



FSG Competition Handbook 2025

2024-12-22

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Changelog

| Rule | Version | Change |
|-------------|----------------|--|
| DE3.1.8 | 1.0 | Changed how the quiz ranking is calculated |
| DE3.2.2 | 1.0 | Removed reserved slots for top CV teams and increase to five slots for top EVs |
| DE3.2.2 | 1.0 | Added reserved slots for winners of other competitions |
| DE3.3.6 | 1.0 | Clarified rules on additional team members and late bookings |
| DE3.7.4 | 1.0 | Clarified HIC review process |
| DE4.2.3 | 1.0 | Increased maximum file size to 50 MB |
| DE6.1.1 | 1.0 | Limited the supporting material file to 20 pages |
| DE6.1.2 | 1.0 | Limited the cost and emission explanation file to 20 pages |
| DE7.5.6 | 1.0 | Updated driverless skidpad track figure |
| DE8.3.8 | 1.0 | Updated signal names in dbc message definition to better match current rules |
| DE8.3.12 | 1.0 | Removed requirement for dbc upload with ASF |
| DE8.4.17 | 1.0 | Added possibility to verify proper function of Race E-Key for RES |
| DE9 | 1.0 | Incorporated the previously separate "Shipping" document into the Handbook |



Abbreviations

| | | | |
|-------------|--|-------------|---|
| AMI | Autonomous Mission Indicator | ESF | Electrical System Form |
| ASES | Accumulator Structural Equivalency Spreadsheet | ESO | Electrical System Officer |
| ASF | Autonomous System Form | ESOQ | Electrical System Officer Qualification |
| ASRQ | ASR Qualification | EV | Electric Vehicle |
| BPPV | Business Plan Pitch Video | FSG | Formula Student Germany |
| CEST | Central European Summer Time | HIC | Health Insurance Certificate |
| CET | Central European Time | IAD | Impact Attenuator Data |
| CRD | Cost Report Documents | MU | Magazine Uploads |
| CTMD | Cell Temperature Monitoring Device | NMT | Network Management Protocol (CANopen) |
| CTS | Chassis Type Selection | PDO | Process Data Object (CANopen) |
| DC | Driverless Cup | RES | Remote Emergency System |
| DCPI | Driverless Cup Participation Intention | SDO | Service Data Object (CANopen) |
| DL | Data Logger | SE3D | Structural Equivalency 3D Model |
| DLDS | Data Logger Download Station | SES | Structural Equivalency Spreadsheet |
| DSS | Design Spec Sheet | SESA | SES Approval |
| DV | Driverless | TMD | Team Member Designation |
| EBS | Emergency Brake System | VSV | Vehicle Status Video |
| EDR | Engineering Design Report | | |



DE Formula Student Germany Competition Handbook 2025

DE1 General Information

DE1.1 Competition

DE1.1.1 There will be a competition for the Electric Vehicle (EV) class. This will take place together with the additional Driverless Cup (DC).

DE1.2 Applicable Rules

DE1.2.1 The competition will be held in compliance with the "Formula Student Rules 2025".

DE1.3 Competition Dates and Place

DE1.3.1 FSG 2025 will be held from 18th until 24th of August 2025 in Hockenheim, Germany.

DE1.4 Competition Website

DE1.4.1 The URL of the FSG competition website is <https://www.formulastudent.de>.

DE1.5 Date and Time Format

DE1.5.1 The competition date/time format is "YYYY-MM-DD hh:mm" according to ISO 8601¹.

DE1.5.2 The competition time zone is Central European Time (CET)² or Central European Summer Time (CEST) from last Sunday of March to last Sunday of October, Europe/Berlin.

DE1.5.3 The time of the competition website is the official time for all deadlines and decisions:
<https://www.formulastudent.de/time>.

¹https://en.wikipedia.org/wiki/ISO_8601

²https://en.wikipedia.org/wiki/Central_European_Time



DE2 Emergency Information

DE2.1 Emergency Numbers

DE2.1.1 The official emergency number in Germany is **112**. This number works from every phone and carrier network and is always free of charge.

DE2.1.2 During the competition, you can reach a Pit Marshal or Event Support via the following numbers:

- +49 (151) 560 747 00 – Pit Marshal (Pascal Heuter)
- +49 (151) 560 747 02 – Event Support (Matthias Brutschin)

DE2.2 Minor Injury

DE2.2.1 Emergency aid is provided at the Medical Center whenever the Pits are open. Its location is marked on the map.

DE2.2.2 Please accompany the injured person to the Medical Center.

DE2.3 Severe Injury

DE2.3.1 During the dynamic events, an ambulance is on standby on site. They are located next to the Medical Center and are marked in blue on the map. Every Official and Security has two-way radio, ask them to call the Medical Center or the ambulance on channel 16.

DE2.3.2 Call an ambulance yourself if someone is severely injured and needs urgent help. The Emergency Number for every phone and mobile phone is 112.

