynamic Area (FDF) with pavilion and WC
3	Brake Measurement (BMS) with Basalt West
4	Handling Course (HLK)
5	Multi-function area (MFF)
6	Rough road tracks 1 (SWS1)
7	Rough road tracks 2 (SWS2)
8	Hills (SGH)
9	Blue basalt east (BAO)
10	Water fording (WDF)
11	Gravel track (GVS)

Information about adhesion factors of single track modules can be requested via the Control Center.

1. High Speed Oval (HGO)

Safety Rules High Speed Oval





Speed limits in normal mode if braking zone is free

Allowed speed (km/h)	Emergency lane	Lane 3	Lane 2	Lane 1	Special mode
Maximum speed	Use is only allowed in case of breakdowns or accidents!				
Minimum speed					

- Maximum speed in north curve limited to 160 km/h.
- Slowly get accustomed to higher speeds on the banked curves.
- While driving on banked curves with an active vehicle dynamic controller, the control system can potentially intervene incorrectly.
- Adapt speed and pay special attention by the notice: “Stopped vehicle”.

Track Details

Lane	Length (m)	Width (m)
Emergency	-	3,0
Lane 1	2945	3,75
Lane 2	2967	3,75
Lane 3	2990	3,75

Track Sections	Length (m)	Slope (%)
Straight West	353	1,7
Straight East	353	1,7
North Curve	355 (+ 2x 171)	-
South Curve	1016 (+ 2x 326)	-
Total	3071	-

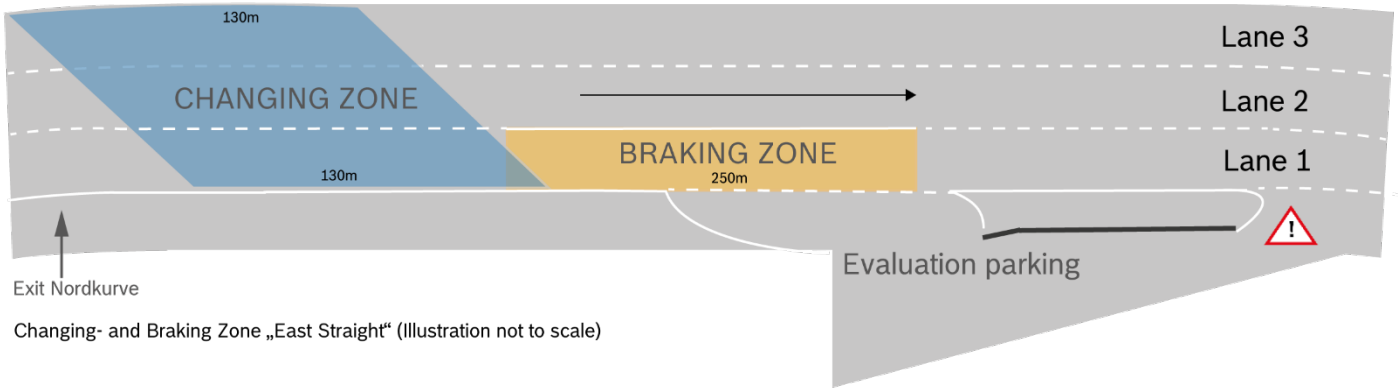
	North curve		South curve	
Middle radius (m)	195		350	
Cross slope of lanes	15% - 65%	8,5° - 33°	8% - 56%	4,5° - 29°
Cross slope of emergency lane	15%	8,5°	8%	4,5°
Side force free (Lane 2)	120 km/h		150 km/h	
V_{max}	160 km/h		250 km/h	

Acceleration Forces South curve	200 km/h	250 km/h
Normal acceleration	1,3 g	1,5 g
Lateral acceleration	0,4 g	0,8 g

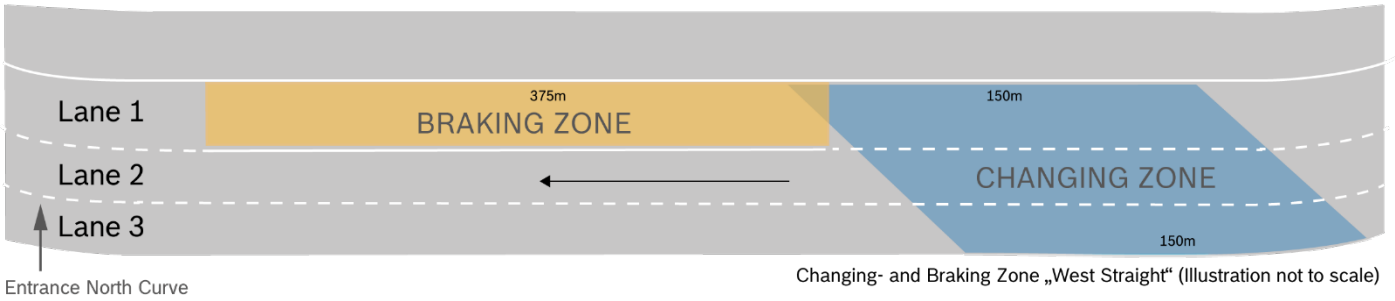
Check tire pressure before doing tests at high speed!

Changing and Braking Zones

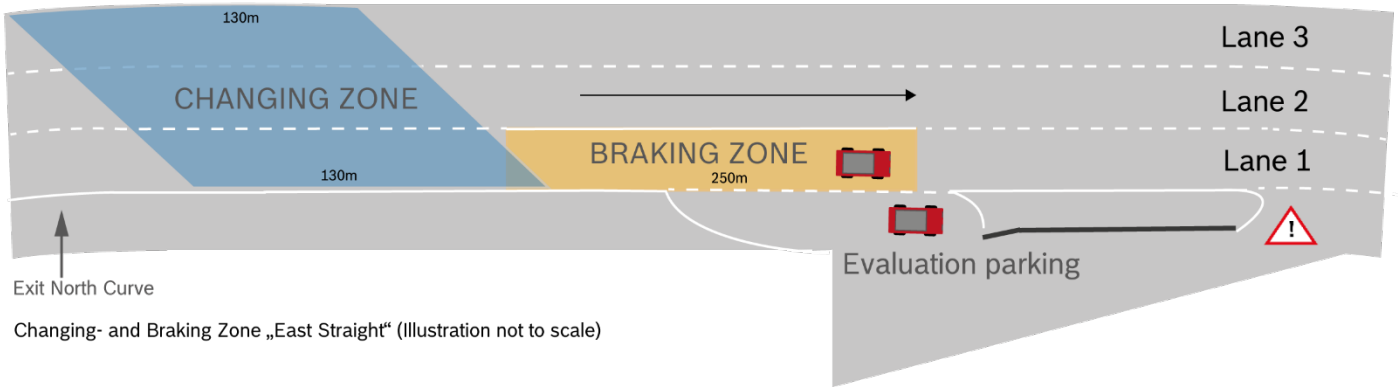
- Brake tests that require decelerations ≥ 5 m/s² or speeds below 20 kph are only allowed to be carried out in the defined braking zones **on lane 1.**
- Before starting the brake test, emergency lights must be turned on.
- Maintain an adequate following distance between yourself and other test vehicles
- As soon as the brake test is completed, it is important to come back to minimum speed as soon as possible.



Changing- and Braking Zone „East Straight“ (Illustration not to scale)



Changing- and Braking Zone „West Straight“ (Illustration not to scale)



Changing- and Braking Zone „East Straight“ (Illustration not to scale)

Speed limits and regulations if changing or braking zones are occupied

	Emergency lane	Lane 3	Lane 2	Lane 1
Maximum speed	Use is only allowed in case of breakdowns or accidents!			 Brake Test: Don't drive on lane 1
Minimum speed				

If the braking zone is already being used by a vehicle, the following maximum and minimum speeds are valid for following cars:

- The braking zones can only actively be used when there is no other vehicle in the changing or braking zones.
- Following vehicles are not allowed to use lane 1 in the brake zone if another vehicle is already using the braking zone.
- When using the braking and changing zones on the east straight be cautious of vehicles driving out of the evaluation parking area.
- Users in the evaluation parking area must also use caution when exiting the area.

Evaluation parking


Vehicles driving out must yield right of way


Only behind the fence (minimum distance 2m)


Limit stay to a minimum

2. Vehicle Dynamics Area (FDF)

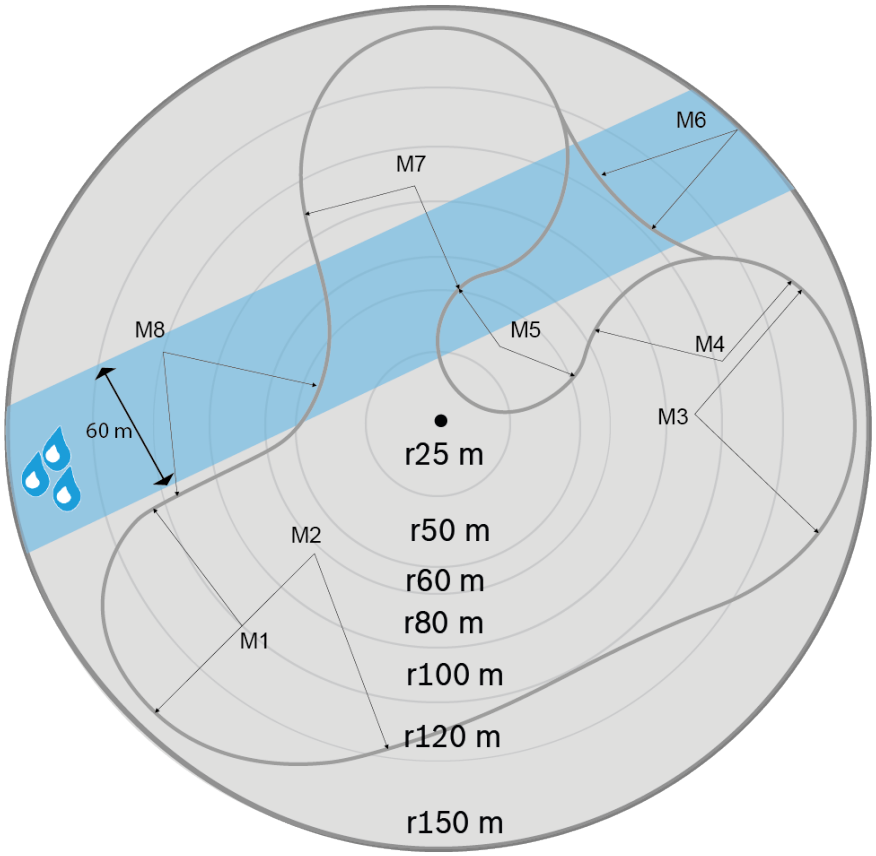
FDF-Control

Meeting room in the pavilion

Sanitary facilities

Watering on request (60 m or partly)

Overview dynamic area with circle radii and handling course



Technical Details Handling Course	
Lane length of smaller course	800 m
Lane length of larger course	1000 m
Lane width	3,5 m

Radii of the circles to the middle	
M1	43,7 m
M2	77,0 m
M3	67,0 m
M4	42,0 m
M5	29,0 m
M6	46,4 m
M7	43,0 m
M8	56,0 m

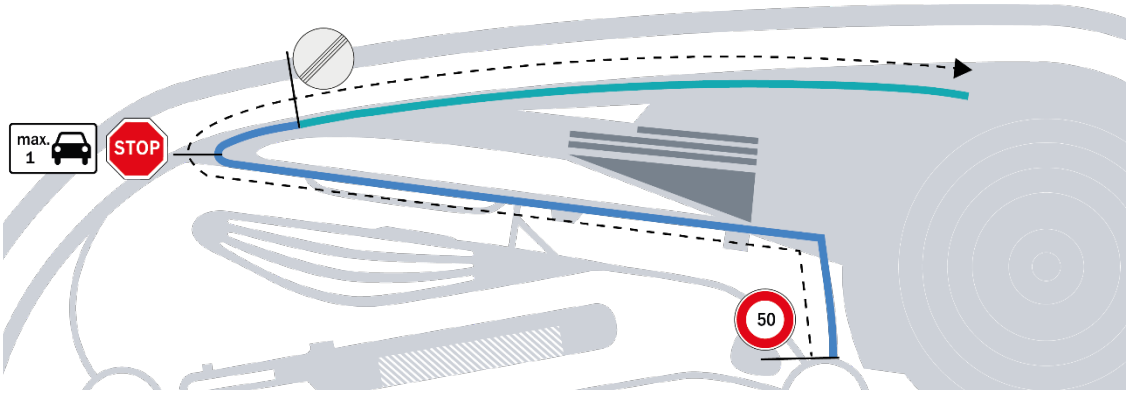
Normal mode WITH FDF Control

Registration	Inform FDF-Control about critical tests	Consider run-off zones	In active testing	Yield right of way in crossing of the fast access

- Register at the FDF-Control via OBU before entering the module.
- Consider the actual testing mode **(lane change/circle manoeuvre)**.
- Max. 1 vehicle in active testing allowed: Test must be stopped when the vehicle in front is still in the testing area.
- The FDF controller must be informed about critical tests (e.g. tests in critical speeds or with high risks of tipping over).
- Vehicles coming in from the fast access have right of way. Stop at the stop marks and only when the crossing is free the test can be started.
- Deregister with the FDF-control after you finished testing via OBU.

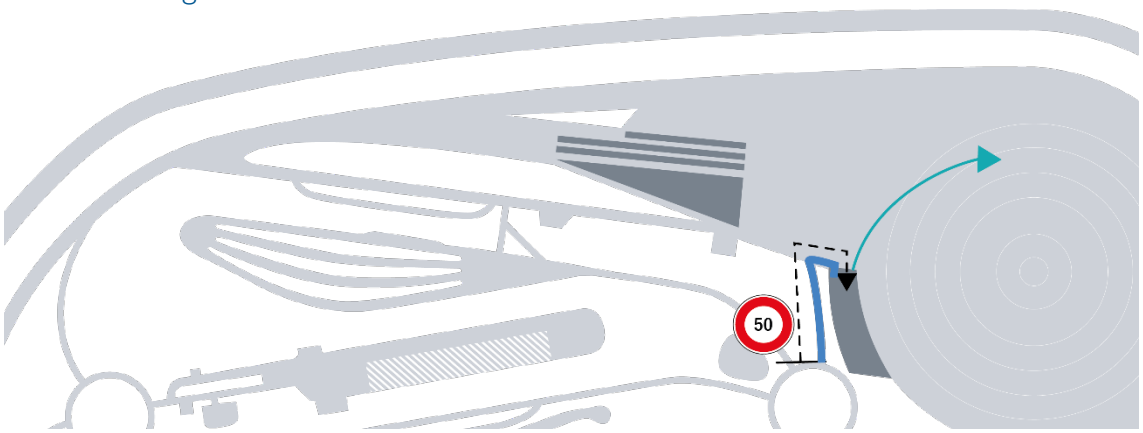
Access possibilities

1 Access West



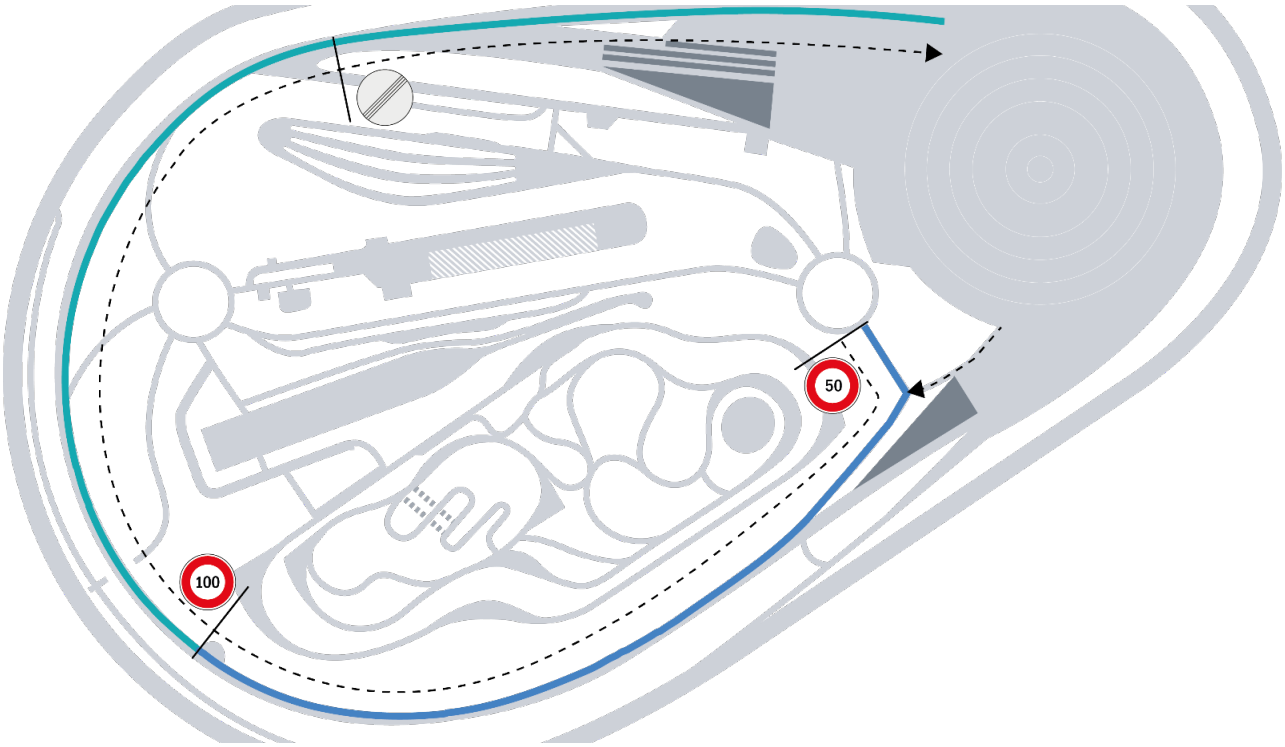
Only during operating mode **lane changes**