DE2.3.3 The closest Hospital to the competition site is the "Krankenhaus Schwetzingen", Bodelschwinghstrasse 10, 68723 Schwetzingen. You can reach them via phone at +49 (0) 6202 / 84-30

DE2.4 Clear message of zero tolerance of all forms of violence and hate crime

DE2.4.1 We would like to preventively raise awareness and spread the clear message of zero tolerance of all forms of violence and hate crime. Should an incident occur, we will be happy to help you deal with it confidentially.

DE2.4.2 During the competition, you could also go to the Medical Center and talk to the emergency services there.

DE2.4.3 We would also like to draw your attention to the following hotlines for professional support:

- 24-hour services of the EU-wide free helpline for women 116 016 (<https://www.hilfetelefon.de/en.html>)
- Nationwide victim support 116 006 (<https://weisser-ring.de/english>)



DE3 Registration

DE3.1 Team Registration

- DE3.1.1 The team registration will take place in the form of a quiz. Registration without taking part in the quiz is not possible. The quiz will require knowledge from all fields related to Formula Student.
- DE3.1.2 The URL of the registration website is <https://reg.formulastudent.de>. A test registration website will be made available at <https://t.reg.formulastudent.de>.
- DE3.1.3 Teams must create a team account on the competition website and assign a team captain and two deputies. The deadline for this is 24 h before the registration starts, see DE4.1. The team captain and their deputies may assign team members as participants simultaneously. Only one person (the team captain or one of their deputies) may complete the registration quiz.
- DE3.1.4 The quiz starts as defined in DE4.1.
- DE3.1.5 Only one question will be visible at a time and can only be answered once.
- DE3.1.6 Questions will have a fixed duration during which an answer has to be provided by the team.
- DE3.1.7 When entering the quiz late, depending on the delay, the first questions will not be visible anymore.
- DE3.1.8 The ranking is determined by the teams' quiz scores, as outlined in Equation DE.1. A lower score corresponds to a higher position in the ranking. Each question is assigned a weight proportional to its duration, which will be displayed alongside the question.

$$\begin{aligned}
 & i := \text{question index} \\
 & score_i = question_{weight,i} * \begin{cases} \frac{time_{team,i}}{2*time_{question,i}} & \text{valid answer} \\ 1 & \text{invalid answer} \end{cases} \\
 & score_{team} = \sum_i score_i \qquad \qquad \qquad (DE.1)
 \end{aligned}$$

- DE3.1.9 Once the quiz has been successfully completed, the team captain or one of their deputies must register the team for the competition by agreeing to the rules and by selecting a free vehicle number between 001 and 399. Requests for changing the vehicle number are only possible within 168 h (7 days) after the start of the registration.
- DE3.1.10 The quiz will close after the time to answer the last question has expired.
- DE3.1.11 No feedback if the answer was correct will be provided until the results are published on Saturday 2025-02-01 13:00 CET on the registration quiz page, see DE3.1.4. After the results are published, teams have 4 h to hand in protest until 2025-02-01 17:00 CET on <https://www.formulastudent.de/fsg/feedback-quiz/>. Protests by e-mail will be ignored. Quiz times and the resulting ranking will be published on Monday 2025-02-03 13:00 CET.
- DE3.1.12 Reserved slots, see DE3.2.2, will be assigned to the teams based on past achievements. All remaining and unused reserved slots will be assigned to all other teams, with regard to their quiz result.



DE3.1.13 All assigned teams will be placed on the pending list on the competition website. In order to move to the participating list, they have 72 h to pay the registration fee, see DE3.3. Once all slots have been filled, all additional teams will be placed on a waiting list, see DE3.4. The period to pay the registration fee starts with the publication of the ranking on 2025-02-03 13:00 CET.

DE3.1.14 The technical inspection order at the competition will be based on the quiz result.

DE3.2 Registration Slots

DE3.2.1 FSG 2025 is limited in total to 84 EV slots. Up to 42 of the registered teams may participate in the DC.

DE3.2.2 Reserved slots will be assigned to the following teams:

- Five top EV teams from FSG 2024
- Five top DC teams from FSG 2024
- Five top EV teams from latest World Ranking Lists³
- Winning EV teams from all World Ranking List³ competitions 2024

The top team slots will be assigned in the above order. Duplicate teams will be filled up with the next team from the respective category.

DE3.2.3 All remaining and unused reserved slots will become available for all other teams after the registration quiz has been closed on the registration website, see DE3.1.10.

DE3.3 Registration Fee

DE3.3.1 The registration fee is 1500€ and includes up to 15 team members.

DE3.3.2 The registration fee is waived for the overall winners (EV and DC) and for the winner of the Sportsmanship Award from FSG 2024.

DE3.3.3 The registration fee must be paid online within 72 h by a verified PayPal account after the team has been moved to the pending list in order to move to the participating list. Otherwise the team will be de-registered. Payment methods other than PayPal are not accepted.

DE3.3.4 Registration fees are only refundable should unexpected entry restrictions prohibit the team from traveling.

DE3.3.5 More team members can be registered for 50€ per participant until the TMD deadline, see DE4.2. Unassigned spaces expire at the TMD deadline and will not be refunded. There is no limit in team size.

DE3.3.6 After the TMD deadline, see DE4.2, changes to the list of team members are only possible by paying a late booking fee of 100€ per participant. This also applies to teams who move up from the waiting list after the TMD deadline. There is no deadline for late bookings.

DE3.4 Waiting List & Withdrawals

DE3.4.1 Teams on the waiting list may move to the participating list until 2025-08-03 00:00 CEST. This is possible if registered team withdraw from the competition.

³<https://fs-world.org>



Once a slot on the participating list has become available again, the next team on the waiting list will move to the pending list and has 72 h to pay the registration fee in order to move to the participating list.

- DE3.4.2 Teams on the waiting list are required to submit all documents and forms by the same deadlines as teams on the participating list. This includes the TMD deadline, see DE3.3.6.
- DE3.4.3 Teams on the waiting and participating lists who find that they will not be able to attend the competition are requested to officially withdraw via the option on their competition settings page. This cannot be undone.
- DE3.4.4 After the waiting list closes, execution of A5.4.2 is suspended and teams will no longer be de-registered.

DE3.5 No Driverless Events

- DE3.5.1 Teams that do not intend to run in autonomous mode at the competition must set the status "No Driverless Events" on their competition settings page. This cannot be undone. All driverless events will be scored with 0 points. The team will not be allowed to run in autonomous mode.
- DE3.5.2 Teams with the status "No Driverless Events" are not required to upload the ASF, ASRQ and the dbc file. Therefore, if these deadlines are missed, the team will not be de-registered from the competition. All correction request for these deadlines become invalid immediately. Existing penalties remain if the status "No Driverless Events" is handed in after a deadline already expired.

DE3.6 Driverless Cup

- DE3.6.1 All teams must decide on their competition settings page whether they wish to participate in the Driverless Cup (DC) by the DCPI deadline, see DE4.2.
- DE3.6.2 Up to 42 DC slots will be assigned among these teams. Five slots are reserved for the five top teams from the FSG 2024 DC competition, the remaining slots will be assigned in the order of the quiz results.

DE3.7 Team Member Designation

- DE3.7.1 Participating team members must be assigned prior to the competition by the team captain or their deputies.
- DE3.7.2 Any changes after the TMD deadline, see DE4.2, are considered late bookings according to DE3.3.6. Registered participants cannot be swapped for other team members after the deadline.
- DE3.7.3 If there are any team members who are studying at a different university, they must choose the team's university during their registration process as a team member.
- DE3.7.4 Team members may only be selected as participants by the team captain, if they have entered the following personal information in their user profiles:
- Personal address
 - Clothing size
 - Valid Health Insurance Certificate (HIC) for Germany (e.g. travel insurance)



- FSG standard terms

It is possible to select team members as participants who have not yet passed the HIC review. New or updated HICs will only be reviewed after the team member has been selected as participant by the team captain.

DE3.7.5 As proof of valid health insurance in Germany the following documents are accepted (English or German language only):

- For members of any EU/EWR country: the backside of their European Health Insurance Card (EHIC).
- For all other (non EU/EWR or private health insurance): a DIN A4 PDF containing the member's full name, date of birth, validity date, clear statement that insurance is valid in Germany during the time of the event.

Team members have three attempts to upload a correct HIC. Ignoring the reviewer's comments more than twice will lead to an irrevocable fail.

DE3.7.6 The submission of the signed standard terms will be handled digitally. All participants will find personalized standard terms in the **My Account** section on the FSG website. This document must be signed and then uploaded using the standard terms upload in the **My Account** section.

DE3.8 Visa for Participants

DE3.8.1 All participants which passed the HIC-check, will find a personalized letter of invitation with a digital signature in their account overview.

DE3.8.2 An invitation letter with a hand signature can be ordered on the competition website. Once a fee of 90€ has been paid, the letter will be sent out within two weeks.

DE4 Important Dates

DE4.1 Team Registration

DE4.1.1 Team registration, see DE3.1, for all teams starts on 2025-01-31 13:00 CET with the registration quiz and ends after the registration quiz has been closed, see DE3.1.10.

DE4.2 Deadlines

DE4.2.1 All required documents and information must be uploaded to the competition website by the team captain and/or their deputies by the deadlines stated in Table 2.

DE4.2.2 Deadlines are specified such that documents need to have been submitted and received by the website **before** the time specified by the respective deadline. An upload time of 13:00:00.000 is therefore already too late if the deadline was 13:00.

DE4.2.3 All documents must comply with a maximum size of 50 MB.