2 FDF-Parking Lot



Only during operating mode **circles**

3 Fast Access West



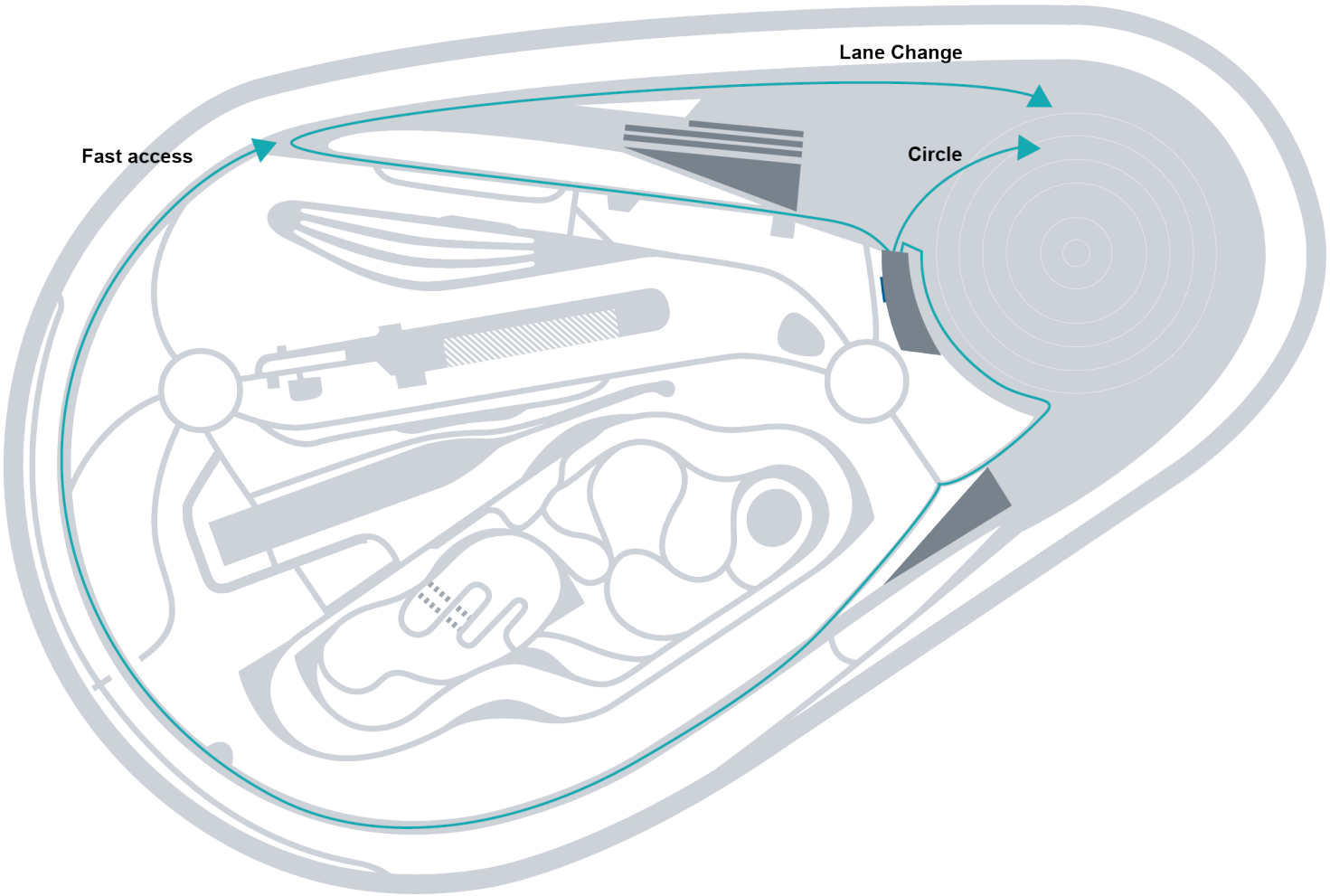
Technical Details

Total length through FDF area (m)	2600
Width of lanes totally (m)	6 (2 x 3)
Radius middle (m)	307
Transverse gradient of lane - south curve	5%
Transverse gradient of lane - access of dynamic area (West)	0,76%
Lane attitude turning bend	0,5%
Lane attitude middle curve area	1,1%
Lane attitude access of dynamic area (West)	0,9%

Normal mode WITHOUT FDF control

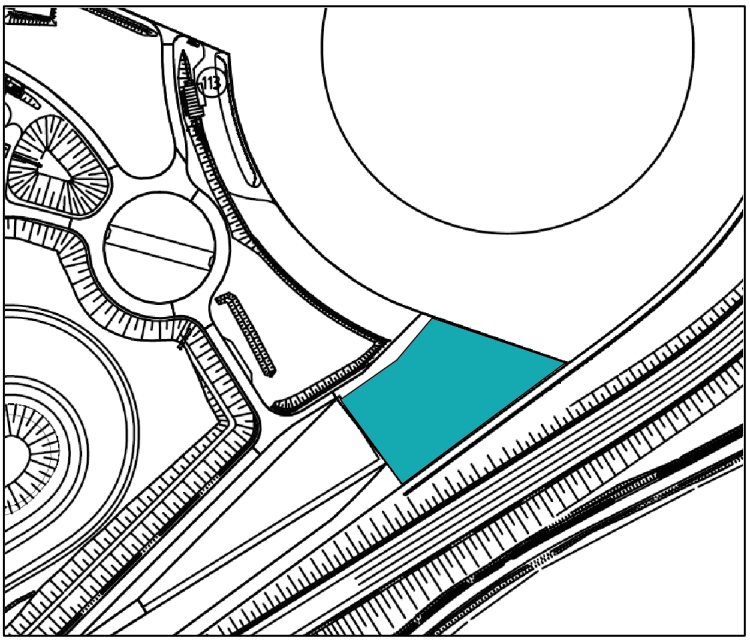
- Regardless of the test manoeuvre, all tests must be started from the FDF parking area.
- Entry only as defined below.
- Consider the actual testing mode **(lane change/circle manoeuvre)**.
- Max. 1 vehicle in active testing allowed: All other users must wait for the return of the active user on the FDF parking. Only then can the next test be started.
- Adhere to the same speed limits as in the normal mode with FDF-Control.
- The Control Centre must be informed about critical tests (e.g. tests with dangerous speeds or with high risks of tipping over).

Access possibilities



Mixed modes with FDF-Control (small circles)

30 Mixed mode	FDF Registration	max. 1 In active testing
Only in operation mode lane changes	ACC measuring track not in use	No dynamic testing ($ay_{lim} \leq 0{,}5$ g)

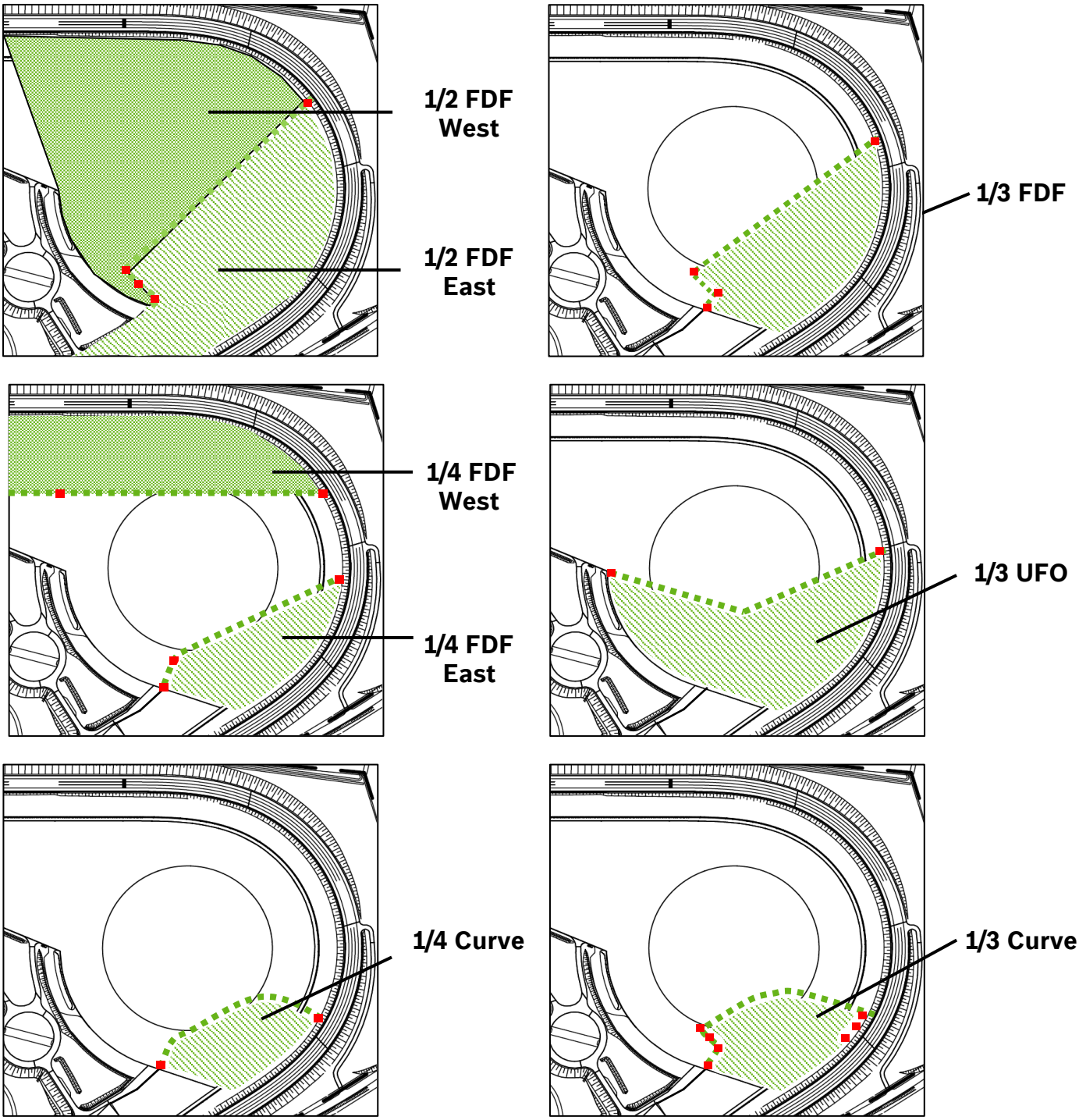


Subzones of the FDF (possible limitations from closures or exclusive testing)