| Date | Deadline |
|-----------------------|--|
| 2025-02-21 13:00 CET | Driverless Cup Participation Intention (DCPI) |
| 2025-03-14 13:00 CET | Accumulator Structural Equivalency Spreadsheet (ASES) |
| 2025-03-14 13:00 CET | Chassis Type Selection (CTS) |
| 2025-03-14 13:00 CET | Impact Attenuator Data (IAD) |
| 2025-03-14 13:00 CET | Structural Equivalency 3D Model (SE3D) |
| 2025-03-14 13:00 CET | Structural Equivalency Spreadsheet (SES) |
| 2025-03-14 13:00 CET | SES Approval (SESA) |
| 2025-03-28 13:00 CET | Autonomous System Form (ASF)* |
| 2025-03-28 13:00 CET | Electrical System Form (ESF) |
| 2025-06-06 13:00 CEST | Business Plan Pitch Video (BPPV) |
| 2025-06-06 13:00 CEST | Design Spec Sheet (DSS) |
| 2025-06-06 13:00 CEST | Engineering Design Report (EDR) |
| 2025-06-06 13:00 CEST | Magazine Uploads (MU) |
| 2025-06-27 13:00 CEST | ASR Qualification (ASRQ)* |
| 2025-06-27 13:00 CEST | Electrical System Officer Qualification (ESOO) |
| 2025-06-27 13:00 CEST | Team Member Designation (TMD) |
| 2025-07-11 13:00 CEST | Vehicle Status Video (VSV) |
| 2025-08-01 13:00 CEST | Cost Report Documents (CRD) |
| 2025-08-01 13:00 CEST | dbc file upload* |
| 2025-08-01 13:00 CEST | Option to set "No Driverless Events" (DE3.5) |
| 2025-08-03 00:00 CEST | Waiting list closes (DE3.4) |
| 2025-08-18 20:00 CEST | On-site accumulator registration according to DE5.13.2 |

Table 2: Document deadlines

* The ASF, ASRQ and dbc file upload is not required for teams that have selected the "No Driverless Events" status, see DE3.5.

DE5 Competition Site Organization

DE5.1 On-Site Registration

- DE5.1.1 Each team will be assigned to one of three time slots for registering on-site. The order is the same as in DE5.10. The three slots will be published in the main schedule on the FSG website⁴.
- DE5.1.2 On Monday, the on-site registration will take place near the south stands. On Tuesday, the on-site registration will take place at the ticket center near the main entrance.
- DE5.1.3 Until Tuesday 2025-08-19 15:30 CEST, teams are limited to have only 7 members on-site.
- DE5.1.4 Until Tuesday 2025-08-19 15:30 CEST, there is a no-go area in effect. Details can be found in the map published on the competition website.
- DE5.1.5 The team captain will be handed the tickets of their team members and all other required documents for entering the venue.

⁴<https://fsg.one/schedule>



- DE5.1.6 Tickets will only be handed out for team members with complete profiles on the FSG website.
- DE5.1.7 All questions regarding the registration procedure must be asked via the "Event Helpdesk" on the FSG website⁵.
- DE5.1.8 The team must enter the competition site for unloading immediately after receiving their tickets and documents.

DE5.2 Entering the Competition Site

- DE5.2.1 A pink "team truck" entrance pass with a green "unload card" attached to it is handed to each team at the registration. This entrance pass must be filled out completely and displayed behind the windscreen of the "team truck" used to transport the competition vehicle and equipment to the pits.
- DE5.2.2 The driver may queue the "team truck" only after the entrance passes are filled out.
- DE5.2.3 The total length of the "team truck" including a possible trailer must not exceed 12 m.
- DE5.2.4 The team is entitled to enter the competition site only once with their "team truck" for a maximum of 30 min for the purpose of unloading their competition vehicle and equipment.
- DE5.2.5 Afterwards the "team truck" must be moved outside of the Hockenheimring.
- DE5.2.6 It is not possible to drive to the pit area again with the "team truck" during the event before loading on Sunday.
- DE5.2.7 On Sunday 2025-08-24 the team is entitled to enter the pits once with the "team truck" for a maximum of 30 min for the purpose of loading.
- DE5.2.8 On request, teams may receive an additional yellow entrance pass that allows one passenger vehicle to enter the pit area for the next hour. These passes are only given out from Wednesday 2025-08-20 until Sunday 2025-08-24 11:00 CEST.

DE5.3 Announcements

- DE5.3.1 All announcements can be found on the competition website <https://today.formulastudent.de/>.

DE5.4 Protest Procedure

- DE5.4.1 To initiate the protest procedure according to A3.7.2, a request for clarification must be submitted via email to the address shown on <https://fsg.one/protest> before the announced protest deadline. The request must at least contain the following information:
- Rule interpretation, score or official action to be protested against
 - Explanation of the team's interpretation of the rules regarding the incident
 - Additional material supporting the team's interpretation

⁵<https://fsg.one/questions>



- DE5.4.2 After submitting the request for clarification, the team captain is going to be contacted by an official for an informal preliminary review. Within 2 h after the review the team can chose to continue the procedure by submitting a formal protest via email to the address shown on <https://fsg.one/protest>, binding 25 points to it. If no formal protest is received within 2 h after the review, the protest procedure for this incident is cancelled permanently.
- DE5.4.3 The announced protest deadline is always going to be between 10:00 CEST and 22:00 CEST.
- DE5.4.4 The protest deadline for scoring results and penalty publishings is going to be at least 2 h after publication. For protests regarding endurance, the protest deadline may be shorter.
- DE5.4.5 If no explicit protest deadline is announced, the deadline is 24 h after the respective incident.

DE 5.5 Competition Site

- DE5.5.1 The use of motorcycles, quads, bicycles, scooters, skateboards or other similar mobility devices as well as self-propelled devices in general by team members and spectators is prohibited.
- DE5.5.2 Lost & found items must be picked up until Sunday 2025-08-24 18:00 CEST at Event Control.
- DE5.5.3 Confiscated goods must be picked up until Sunday 2025-08-24 18:00 CEST at a place to be announced. Confiscated items that are not picked up in time will not be kept.

DE 5.6 Welding

- DE5.6.1 FSG attempts to provide an approved welder. Outside of the opening hours it is possible to weld with own equipment in the welding area only, using appropriate safety gear.

DE 5.7 Tires

- DE5.7.1 FSG attempts to provide a tire changing service.

DE 5.8 Team Briefings

- DE5.8.1 Important information for the upcoming day will be published on the competition website every evening. The team captain, their deputies and all drivers are expected to have read those briefings.

DE 5.9 Driver Registration

- DE5.9.1 Driver registration will take place during the egress tests in the pits. All drivers must have their government issued driver's license and national ID card as well as their student ID ready for inspection.



DE 5.10 Technical Inspection Time Schedule

- DE5.10.1 The technical inspection parts pre-inspection, accumulator inspection, mechanical inspection, electrical inspection and driverless inspection will be conducted within a strict time schedule where every team will get a predesignated time slot. The time schedule will be published on the website shortly before the start of the competition.
- DE5.10.2 The slots will be assigned to DC participants first and then to the other teams, based on the registration quiz order.

DE 5.11 Transponders / Timekeeping

- DE5.11.1 In order to have the vehicle be identifiable during dynamic disciplines, Timekeeping will stick three RFID tags to the vehicle. There will be one tag on the front, center and rear of the vehicle. They will all be on the left side (as shown in figure 1).

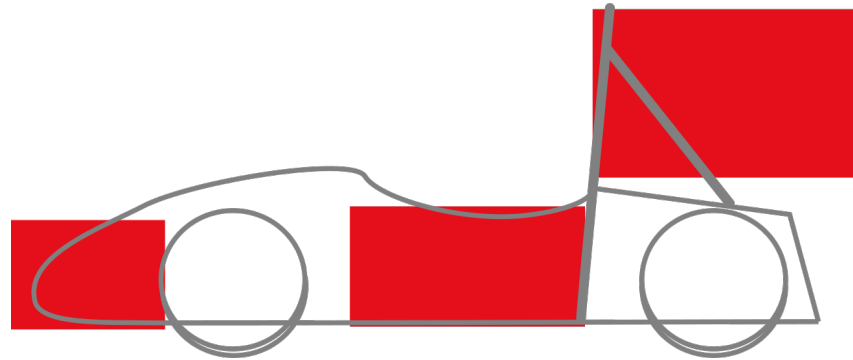


Figure 1: RFID Tag Placement Areas

- DE5.11.2 The location of the tags is decided by the officials. Areas where the driver will touch to get in or out and any sponsorship sticker will be avoided if possible.
- DE5.11.3 The area on the vehicle will be cleaned (regular window cleaner) to apply Velcro tape to mount RFID tags.
- DE5.11.4 If an RFID tag gets damaged, please contact Event Control. This will not result in a penalty.
- DE5.11.5 The RFID tags must not be fixed in any other way than done by the officials initially. This especially includes safety wiring or tape, as both interfere with the detection of the tags. In the unlikely event that a tag loosens from its mounting, this will never be treated as the team's fault.
- DE5.11.6 After the competition, these tags must be returned to the Event Control by Sunday, 2025-08-24 18:00 CEST.
- DE5.11.7 Live-timing is provided at <https://tk.formulastudent.de>. The shown data is unofficial.

DE 5.12 Charging

- DE5.12.1 The charging area is a separated dynamic area including separate entrance restrictions.



- DE5.12.2 Only three members per team may enter the charging area at the same time. One of them must be an Electrical System Officer (ESO).
- DE5.12.3 Inside the charging area, team members must not wear any conductive jewelry and must not wear any conductive objects of any kind which could touch the accumulator.
- DE5.12.4 400V, 50Hz, 3-phase CEE charging connectors (3L+N+PE 6h) with 16A and 32A as well as 230V, 50Hz, 1-phase CEE 7/3 "Schuko" are available in the charging area.

DE 5.13 Accumulator Inspection

- DE5.13.1 The accumulator inspection will take place in the charging area.
- DE5.13.2 All teams that are allowed to enter on Monday 2025-08-18 and don't have their accumulator inspection on Monday must bring their accumulators to the charging area by 20:00 CEST that day. All teams that have their accumulator inspection on the same day of entering bring their accumulators directly to the accumulator inspection.
- DE5.13.3 If a team misses the aforementioned deadline, a penalty of 10 points is deducted of its overall score for every commenced 12 hours up to a maximum total of 30 penalty points.
- DE5.13.4 The team has to register the accumulator delivery at the charging area.

DE 6 Static Events

DE 6.1 Cost Report Documents (CRD)

- DE6.1.1 For FSG, the supporting material file, see S3.6, must not exceed 20 pages of content. A title page and a table of contents page may additionally be added.
- DE6.1.2 For FSG, the cost and emissions explanation file, see S3.7, must not exceed 20 pages of content, consisting of not more than 10 pages each for costs and for emissions. A title page and a table of contents page as well as an appendix may additionally be added. The appendix may only list input values (e.g. the price for 1 kg of aluminium). It must not contain any calculations.