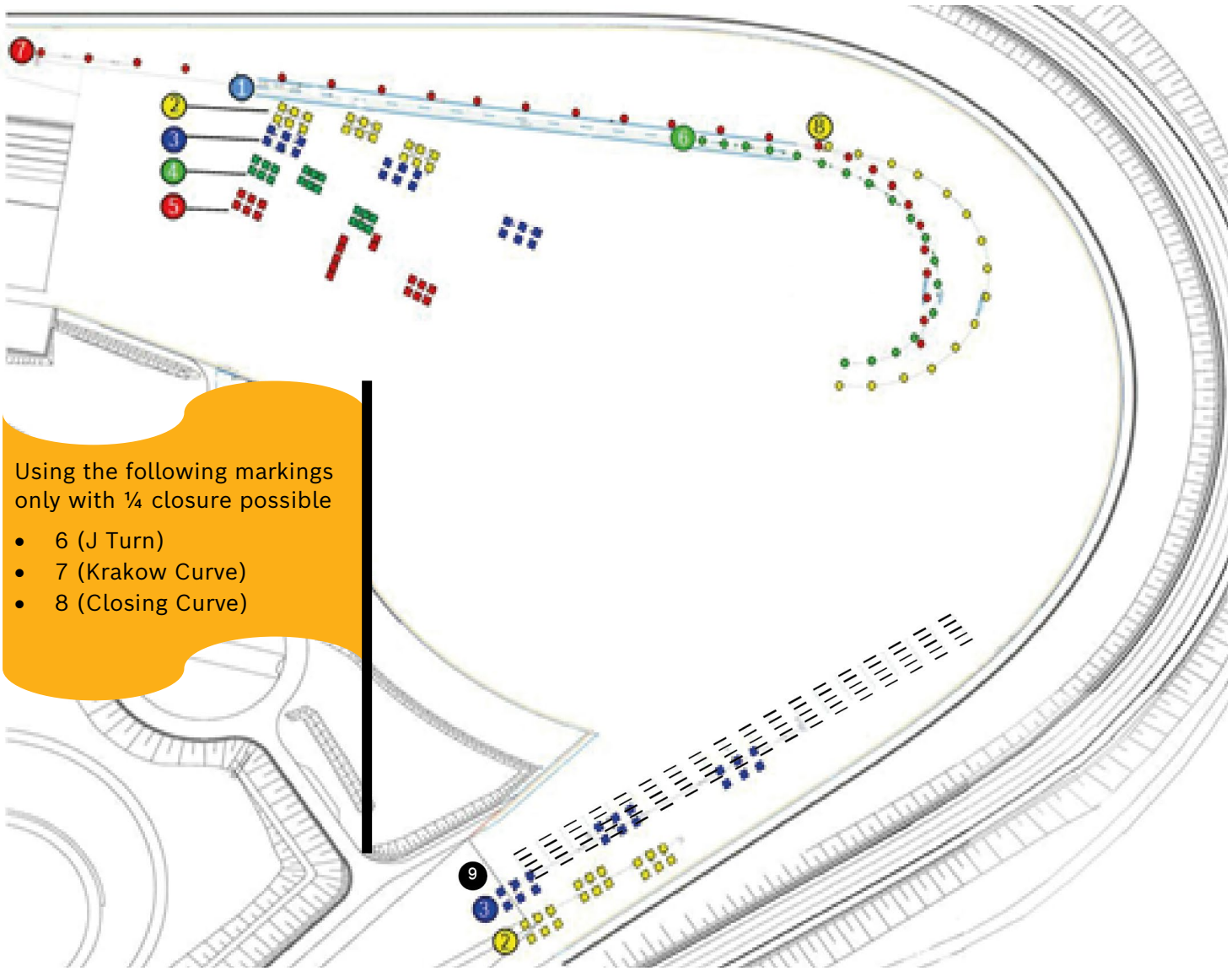
No driving through the cones

Keep enough distance

Circle manoeuvres till r= 80 m are only possible by ¼ closure



Overview of lane changing markings/ other road markings



1 Country/Federal road
Length = 200 m
Width country road = 6 m
Width federal road = 7 m

2 VDA lane change ISO/TR 3888
With coloured markings – analogue to vehicle width 30 m entrance gate (only West)

3 ISO lane change (West and East)
30 m entrance gate (only West)

4 "Moose accident test" lane change

5 ADAC lane change
With coloured markings – analogue to vehicle width 30 m entrance gate

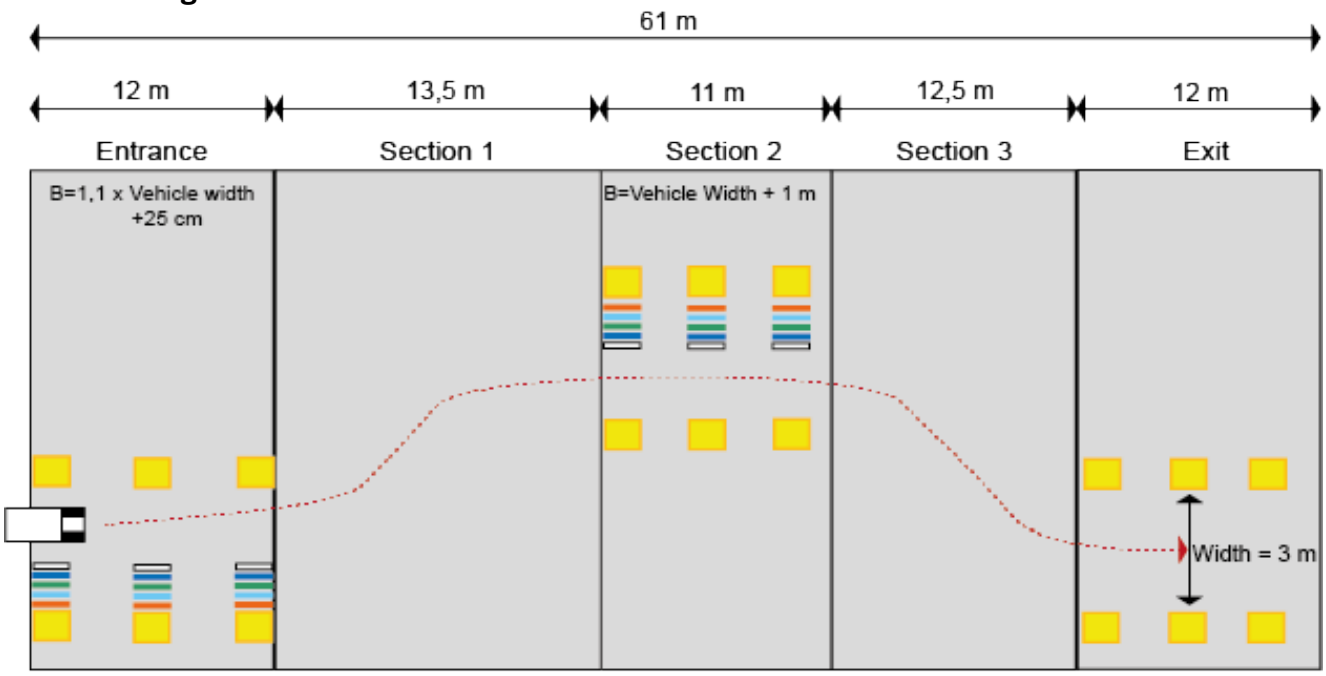
6 "J" Turn

7 Krakow Curve

8 Closing Curve

9 ACC Measuring track
Total length 200 m
Total width 10 m (5 lanes of 2 m)

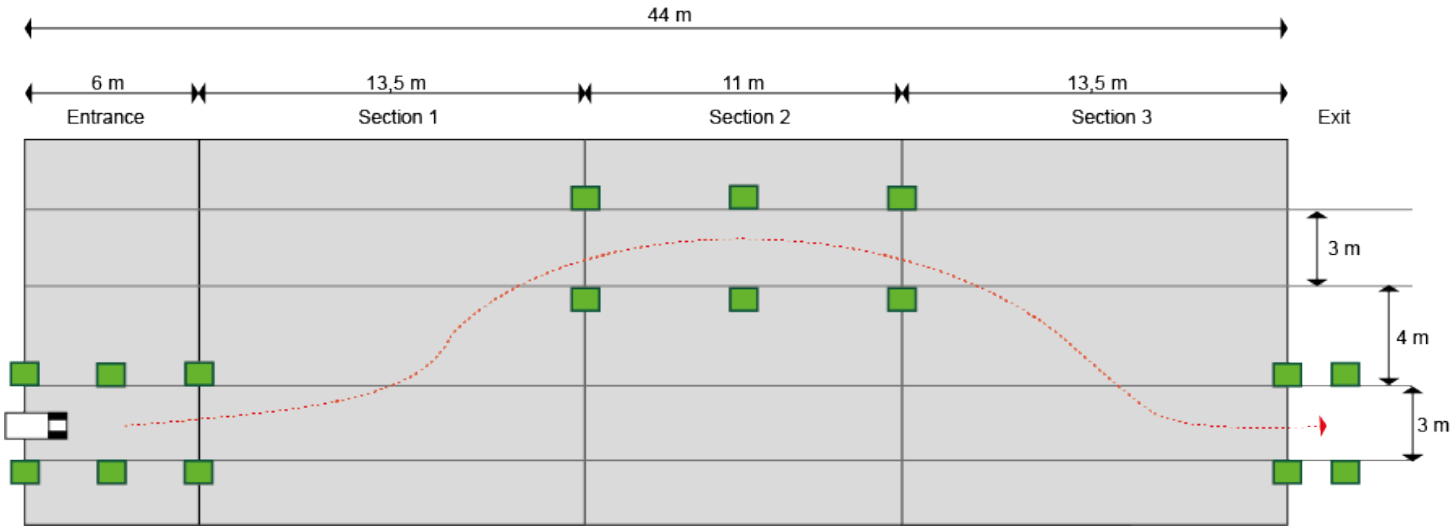
VDA lane change



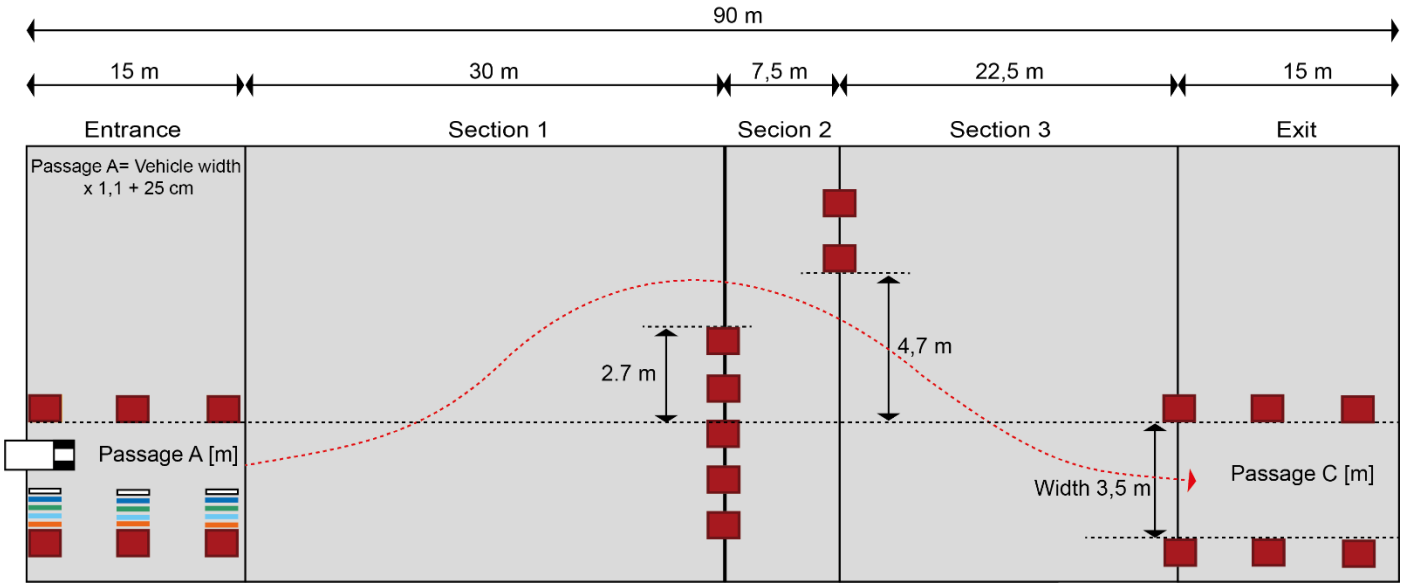
Road 1		
Vehicle width (m)	Marking	Color
1,50 m	1,09	
1,60 m	2,01	
1,70 m	2,12	
1,80 m	2,23	
1,90 m	2,34	
2,00 m	2,45	

Road 2		
Vehicle width (m)	Marking	Color
1,50 m	2,50	
1,60 m	2,60	
1,70 m	2,70	
1,80 m	2,80	
1,90 m	2,90	
2,00 m	3,00	

Moose accident test



ADAC-lane change

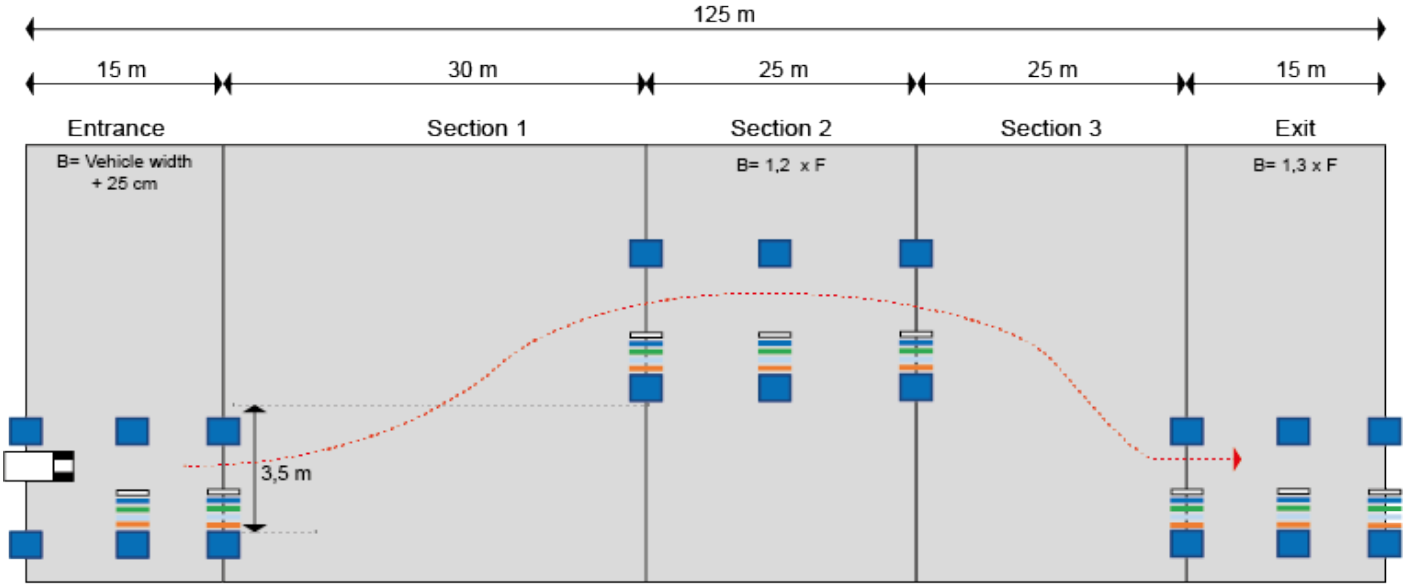


Road A		
Vehicle width (m)	Marking	Color
1,50 m	1,90	
1,60 m	2,01	
1,70 m	2,12	
1,80 m	2,23	
1,90 m	2,34	
2,00 m	2,45	

Note for vehicle conditioning:
test weight = unladen weight + half payload (see vehicle documents).

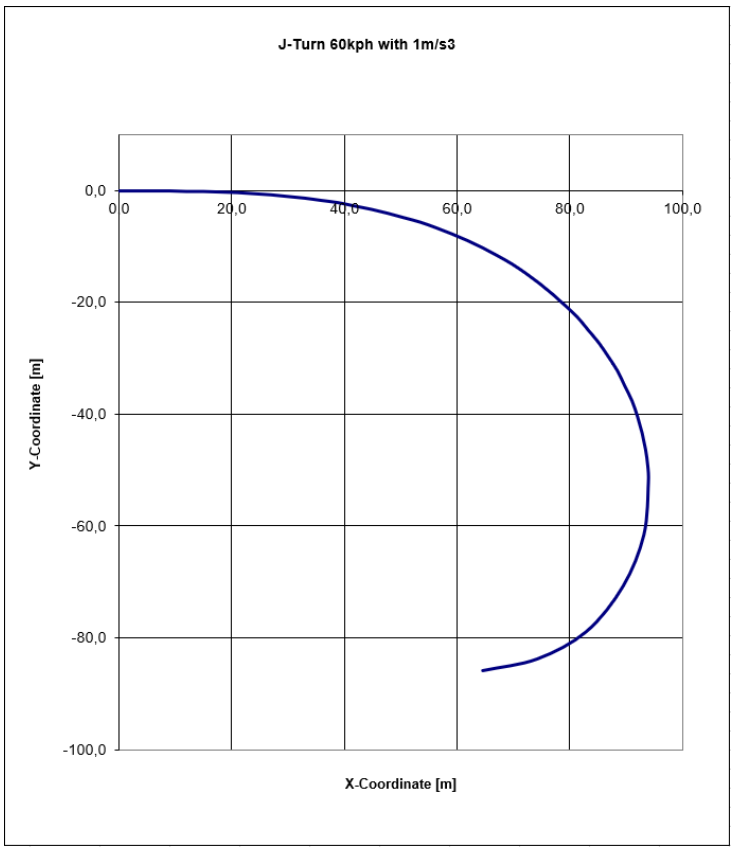
Tyre pressure according to loading condition.

ISO 3888



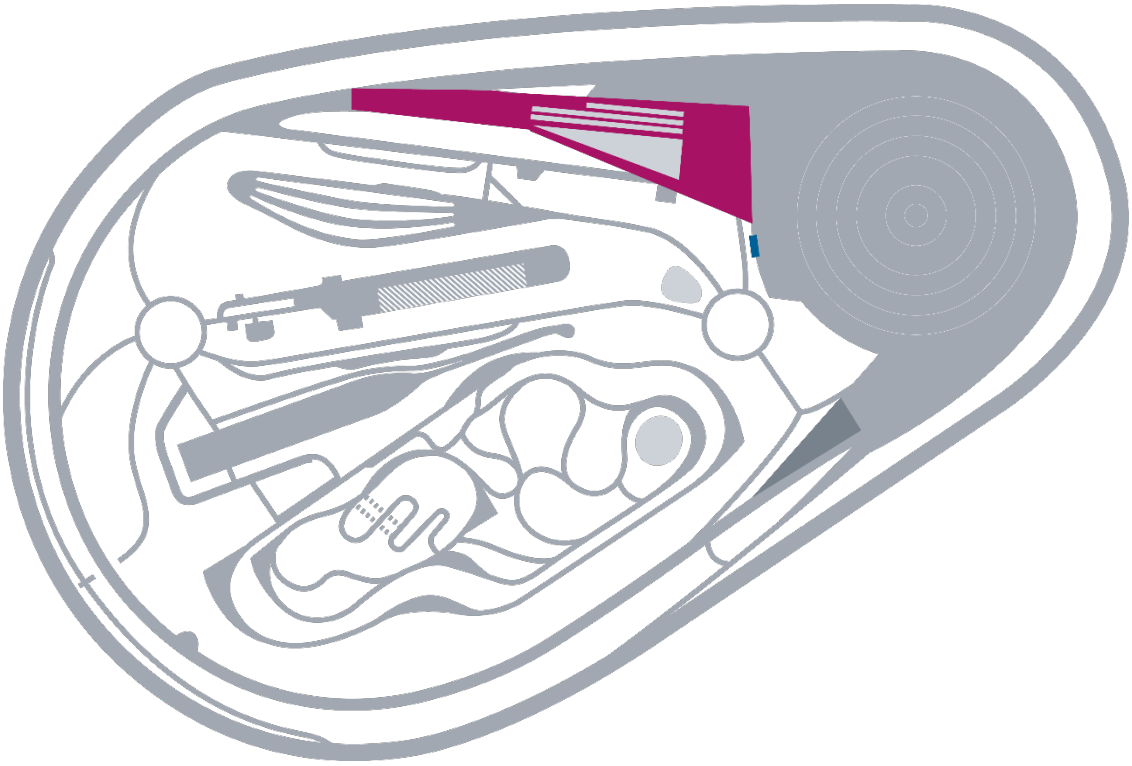
Road A		
Vehicle width (m)	Marking	Color
1,50 m	1,90	
1,60 m	2,01	
1,70 m	2,12	
1,80 m	2,23	
1,90 m	2,34	
2,00 m	2,45	

“J Turn“



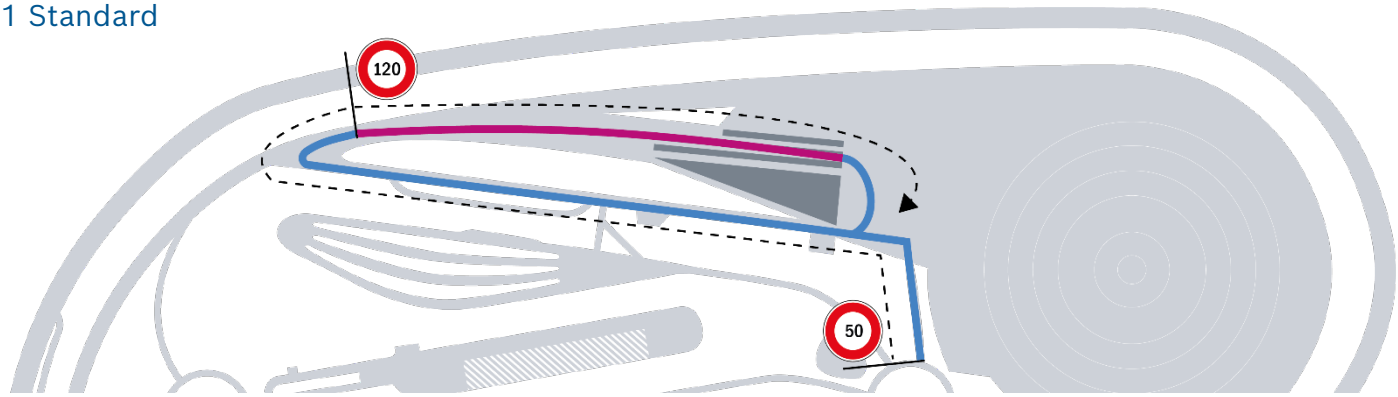
3. Brake Measurement Track (BMS) with Basalt West

 Normal mode	 Register for tests > 120 km/h by FDF-Control	 in active testing	 Testing area needs to be cleared as quickly as possible	 Only drive on tiles when watered



Access possibilities

1 Standard



- If there is a vehicle in the testing area, other users must wait in line in the marked places until the testing area is free again.
- Testing must be stopped if the vehicle in front is still in the testing area.