DE 7 Dynamic Events

DE 7.1 Dynamic Events Closing Time Handling

- DE7.1.1 An audio signal (i.e. "gong") indicates the end of the current session.
- DE7.1.2 Teams that have received a green flag or a go signal prior to the audio signal can finish their run. Directly following second runs are not allowed after the audio signal.
- DE7.1.3 Re-runs will be granted after the audio signal, if applicable.



DE 7.2 Endurance Running Order

- DE 7.2.1 The running order for the endurance according to D 7.3 will be published before the start of the endurance.
- DE 7.2.2 The running order is divided into different sessions.
- DE 7.2.3 At least the five next vehicles according to the running order must queue up at any time during the endurance.
- DE 7.2.4 The queue must be continuously filled up by the following vehicles.
- DE 7.2.5 When the queue runs empty (i.e. there is no vehicle in the queue) for more than 5 min, the session is finished, even if not all vehicles from this session have been running yet.
- DE 7.2.6 A vehicle is defined as running out of order and penalized according to D 9.2.1 if it is missing from the queue. I.e. if there is at least one vehicle within the first 5 positions in the queue that has a later running order place or is running out of order as well.
- DE 7.2.7 Running out of order is only possible at the end of the originally allocated session. There is no out of order running in or after the final session.

DE 7.3 Trackdrive Running Order

- DE 7.3.1 The running order for the trackdrive according to D 8.2 will be published before the start of the trackdrive.
- DE 7.3.2 At least the three next vehicles according to the running order must queue up at any time during the trackdrive.
- DE 7.3.3 The queue must be continuously filled up by the following vehicles.
- DE 7.3.4 When the queue runs empty (i.e. there is no vehicle in the queue) for more than 5 min, the trackdrive is finished, even if not all vehicles have been running yet.
- DE 7.3.5 A vehicle is defined as running out of order and penalized by 30 s if it is missing from the queue. I.e. if there is at least one vehicle within the first 3 positions in the queue that has a later running order place or is running out of order as well.
- DE 7.3.6 Running out of order is only possible at the end of the trackdrive.

DE 7.4 Behavior Inside Dynamic Area

- DE 7.4.1 Within the dynamic area, equipment that cannot be carried handheld by one team member, such as tool trolleys, jacks, etc., is only allowed in the inspection and preparation areas and not in the dynamic event queues.
- DE 7.4.2 As soon as the vehicle moves under its own power, all associated team members within the dynamic area, with the exception of the ASR, must wait in a designated area until the run is finished. After the run, the vehicle must be collected immediately at the exit by two team members and the push bar.

DE 7.5 Driverless Events Track Marking

- DE 7.5.1 The markings of all dynamic events will have the following characteristics:



- The track is marked with cones.
- The left borders of the track are marked with small blue cones.
- The right borders of the track are marked with small yellow cones.
- Exit and entry lanes are marked with small orange cones.
- Big orange cones will be placed before and after start, finish and timekeeping lines.
- If not defined otherwise in chapter D of the rules, the maximum distance between two cones in driving direction is 5 m. In corners, the distance between the cones is smaller for a better indication.
- The start, finish and timekeeping lines as well as keep out zones around the timekeeping equipment are marked with red, orange or pink paint.
- Additionally for skid pad and trackdrive, track limit lines on either side of the track and entry/exit lanes may be marked with yellow, green or white paint.
- There are no track limit lines for acceleration and Emergency Brake System (EBS)-test.
- Timekeeping equipment may be surrounded by additional cones outside of the track boundary.

DE7.5.2 All lines are spray painted with the chalk-based marking paint "Technima - Tempo T.P."⁶.

DE7.5.3 The cones used at the competition are equal to the cones listed in Table 3 despite that there will be letters "FSG" on the black/white band of the cones (white/black respectively).

DE7.5.4 The manufacturer WEMAS⁷ does not sell the cones to end customers, but they may be purchased from baustellenabsicherung24.de⁸.





| | | | |
|---|---|---|---|
|  |  |  |  |
| big orange cone two white stripes | small orange cone single white stripe | small yellow cone single black stripe | small blue cone single white stripe |
| WEMAS 307.610500.00.00 | WEMAS 400.000013.00.00 | WEMAS 400.000013.01.10 | WEMAS 400.000043.00.00 |
| 285 mm × 285 mm × 505 mm 1.05 kg | | 228 mm × 228 mm × 325 mm 0.45 kg | |

Table 3: Cone specs

DE7.5.5 There are the following limitations mainly resulting from the Hockenheim track conditions and organizational/authorizational issues:

- The lines may not be perfectly and continuously drawn.

⁶<https://fsg.one/spraypaint>

⁷<https://www.wemas.de>

⁸<https://fsg.one/cones>



- There may be further markings, to those mentioned above, that are not part of the track (e.g. markings, including cone position markings, lines from other events or different colored surface, etc.) on or close to the track which will not be removed by the officials.
- There may be (stacked) spare cones standing at the track side at distinguishable distance.
- There is time keeping equipment next to the track that could be recognized as cone.
- No special artificial landmarks are provided by officials. The team must not place additional landmarks on the track or inside the dynamic area.
- No map data is provided by the officials.

DE7.5.6 Figures 2, 3 and 4 visualize the track layout descriptions given in D5.1, D4.2.4 and D8.1.

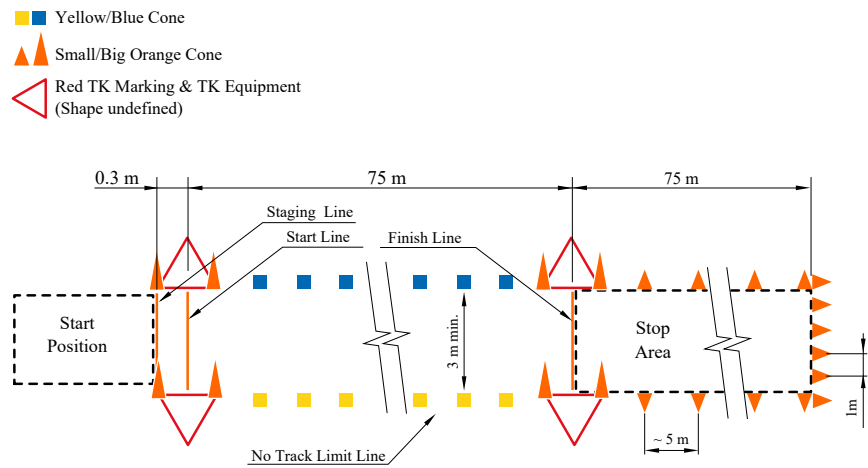


Figure 2: Acceleration according to D5.1

DE7.6 [DC ONLY] Driverless Autocross Track Walk Procedure

DE7.6.1 Due to the manual acceleration event running in parallel, the dynamic area restrictions, see D1.4, are relaxed for the track walk of the driverless autocross. Entrance to this track walk is granted to team members wearing a dynamic vest or carrying an entry card for the charging area.

DE8 Vehicle Requirements and Restrictions

DE8.1 Technical Inspection Sticker

DE8.1.1 For the competition technical inspection sticker according to IN1.3, a space 50 mm tall × 180 mm wide must be made available on the nose of the vehicle directly in front of the cockpit opening.