2 Fast access

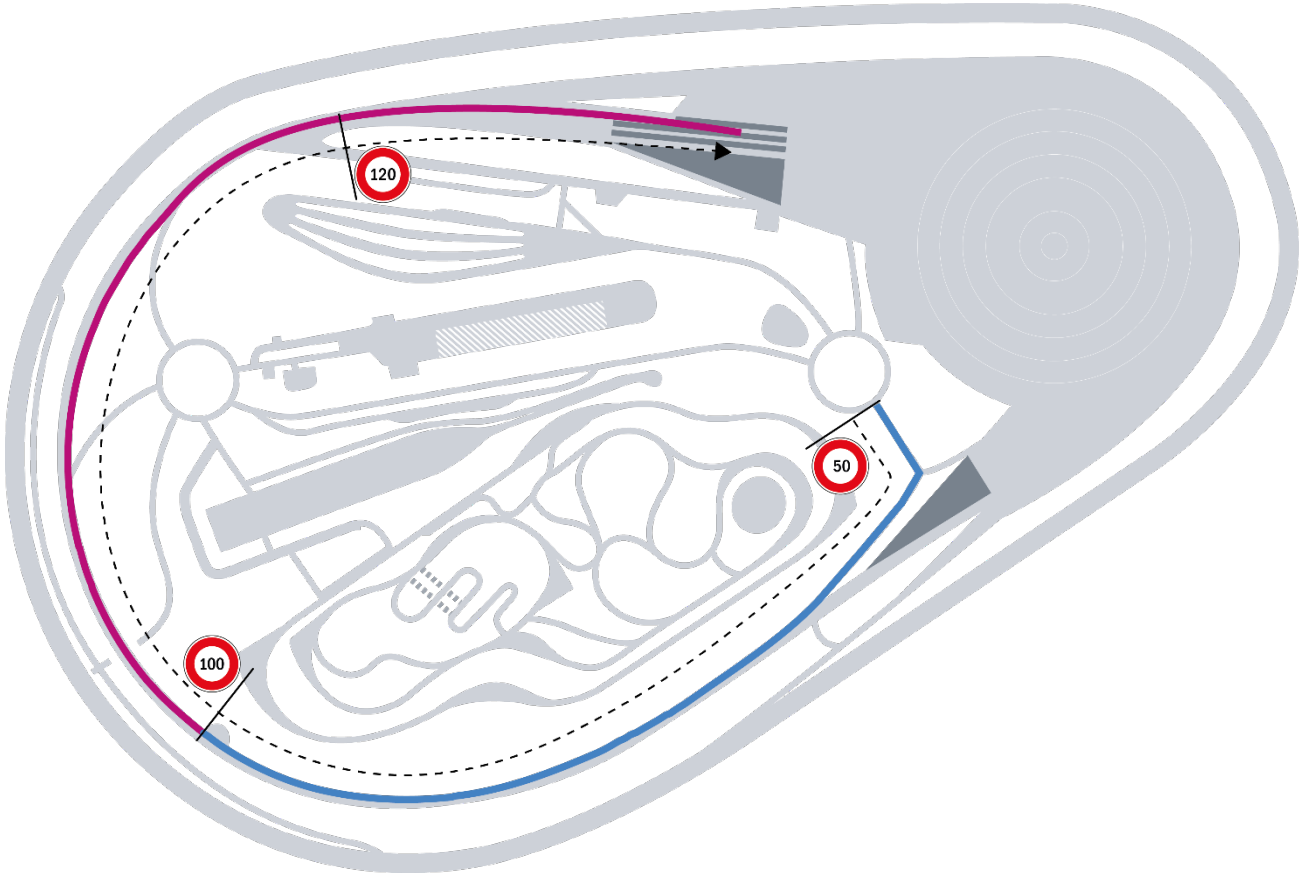
Do not stop

No overtaking for all vehicle categories

No turning outside the turning area and access area Basalt East

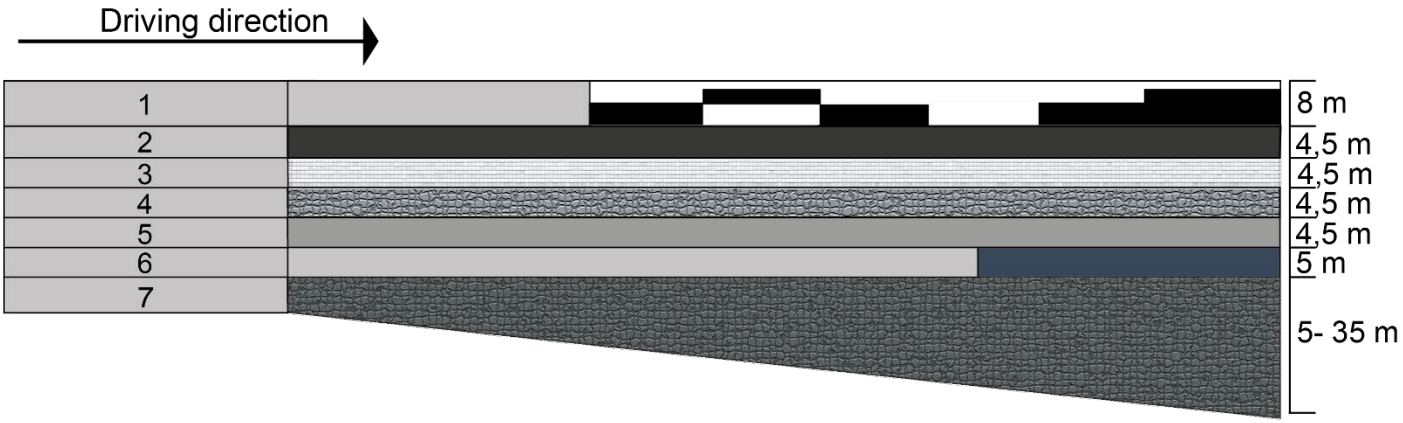
No brake tests or lane changes

Set a date with the Control Centre



- Testing must be stopped if the vehicle in front is still in the testing area.
- Support vehicle must regulate traffic at crossroads. An early agreement on a set time with the Control Centre is needed. The return drive must also be agreed upon with the Control Centre.

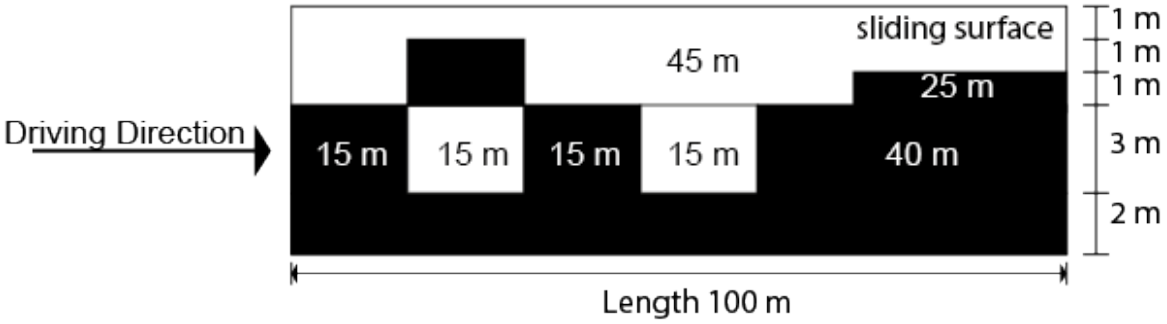
Detailed view



Track details

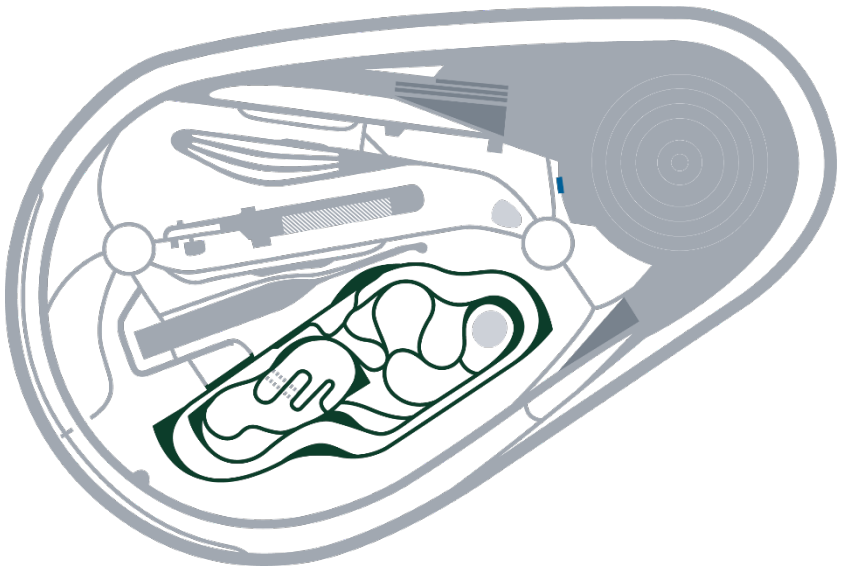
Lane	Type	Length (m)	Width (m)	Watering
1	Checkerboard	100	8	always
2	Asphalt	150	4,5	from 12:00
3	Tiles	150	4,5	always
4	Basalt smoothed	150	4,5	on demand
5	Cement	150	4,5	use only when watered, watering on demand
6	Aquaplaning basins	50	5	use only when watered, watering on demand Depth approx. 4 cm
7	Blue basalt smoothed	150	5-35	on demand

Checkerboard plan



4. Handling Course (HLK)

Please ensure that you are familiar with the track conditions of the Handling Course by watching the Introduction Video HLK.

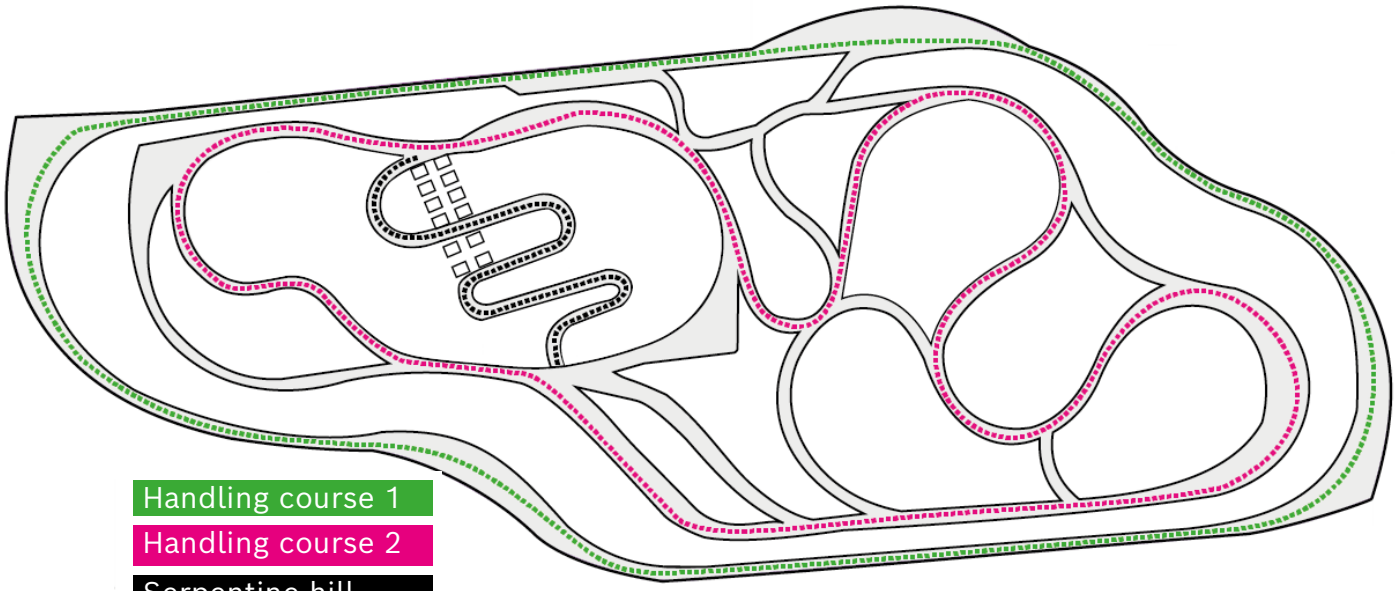


Track details

Track section	Length (m)	Width (m)
Handling course 1	1.253	6,5
Handling course 2	1.366	6,5
Serpentine hill	306	4,5
Driftcurve	289	10

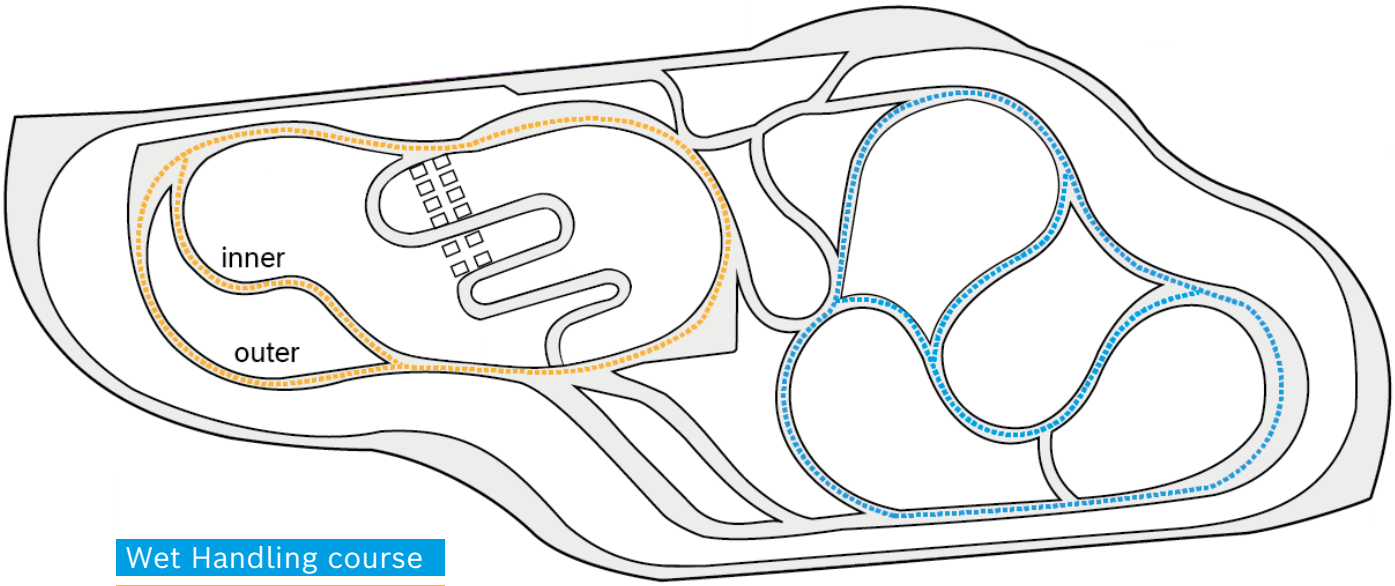
Other HLK 1	Length (m)	Width (m)
Wet handling course	765	6,5
Serpentine hill	306	4,5
Partial inner track	547	6,5
Partial outer track	584	6,5

Track layout standard course



Handling course 1
Handling course 2
Serpentine hill

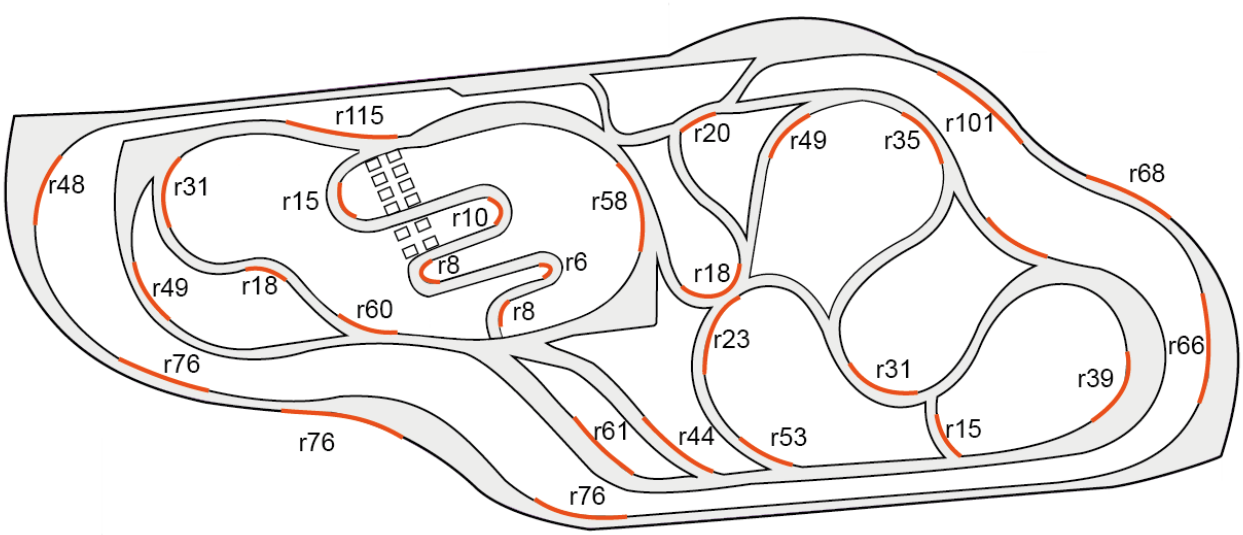
More track layouts



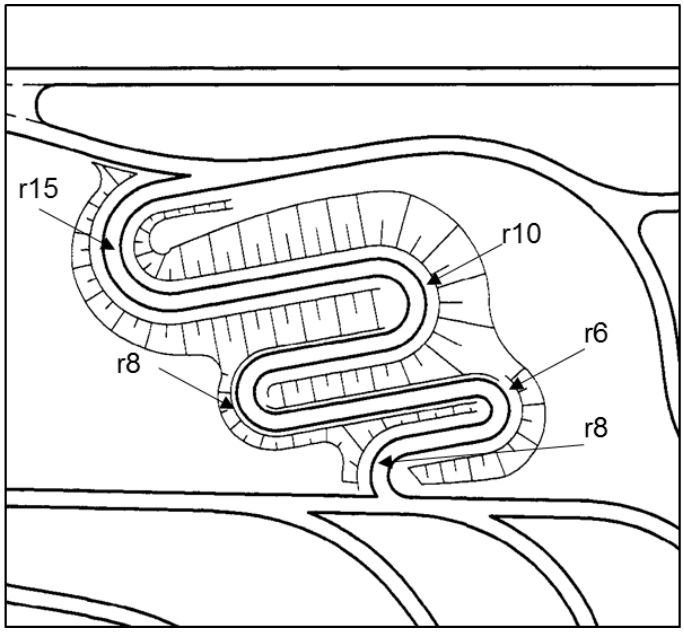
Wet Handling course
Inner subsection
Outer subsection

Caution: Higher risk of aquaplaning with cup-/sport tires.

Curve radius in [m]



Serpentine hill with radius in [m]



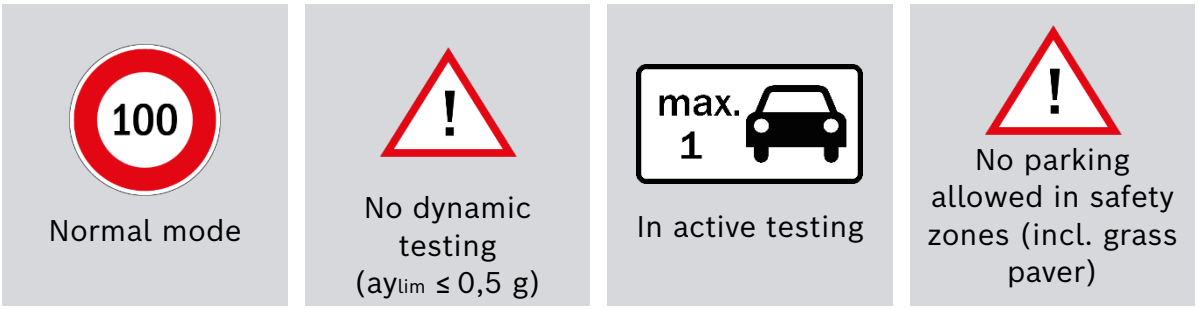
Details serpentine hill	
Uphill slope S1	10%
Uphill slope S2	10%
Downhill slope S3	8,6%
Downhill slope S4	10%
Downhill slope S5	4%
Cross slope to inside of curve	each 2,5%

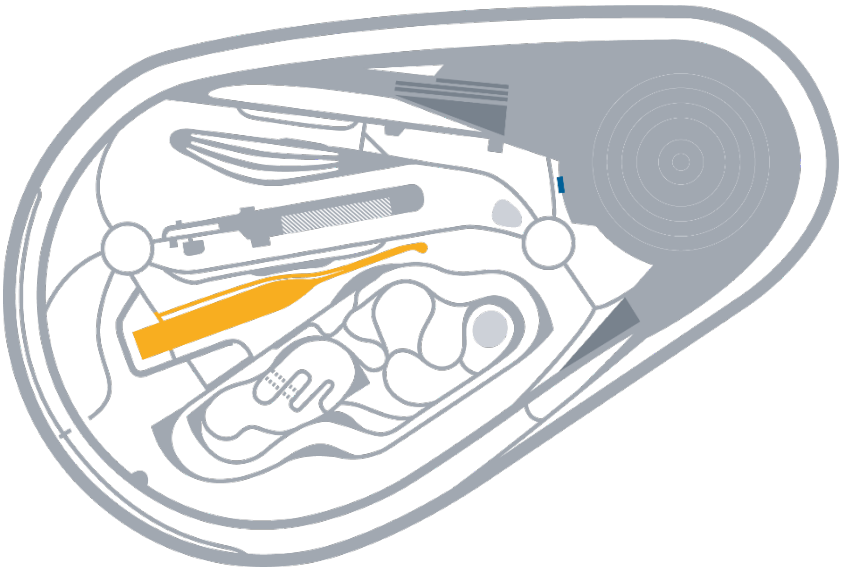
Evaluation parking

Exiting vehicles must yield right of way

Limit stay to a minimum

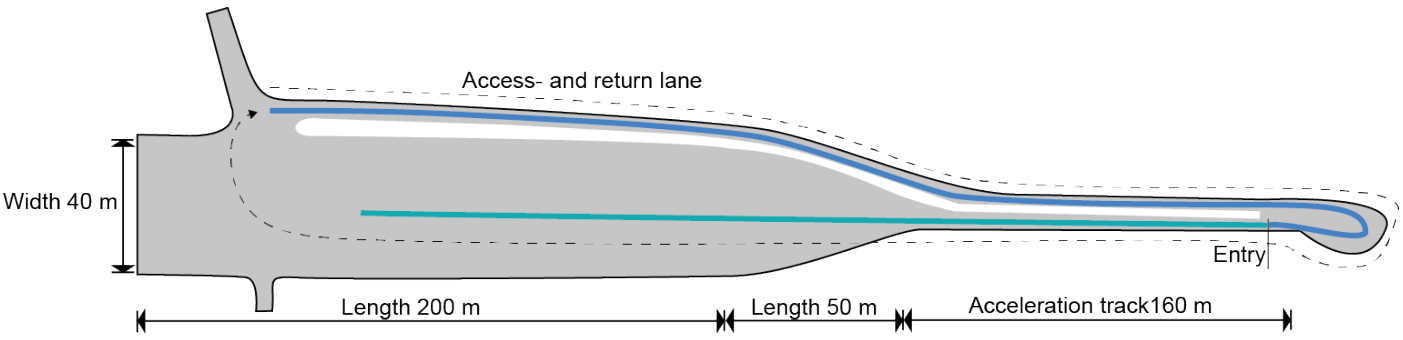
5. Multi-Functional Area (MFF)





- Only non-dynamic tests (a_{ylim} ≤ 0,5 g) are allowed on the Multi-Functional Area.
- Access- and return lane must be used as described below.
- By parallel use entry only if area is free.

Details



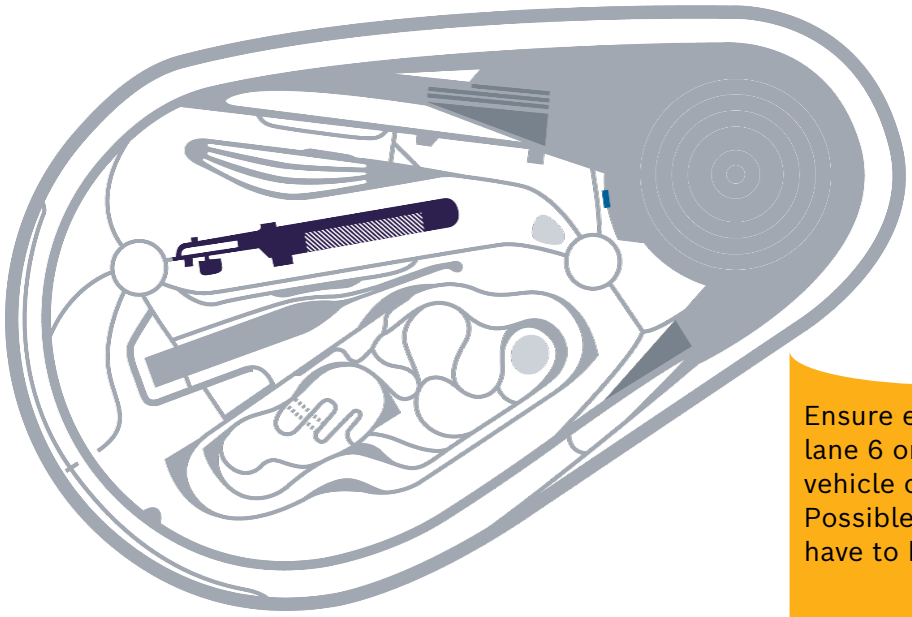
6. Rough Road Track 1 (SWS 1)

Lanes 1-6
& return lane

Lanes 7-9

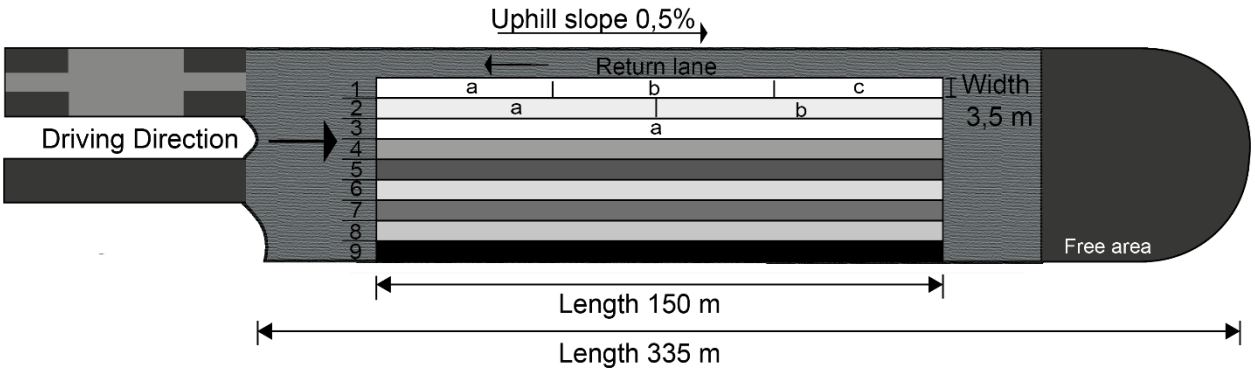
No braking near the ISO sound measurement area

No side by side use: **2 free lanes** between every vehicle



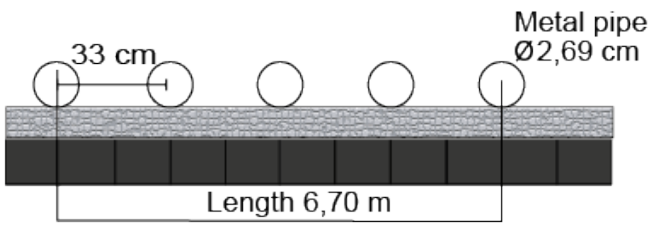
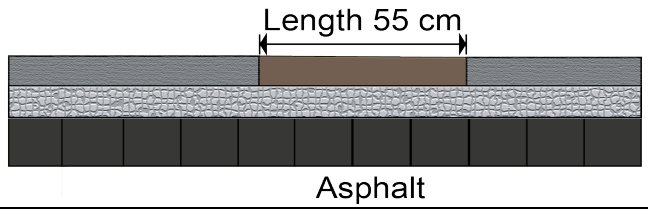
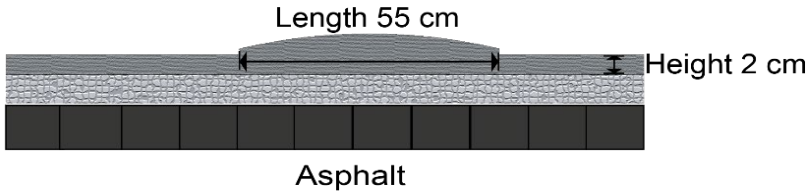
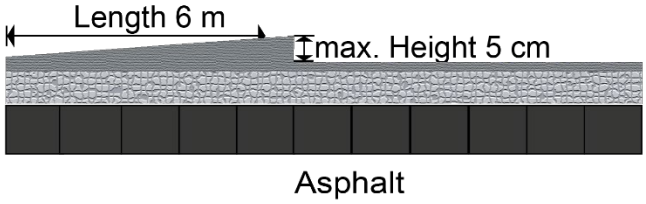
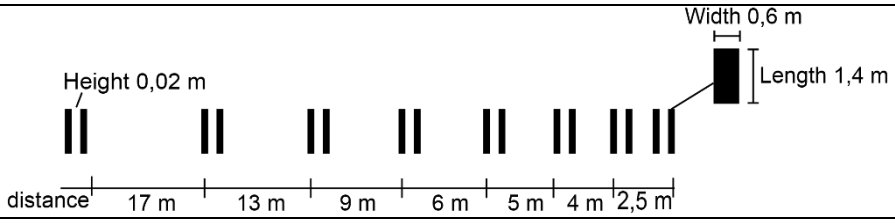
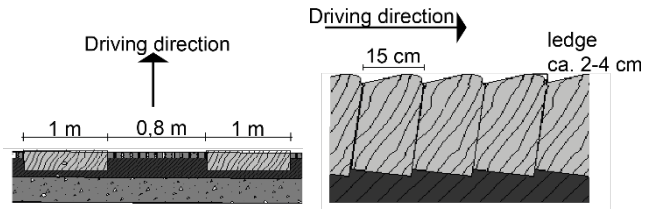
Ensure enough ground clearance by driving on lane 6 or higher, to prevent damages to the vehicle or the environment (oil leaks).
Possible chassis damage due to full braking have to be checked in the Service Workshop.

Detailed view



- If the free area at the end of the module is occupied by other vehicles, turning is only allowed without crossing the markings.
- You must also adapt your speed on the rough road lanes so that you don't drive over the markings.
- If there is persons outside the vehicle, the speed needs to be reduced to 30 kph and appropriate safety distance needs to be kept at all times.

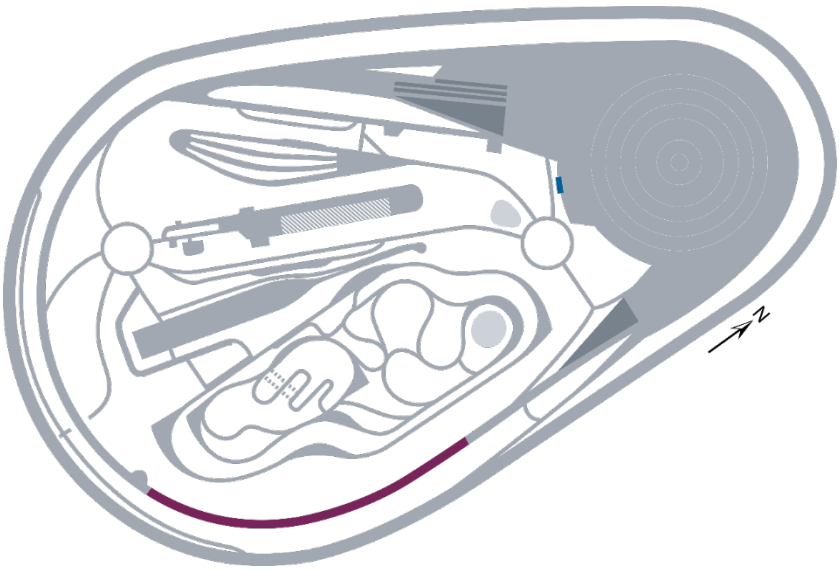
Details to the different lanes

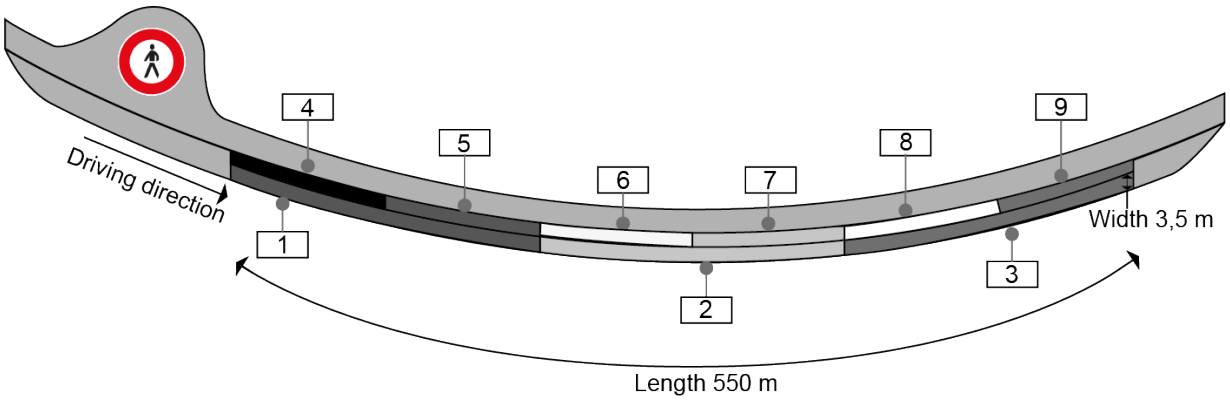
Lane 1	Type “a“ Metal pipes	
	Type “b“ Metal sheet	
	Type “c“ Hill	
Lane 2	Type “a“ wedge with downgrade	
	Type “b“ spanish waves	
Lane 3	Type “a“ Washboard	

Lane	Type	Wave length (m)	Amplitudes (cm)
3	Washboard	0,15	2-4
4	Cobblestone, smooth granite	-	-
5	Cobblestone, granite	4	6
6	Cobblestone, granite	3	8
7	Begian pavement, rubblestone	3	8
8	Belgian pavement, rubblestone	3	8
9	Africa track	8	10 (+ random disturbances)

7. Rough Road Track 2 (SWS2)

100 Normal mode	! No braking or lane changes	max. 1 In active testing
Driving direction South ➔ North Normal mode	Driving direction North ➔ South Special mode	Fs Side force free at ~100 km/h





Explanation see next page

Technical Details

Track part	Type
1	Belgian pflaster
2	Wavy “Toyota“ Asphalt
3	Wavy “Australian“ asphalt
4	Wavy asphalt
5	Wavy asphalt with flat bumps
6	Wavy asphalt
7	Wavy asphalt with flat bumps
8	Wavy asphalt
9	Wavy asphalt with flat bumps

Track part	length (m)	Wave length	Amplitude (cm)	Cross gradient	Long gradient
1	150	5	6	-	-
2	150	0,7	2,5	-	-
3	150	1	2-5 (increasing)	outer = 5% inner = 3%	1,2% against driving direction
4	70	3	5	-	-
5	70	3	5	-	-
6	70	4	6	-	-
7	70	4	6	-	-
8	70	5	6	-	-
9	70	5	6	-	-

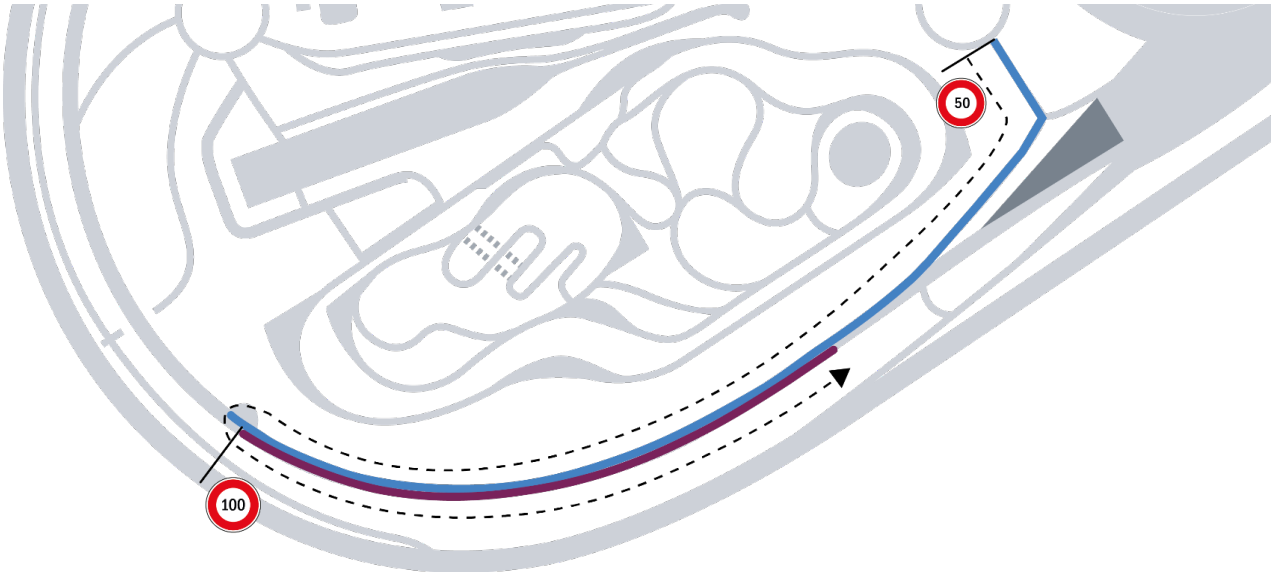
Access

Do not stop

No overtaking for all vehicle categories

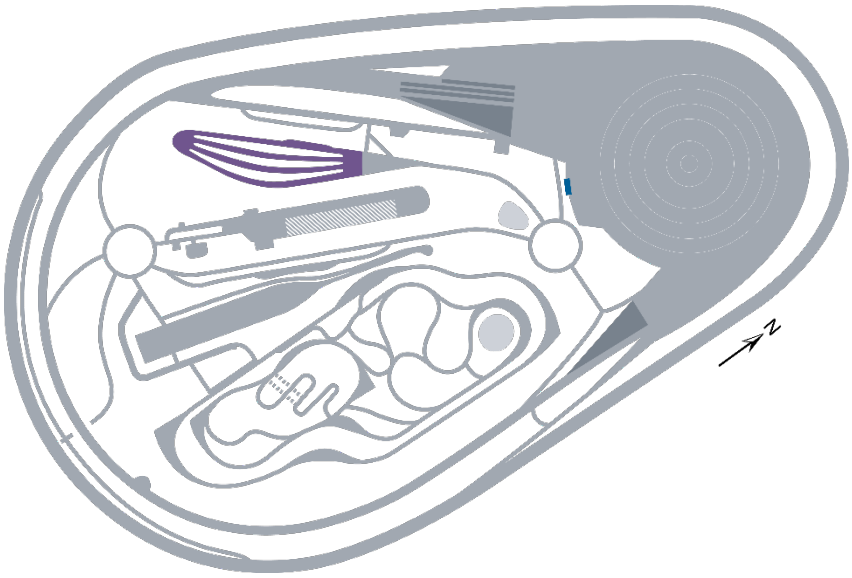
No turning outside the turning area and access area Basalt East

No brake tests or lane changes

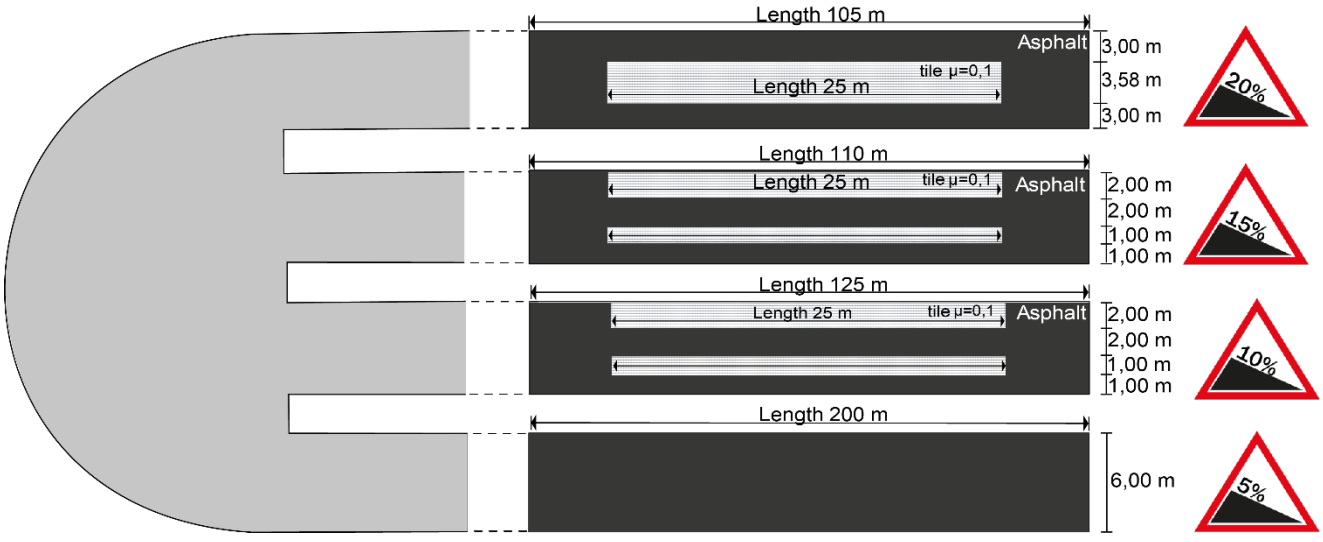


8. Hills (SGH)

70 Normal mode	max. 1 per hill	Watering on demand	Driving direction **North ➔ South** Normal mode	Change of driving direction **South ➔ North** must be confirmed by FDF-Control



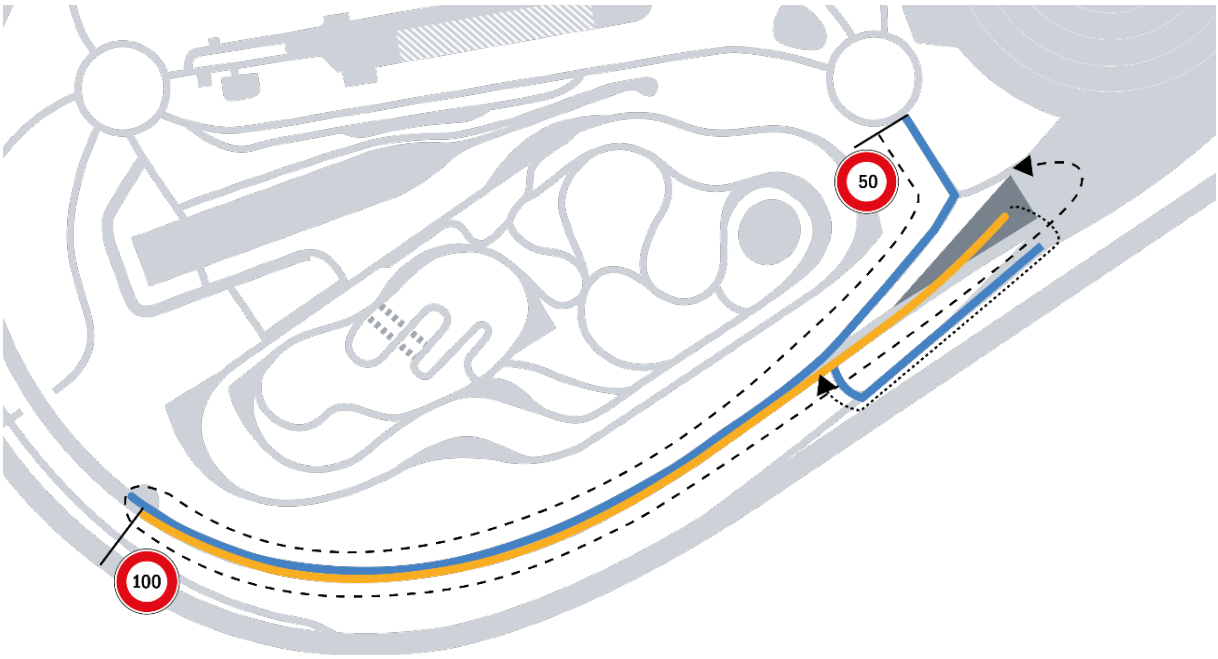
- Please watch out for the instructions regarding driving direction given on your OBU.
- Driving direction change can be requested at the FDF Control.
- Tiles can be driven on only when they are watered.
- Watering can be requested at the FDF-Control or by the Control Centre.



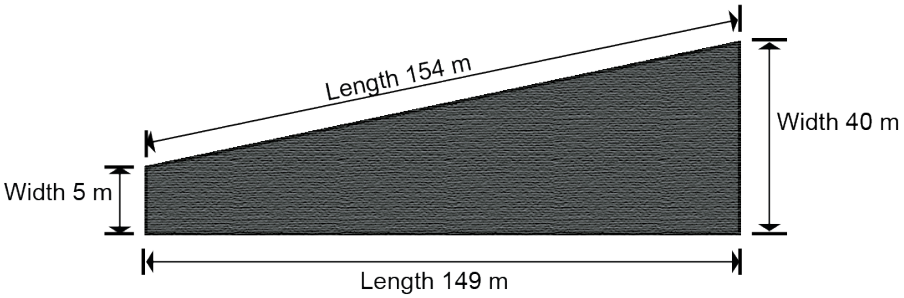
9. Blue Basalt East (BSO)

Approval	Normal mode	Watering on demand	In active testing
Do not stop	No overtaking for all vehicle categories	No turning outside the turning area and access area Basalt East	No brake tests or lane changes

Access



Details

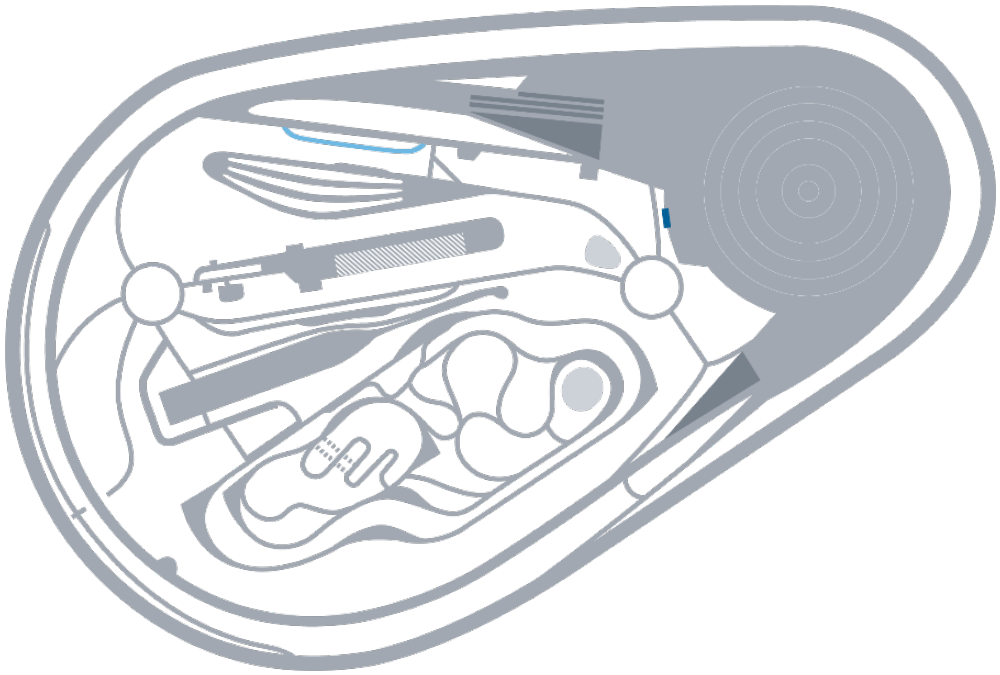


10. Fording and Splash Water Basins (WDF)

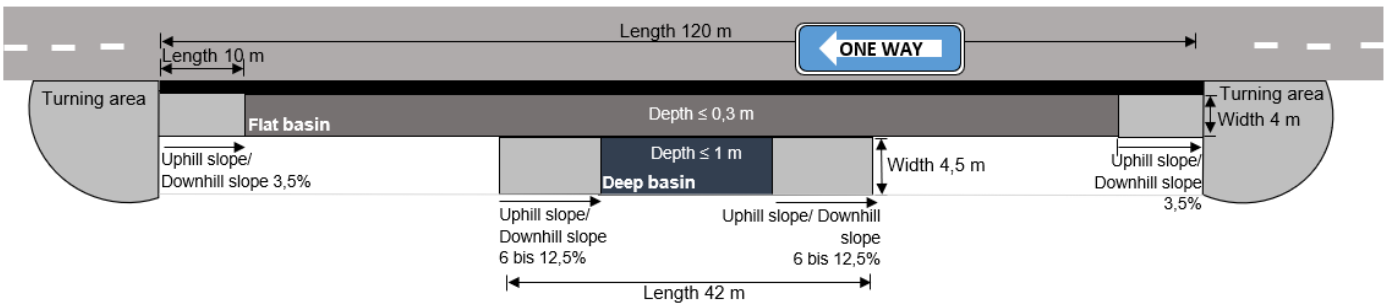
10 Normal mode*	Accessible in both directions	Registration for filling by the FDF-Control	max. 1 In active testing

* depending on the vehicle conditions (height, front skirt. etc.) it is possible to deviate from the defined maximum speed and filling height under the following conditions and only after agreement with the FDF Control:

- Tests are only possible if no water is running out of the basin. Users must therefore increase their speed step by step.
- If water is running out of the basin, the speed must be reduced appropriately.
- The tests must be started in the water basin, if there is a risk of aquaplaning.



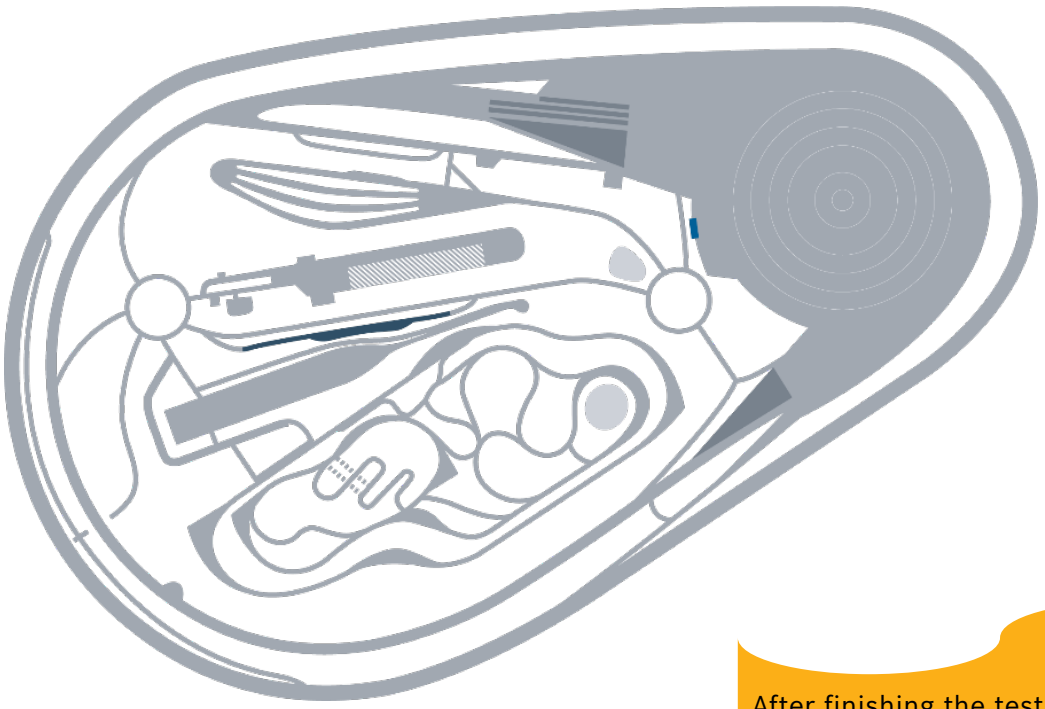
Details



- Filling must be agreed with the FDF Control/Control Centre minimum 2h up-front.
- Before each new testing, the filling of the basins must be completed.
- If the turning area is not large enough, you must return to the module through the brake measurement track and the return lane of the brake measurement track.
- Closures are possible due to water shortage in hot seasons.

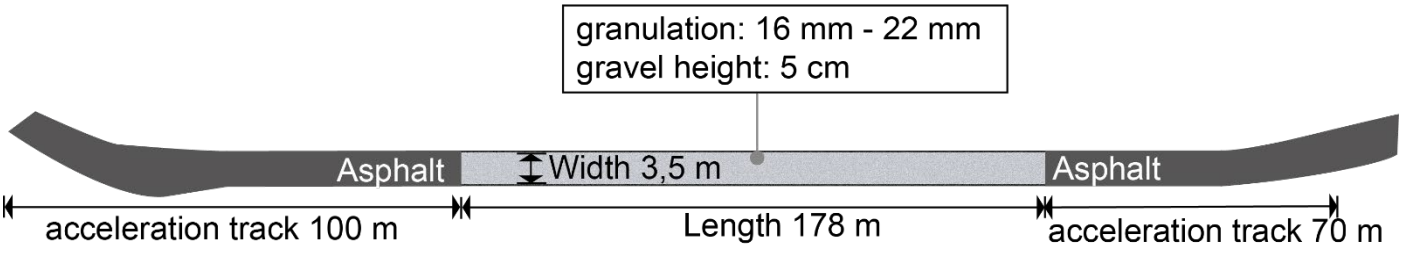
11. Gravel Track (GVS)

50 Normal mode	Registration: FDF-Control/ Control Centre	Accessible in both directions	max. 1 In active testing

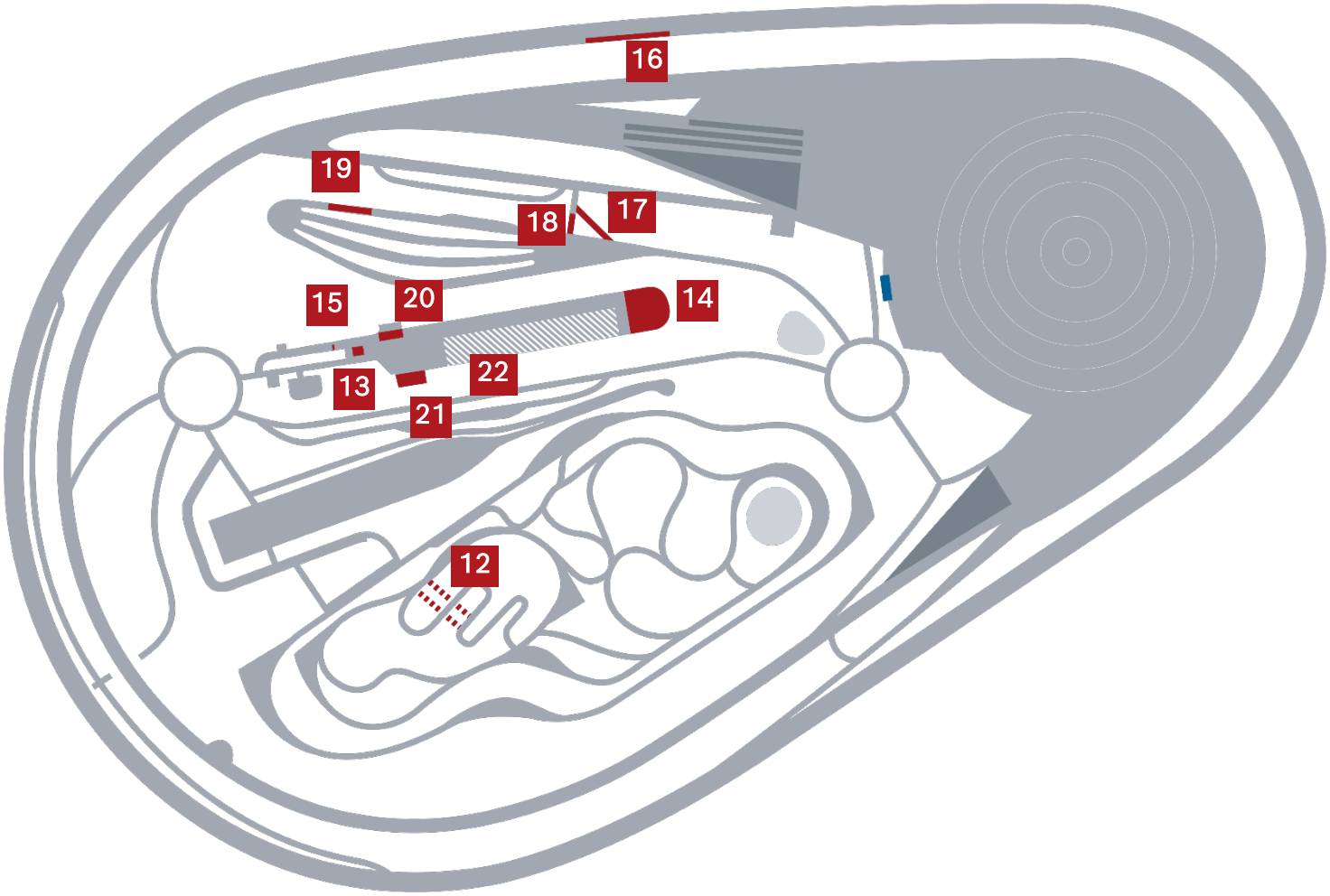


After finishing the test the service workshop must be contacted immediately. Other tracks can only be driven on after the workshop has controlled and cleaned the vehicle.

Details



SPECIAL TRACKS



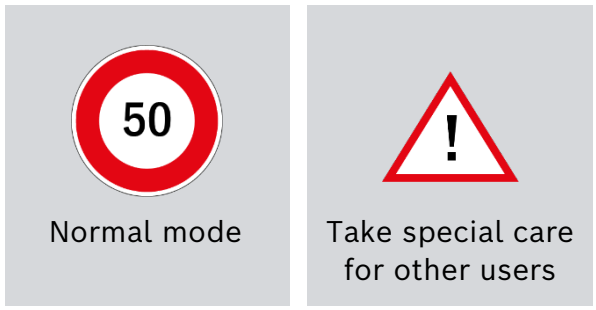
Nr.	Special tracks	In Module
12	Off-Road Track	Handling Course
13	Access driveway over sidewalk	Rough Road Track 1
14	Free Area	Rough Road Track 1
15	Single Sleeping Policeman	Rough Road Track 1
16	Rumble Stripes	High Speed Oval
17	Entanglement Track	Hills
18	Garage Entrance 30% Slope	Hills
19	Multiple Sleeping Policemen/ Garage Threshold	Hills
20	ISO-Sound Measurement Track	Rough Road Track 1
21	Test-Field for Parking Assistant	Rough Road Track 1
22	Power Absorption Roller	Rough Road Track 1

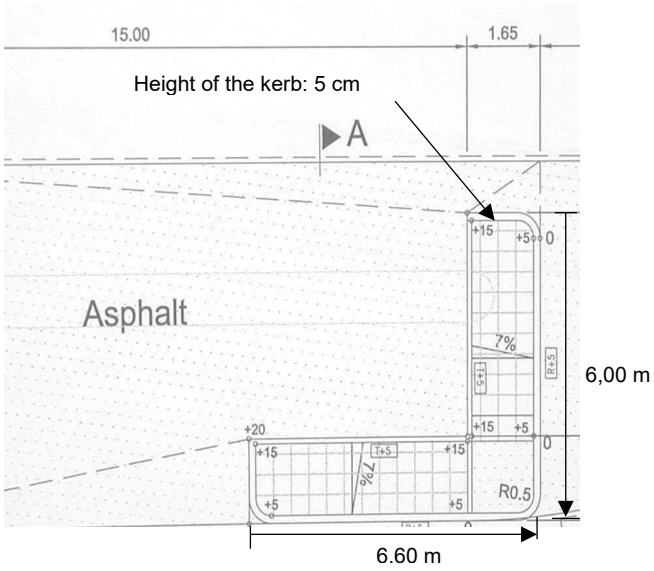
12. Off-Road Track in the module Handling Course - Serpentine Hill

Details

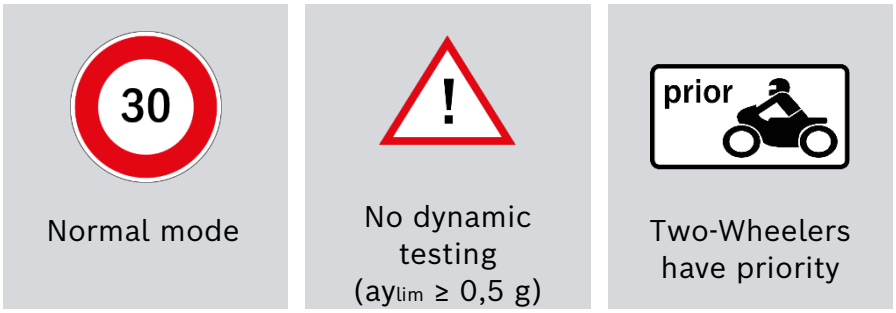
Direction	Sloping
West	60%
East	65%

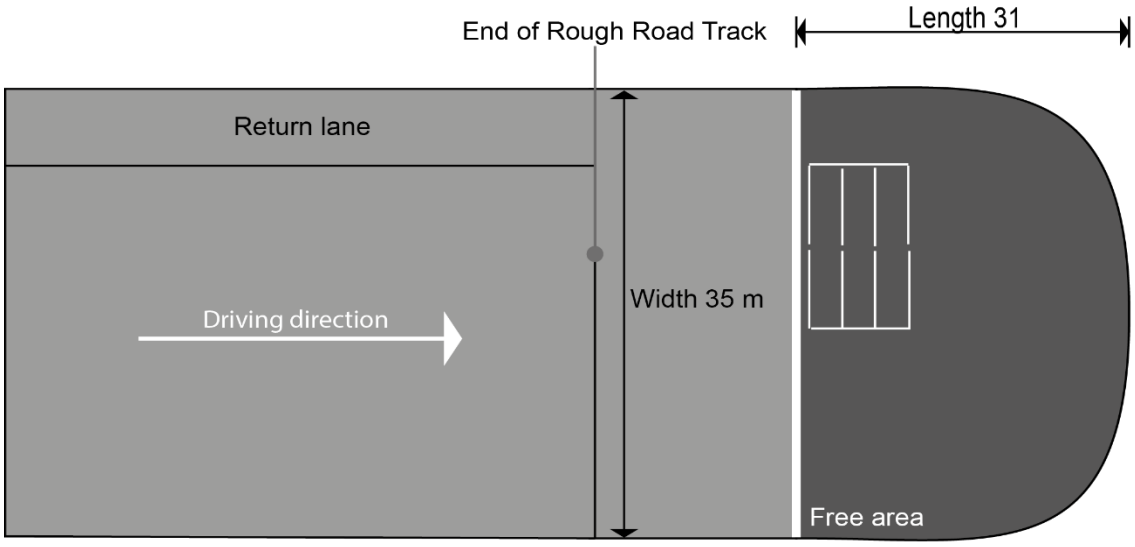
13. Access driveway over sidewalk in the Module Rough Road Track 1





14. Free Area in the Module Rough Road Track 1

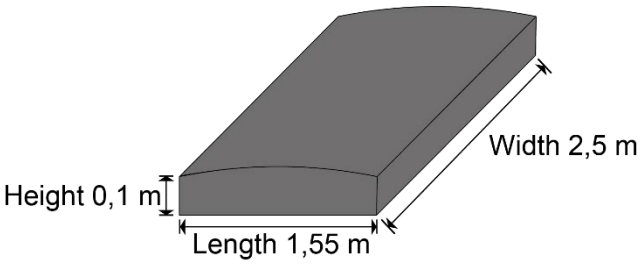




- Free area for non-dynamic testing (e.g. drive-off tests).
- Access lane = lane 1 of the rough road track 1.
- Return lane = return lane of the rough road track 1.
- The safety zone on the way to the rough road track must be kept clear at all times.

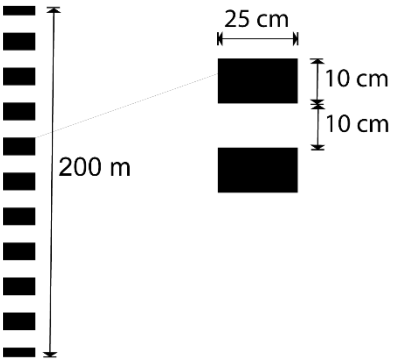
15. Single Sleeping Policeman in Module Rough Road Track 1

Details



16. Rumble Stripes in Module High Speed Oval

Details

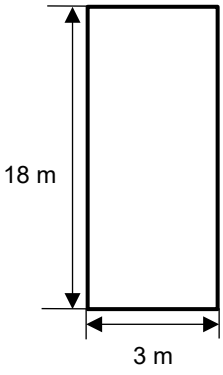


Technical Details	
Measurements	25cm x 10cm
Gap	10cm
Height (m)	5mm
Total length (m)	200m

17. Axle Articulation Track in the Module Hills

18. Garage Entrance in the Module Hills

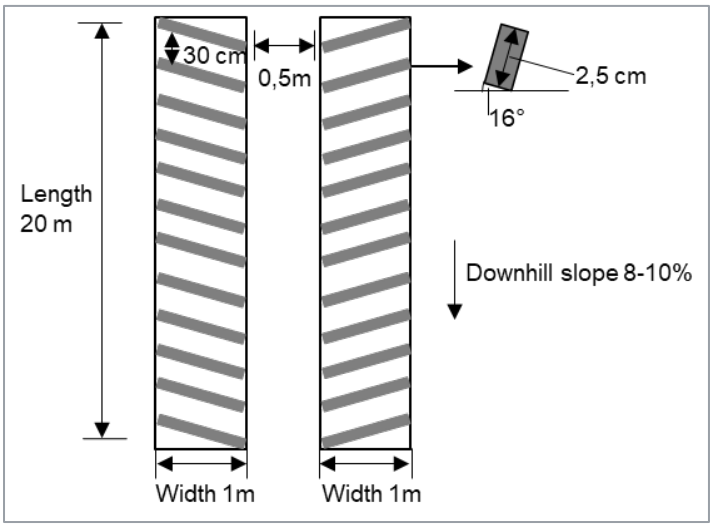
Technical Details



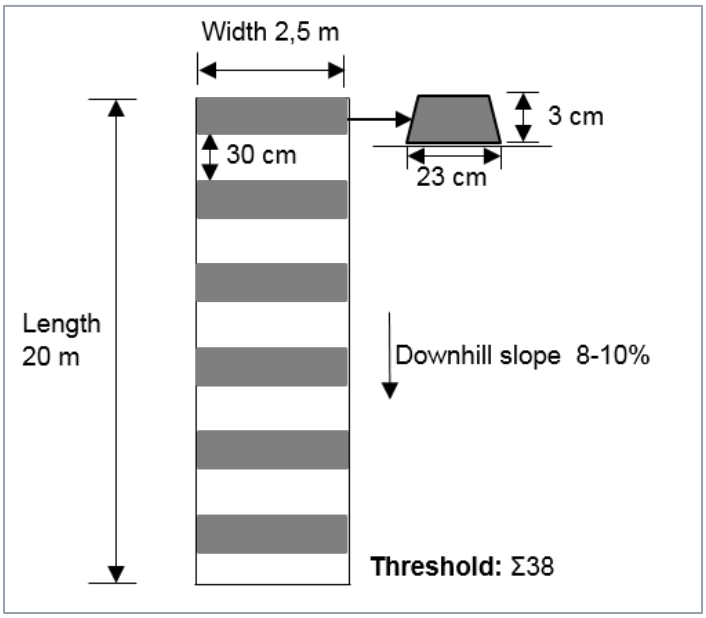
19. Multiple Sleeping Policemen/ Garage Ramps in the Module Hills

70 Normal mode	Driving direction North ➔ South Normal mode	Driving direction South ➔ North Special mode

Detailed plan Garage Ramps



Detailed view Multiple Sleeping Policemen



20. ISO-Measurement Track ISO 10844:2014 (GMS) in the Module Rough Road Track

Normal mode

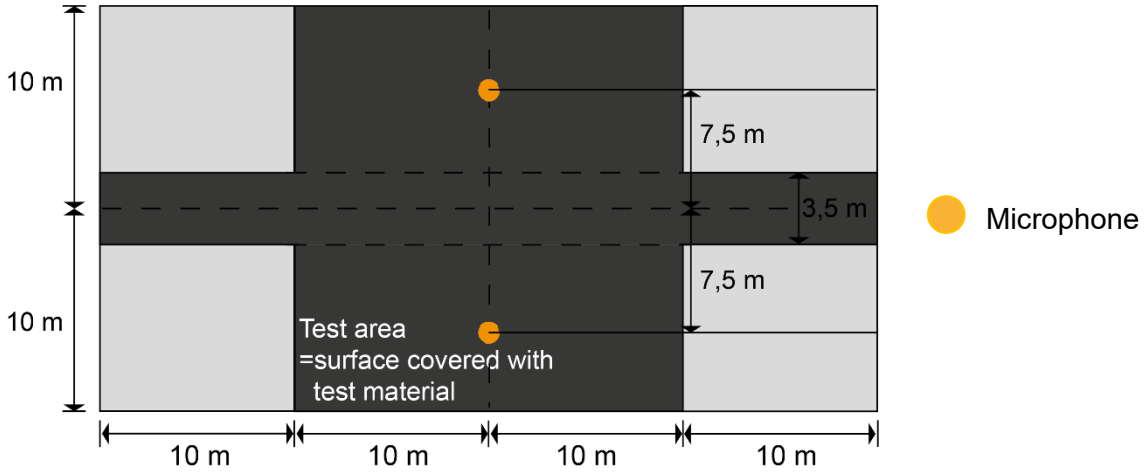
No braking or lane changes

Driving direction
North → South
Normal mode

Driving direction
South → North
Special mode

Safety vest must be worn outside the vehicle

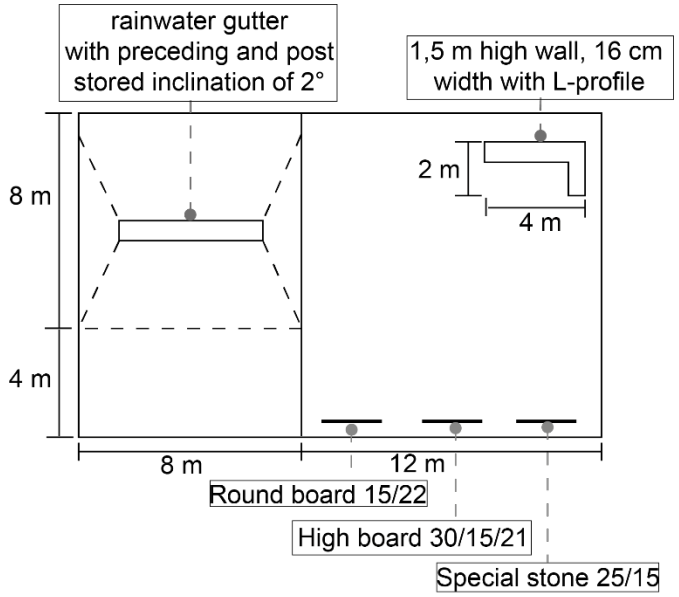
Details



- Safety vest must be worn if it is necessary to get out of the vehicle for testing purpose.
- During active testing an appropriate safety distance must be kept at all times to passing cars.

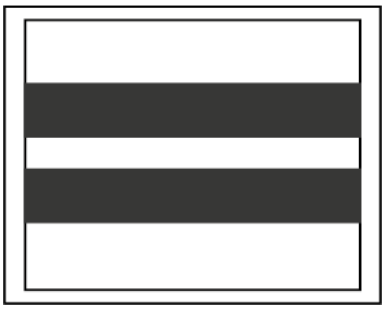
21. Test-Field Parking Assistant in the Module Rough Road Track

Details



22. Power-Absorption Roller in the Module Rough Road Track 1

Detailed View



Technical Details	
Axel load limit	3,5 t
Wheelbase axel distance	565 mm
Allowed tyre diameter, passenger cars	10 - 24 “
Roll diameter	318 mm
Useable roll width	2200 mm

OFFROAD PARCOURS

On modules

On conneting roads

Registration by Control Centre

In active testing per module

Accesible in both directions

Do not stick limbs out of the vehicle

Be careful to not roll over and to have enough ground clearance

Leave vehicle only for instructions and with safety vest

1.1	**Wave track**
1.2	**Wave track with lime sandstone Inlays**
2	**V-Ditch**
3	**Multifunctional area (820m²)**
4.1	**Axle Articulation track 1**
4.2	**Axle Articulation track 2 with lime sandstone Inlays**
5	**50% Slope**
6	**40% Slope with grass paver**
7	**Ramp driveway**
8	**Sloped drive way**

Technical Details

Nr.	Modul	Length	Lane width	Wave height	Depth	Slope	Angle
1.1	**Wave track**	56m	2,50m	40cm	-	-	-
1.2	**Wave track with lime sandstone inlays**	56m	2,50m	60cm	-	-	-
2	**V-Ditch**	26m	4,00m	-	1,00m	-	-
3	**Multifunctional area (820m²)**	-	-	-	-	2˚	-
4.1	**Axle Articulation track 1**	70m	2,50m	40cm	-	0-5˚	-
4.2	**Axle Articulation track 2 with lime sandstone Inlays**	70m	2,50m	60cm	-	0-5˚	-
5	**50% Slope**	20m (55m with approach & departure)	4m	-	-	50%	-
6	**40% Slope**	20m (43m with approach & departure)	4m	-	-	40%	-
7	**Ramp driveway**	10m	8m	-	-	-	30° (12˚-Plateau -18˚)
8	**Sloped drive way**	21m	2,25m horizontal/ 2,4m vertical	-	-	-	to 43˚

SERVICE

1. Catering

- Events
- Presentations
- Seminars
- Trainings

Contact:
EUREST DEUTSCHLAND GMBH
c/o Robert Bosch GmbH
Tel. 0 70 62 / 911 – 15 22
Fax. 0 70 62 / 911 – 15 14
Kitchen: 0 79 30 / 600 – 251
E-Mail: 1043.9@compass-betriebe.de

2. Vehicle Service

Equipment and changes on test vehicles by qualified personnel:

- Changing and balancing tyres
- Alignment test
- Brake tests as well as changes on the brake system
- Supply of braking trailers
- Equipping vehicles with electric and sensor systems

3. Engineering Service

Organisation and realisation of vehicle or component tests according to customer requirements as well as measurement sequences like endurance or braking distance measurement

- External und internal customers
- Bosch-internal in ESP-sector with verification proofs (FMK)
- External institutions und public institutions

4. Technical Equipment

Wheel Load Scale

- Measurement of the wheel load or axle load
- Measurement of hard compound and metal tyres and supports for single-axle trailers

Technical Data	
MS-Typ	
Display range of weights from	0-10 t
Division	20 kg
Accuracy	OIML Nr. 76 Klasse 4
Temperature range	-20°C bis +60°C (2t/5kg: 0°C - 40°C)

Tolerance		
MS-Typ		
Measuring range	Limit of calibration errors	Operation margin of error
0-1.000kg	± 10	± 20
1.000-4.000kg	± 20	± 40
4.000-10.000kg	± 30	± 60

Air-Stream Simulator

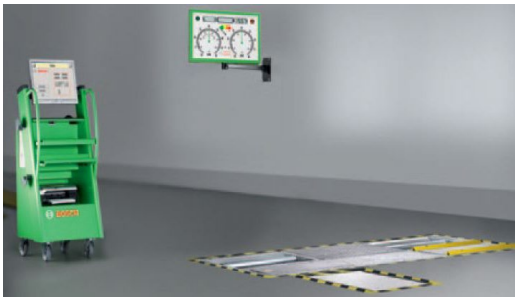
- Simulation airstream for cooling motors, brakes, etc.
- Special feature: 3 fans with different ventilation angles that can be operated individually

Air Performance	
MS-Typ	
1. Step	8.200 m³/h
2. Step	16.400 m³/h
3. Step	24.600 m³/h

BrakeTest Bench (Test Street SDL 4335)

- Measurement of wheel suspension and wheel arch
- Brake test

Technical Data	
Maximum test load	2,5t
Maximum overrun load	4t
Engine Power	2 x 3,7 kW
Test speed	5,2 km/h
Automatic all-wheel drive recognition	Yes
Electric engine brake	Yes
Roll diameter	205 mm
Roll width	700 mm
Roll superelevation	25 mm
Dimensions (W/L/D)	2.360 mm/ 660 mm/ 250 mm
Plug-in roller cover plates	Yes
Presentation medium	analog display BSA 433
Display range	0 kN - 8kN
Nominal measuring range	7,5 kN
Chassis tester	Yes



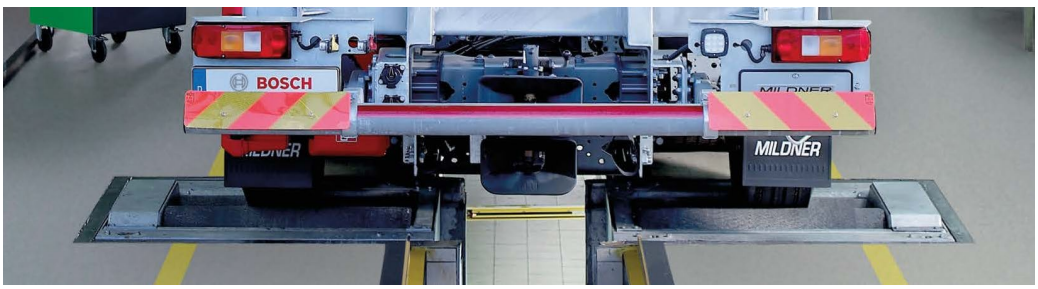
Brake Test Bench for motorbikes

- Measuring brake force of front and rear axle

Technical Data	
Friction Coefficient dry	0,8
Friction Coefficient watered	0,7
Roller length	300 mm
Roll diameter	205 mm
Maxmimal testing width	300 mm
Roller spacing	381 mm
Difference between rear rollers and front rollers	25 mm
Height difference between upper edge of roll and workshop floor	-10 mm
Minimum testable wheel diameter	320 mm (10“)
Maximum testable wheel diameter	800 mm (20“)
Acceptable wheel load	1.000 kg
Maximal acceptable translent load	4.000 kg
Maximal brake force per wheel	2,5 kN

Brake Test Bench BSA 7

- Measurment of braking force on the individual wheels



Technical Data	
Measuring system (DMS)	-
Permissible axle weight	13t
Dimensions (L x W x D)	1300 mm x 1040 mm x 680 mm
Weight with lifting system	700 kg
Friction value	trocken 0,8/ nass 0,7
Roller length	1.000 mm
Roller diameter	205 mm
Smallest inspection width	900 mm
Largest inspection width	2.900 mm
Roll centre distance	398 mm
Superelevation rear roll to front roll	32 mm
Height difference upper edge to workshop floor	0 mm
Smallest testable wheel diameter	320 mm
Smallest testable rim size	10 Zoll
Largest testable wheel diameter	1.000 mm
Largest testable rim size	32 Zoll
Protection class (in accordance with DIN 40 050)	IP 54
Increase of roller sets	200 mm

Technical Data for electric motors	
	Value (low/ high rotation speed)
Power supply	via control box
Functional principle	Dahlander-pole changing: speed control in proportion 1:2
Rated output of drive motors	2 x 6,5 kW/ 2 x 8,5 kW
Test speed	2,2 km/h / 4,4 km/h
Gear reduction	1/16,17
Motor speed	1435/2915 1/min
Roller speed	57,6/117,6 1/min
Motor connection cable	7x4 mm²

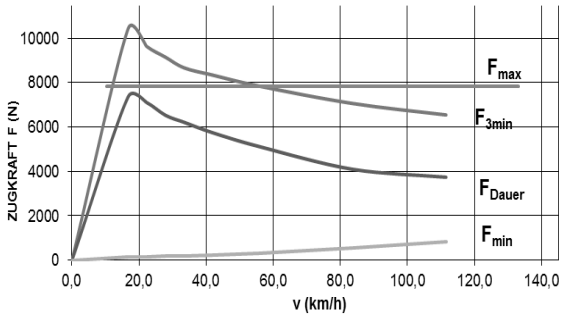
Braking Trailer

- Drag dynanometer for generating a defined braking force (eddy-current principle)
- Simulation of uphill drive
- The braking trailer may only be handed over to the customer by the workshop personnel

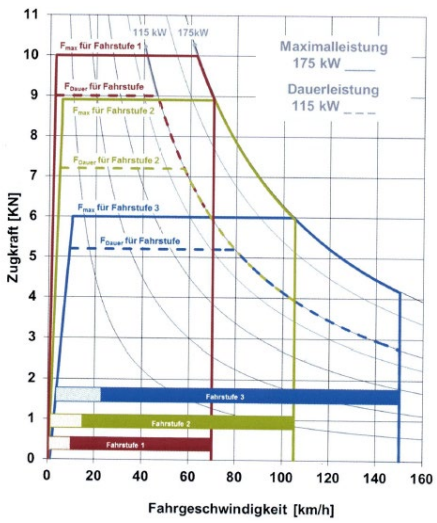
Technical Data	Superflow TD-1200	Volke VBA-2
Unloaden weight (kg)	998	1.005
Max. load (kg)	272	545
Max. axle load (kg)	1.279	1500
Total length (cm)	350	430
Width (cm)	191	182
Height (cm)	91	98
Tires	255/60/VR15	215/65/R16 oder 205/55/R16
Tires ∅ (cm)	67,3	33,1 oder 30,7
Max. brake force(N)	8.000	10.000
Constant load (kW)	97	150
Max. speed	100	155
Use	for vehicles ≤ 4,5 t	for vehicles ≤ 4,5 t
Picture		

Tractive power F = f(v)

Superflow TD-1200



Volke VBA-2



Quick Start Guide to "Super Flow – TD – 1200" Braking Trailer

Get familiar with the functions of the braking trailer.
Try the individual functions at slow speed!
Do not touch any parts inside the trailer after utilisation : Risk of burns!
Ensure that the hood is properly closed!

Trailer operation:

- The trailer must be attached to the towing vehicle using a suitable trailer coupling.
- The power supply (12 volts) is ensured through "Dyno Motive".
- Plug in the "Dyno Motive" headup display on the control unit and attach it securely to the dash panel on the towing vehicle.

Departure:

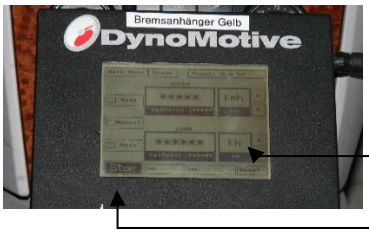
- Change the main switch on the left side of the drawbar (in the direction of travel) into the Power on position.
- Release the parking brake.

Driving at constant speed (RPM)

- Power on / Speed Servo on / Load Servo off
- Digital display indicates the current speed (Setpoint / Data = Data).
  The speed set by the driver is indicated in the “Setpoint / Data” = Setpoint position.
- Set the desired speed on the vehicle and operate the touch screen. This activates the braking effect of the trailer.

Driving at constant load

- Power on / Load Servo on / Speed Servo off
- Digital display indicates the current tractive power (x100 = N).
- (Setpoint / Data = Data). The tractive power set by the driver is indicated in the “Setpoint / Data” = Setpoint position.
- Set the desired load with the button until Poti Load Control is displayed and the load trailer is set at the desired load.

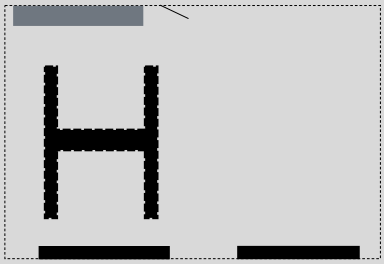
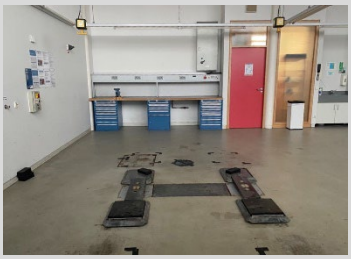
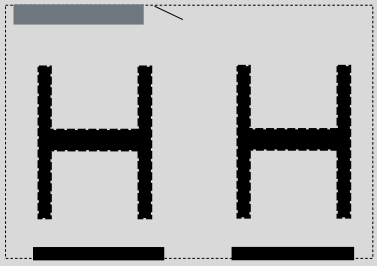
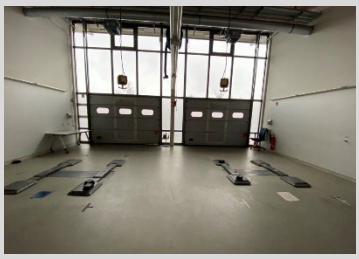
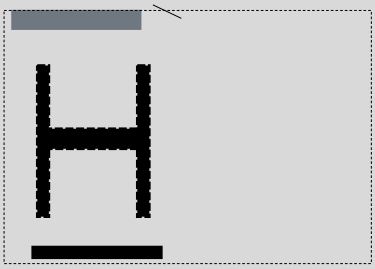
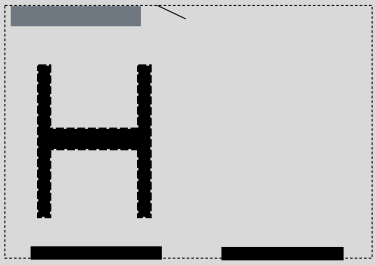
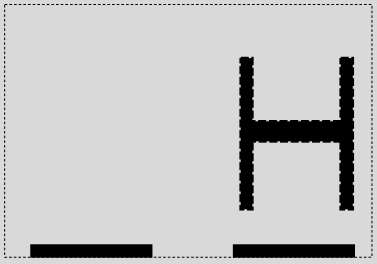


- Determination of speed and tractive force
- A parameter is controlled by the brake trailer. The other parameter can be checked by the test driver himself using the display.

End of test:

- Hand over the braking trailer to the workshop personnel in workshop 7.
- The trailer will be inspected by the workshop personnel.
- Change the settings on the control unit as described under "Setting off".
- Decouple the braking trailer and disconnect it from the power supply.
- Remove the control unit and the headup display from the vehicle.
- Move the main switch on the left side of the drawbar (in the direction of travel) into the Power off position.
- Apply the parking brake.

Lifts

Workshop	Technical Details	Sketch	Picture
W1–W2; W4; W6	▶ No.: 1 ▶ Max. laod: 3 to ▶ Drive on height: 9cm ▶		
W3	▶ No.: 2 ▶ Max. laod: 3 to ▶ Drive on height: 9cm		
W5	▶ No.: 1 ▶ Max. laod: 3,5 to ▶ Drive on height: 9cm		
W7	▶ No.: 1 ▶ Max. laod: 5 to ▶ Drive on height: 9cm		
LKW-Halle	▶ No.: 1 ▶ Max. laod: 5 to ▶ Drive on height: 20cm		

APPENDIX

Fire Safety and Prevention

Fire Regulations

Fire, open flames and smoking forbidden

In Case of Fire

Keep calm

Report the fire

Emergency number **112**
(from mobile phones: 07930 / 600-112)

Warn endangered persons

Bring to safety

Take along helpless people

Close windows and doors

Follow signposted escape routes

Do not use elevator

Go to the assembly point

Follow instructions

Extinguish fire

Use portable fire extinguishers

Do not endanger yourself

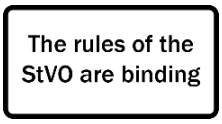
Brandschutzordnung nach DIN 14096, Teil A

House Rules*

Access for persons under the age of 16, as well as visitors who are not directly related to testing, are only permitted after approval by PBX.
Contractors must also register at the control center.
Entering or driving on the test tracks is prohibited without the prior approval of the control center and the track safety briefing.
Animals are not allowed.

PBX-staff instructions must be followed at all times.

The facilities of the proving ground should be treated with care.
All damage must be reported to the control center immediately.
Please leave the rooms clean. The use of non-rented rooms is prohibited.



The rules of the StVO are binding (follow possible exceptions of PXB).

CONFIDENTIAL

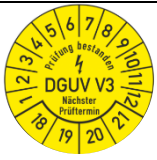
Every visitor/user of the proving ground undertakes to maintain confidentiality about secret information that may be obtained during the stay or during the use at the proving ground. Additional confidentiality obligations of other work relations (e.g. customer contracts, supplier contracts, work contracts) remain unaffected.
If you observe a violation against confidentiality please report it to the control center immediately.

Each user is responsible for the disposal of their own waste. The rules of waste separation must be observed. The containers provided for this purpose in the offices (paper, commercial waste) must be used.
For the disposal of recyclables and other waste (batteries, scrap, liquids, etc.), please contact the control center.

A temperature controlled storeroom for special fuels (1000l A1 fuel and other hazardous substances) is available. The use of the warehouse must be coordinated with the control center.
A planned use of hazardous substances, as well as the carrying of hazardous substances greater than customary quantities (for example > 5 liters of engine oil) must be reported with the booking.

In the area of the service workshops, safety shoes must be worn outside marked areas. Appropriated shoes depending on the task must be worn in all other areas (No Flip Flops or High Heels).

It is forbidden to operate mobile phones during walking.



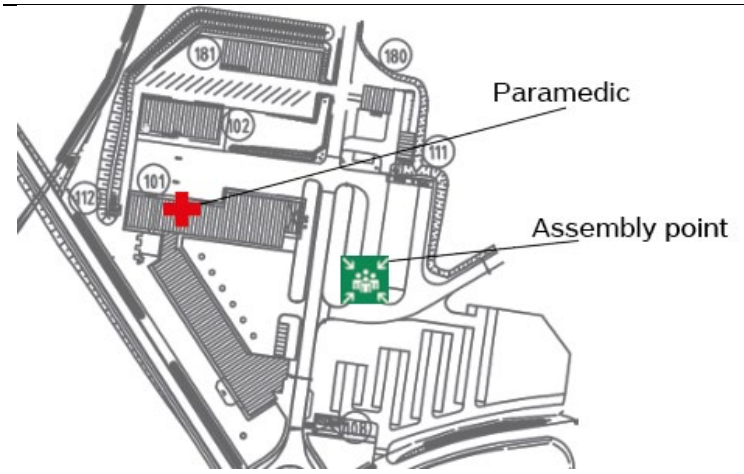
Your own electrical appliances must be checked in accordance with DGUV regulation 3.

Film recording and photo shoots of any kind are prohibited.
The devices can be stored in lockers in the entrance area.
When leaving the proving ground please take your devices with you and leave the key.
A photo permission must be requested in advance and approved in writing by the management. Violations are punished by a ban on entering the house. The corresponding footage will be retained and destroyed.
Please note that the use of environmental monitoring systems with image and/or sound recording on Bosch premises is prohibited, also in vehicles. Any exceptions require the prior approval of the Proving Ground Manager. Before entering the Bosch site it has to be ensured that such systems are deactivated and that no recording can be made on the Bosch site (e.g. turn off or masking of the cameras). If you have any questions, please contact the Control Centre.

Absolutely no alcohol or drugs are permitted.
Driving on the property is only permitted in a sober state (0.0 ‰) and with appropriate driving ability.

Smoking is prohibited throughout the proving ground, except in marked areas.

Emergencies / accidents / fires etc. must be reported immediately via the fixed network of Boxberg with the emergency number 112.
It is possible to make an emergency call from the onboard unit via the SOS button.
From the mobile phone network: 07930-600112
The paramedic is located in building 101 (see drawing).



Each person must know about the escape and rescue plans in their respective building area.
In the event of an evacuation alarm, the building must be left immediately.
Assembly point: Truck parking lot area has to be sought.
The eviction signal is an automated tape announcement (German / English).
The position of the fire extinguisher is marked by information signs.

Important telephone numbers:

- For External calls dial 01-
- Control Centre: 210
- Sales and Customer Service: 256, 257, 233, 365

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*Special rules can be valid for events at the weekend or public holidays.

Contacts and Route

Robert Bosch GmbH
Proving Ground Boxberg

Robert-Bosch-Straße 25
97944 Boxberg-Windischbuch
Germany

E-Mail: boxberg.pruefzentrum@bosch.com
Telefon: +49 7930 600-210
Fax: +49 7930 600-212
Website: www.bosch-poving-grounds.com
www.bosch-boxberg.de

GPS-Coordinates

Lat. 49° 26‘35‘‘North
Long. 09°37‘50‘‘East

Route

The Proving Ground is located about 10 minutes by car from the Highway A81 (Heilbronn-Würzburg)

Follow the sign “BOSCH“