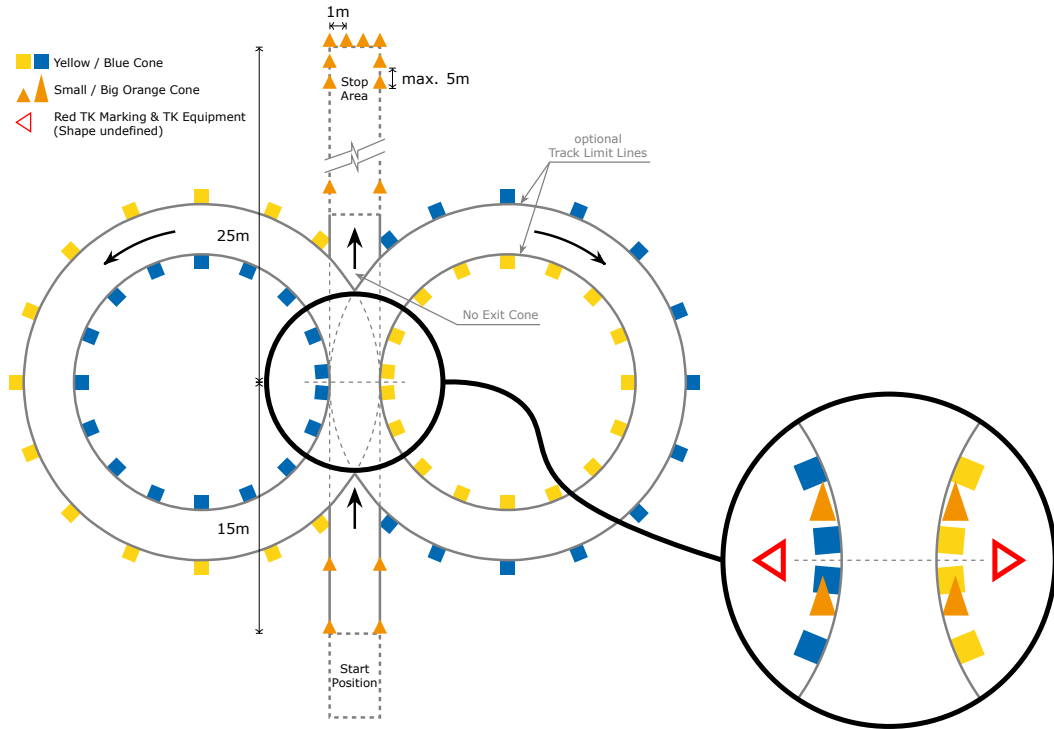


Figure 3: Skidpad according to D4.2.4

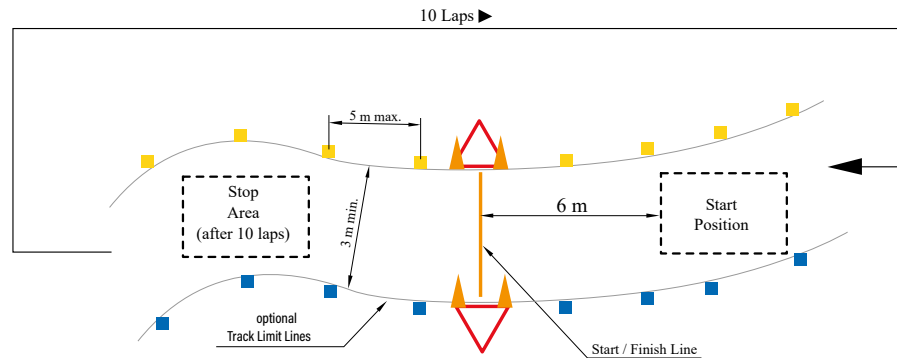
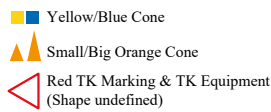


Figure 4: Trackdrive according to D8.1

DE 8.2 Cell Temperature Monitoring Device

- DE8.2.1 As Cell Temperature Monitoring Device (CTMD) according to EV5.8.6, a DS1922T-F5 (iButton) will be provided by the officials and must be installed by the team.
- DE8.2.2 The CTMD must be mounted using a suitable holder. Mounting using only glue is prohibited. It is recommended to use an iButton holder (DS9093S) for mounting.



DE 8.3 Data Logger

- DE8.3.1 A Data Logger (DL) according to EV4.6 and T14.2, described in the additionally published document "Data Logger Specification", will be mounted to the vehicle.
- DE8.3.2 At the competition, several Data Logger Download Station (DLDS) will be provided as self-service terminals.
- DE8.3.3 It is the responsibility of the team to ensure that the DL data from each event is made available to the officials by having it downloaded at a DLDS at latest 1 h after the closing of the respective event.
- DE8.3.4 Failure to make the data available within the specified time period, due to the team's fault, is a violation according to D9.4.4.
- DE8.3.5 Missing or corrupted DL data due to excessive electromagnetic emission by the vehicle is a violation according to D9.4.4.
- DE8.3.6 The DL is based on an IVT-S from Isabellenhütte Heusler GmbH⁹.
- DE8.3.7 The communication described in section DE8.4.9 must be traceable in the logs.
- DE8.3.8 Beside Remote Emergency System (RES) messages, see DE8.4.9, the messages defined in Table 4 must be provided to the DL with a cycle time of 100 ms each. Steering angle δ and vehicle coordinate system is defined in figure 5.

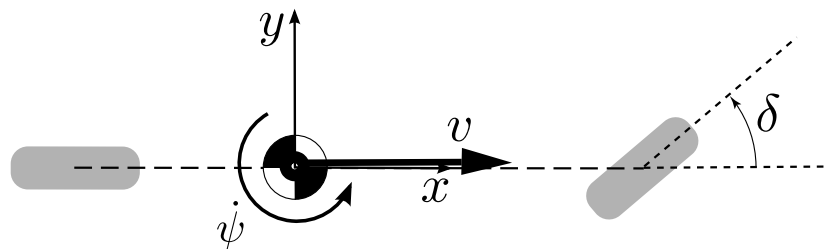


Figure 5: Bicycle model defining steering angle δ (drawn in positive direction after "ISO 8855" coordinate system $\Rightarrow z$ up) and speed v .

- DE8.3.9 All signals are little-endian (Intel). Scale, if not defined, is 1.
- DE8.3.10 Messages 0x500 and 0x502 must be filled in any case. If some values are not directly available, they should be interpolated or calculated (i.e. target values). 0x501 depends on available sensor data.
- DE8.3.11 All signals mentioned in the team's Autonomous System Form (ASF) have to be provided within the up to five messages with CAN-IDs 0x511 to 0x515. Each message can be up to 8 B of data length. Cycle time is 100 ms.
- DE8.3.12 A valid dbc¹⁰ file containing the message definition of the ASF messages must be uploaded until the deadline mentioned in DE4.2.

DE 8.4 Remote Emergency System

- DE8.4.1 The RES according to T 14.3 that has to be used for the competition is a GF2000i-codec/T53R98 combination from Gross-Funk GmbH¹¹.

⁹Refer to <https://fsg.one/ivt-s> for details. If you are interested in this component, please send an email to ISASCALE@isabellenhuetten.de.

¹⁰see https://fsg.one/dbc_format for more information

¹¹<https://fsg.one/res>



| CAN-ID | Name | Length | Format | Unit | Scale |
|---------------------|---|-----------|----------|------------------|-----------------|
| 0x500 | DV driving dynamics 1 | 8 B | | | |
| | Speed_actual | bit 0-7 | unsigned | km/h | |
| | Speed_target | bit 8-15 | unsigned | km/h | |
| | Steering_angle_actual | bit 16-23 | signed | ° | 0.5 |
| | Steering_angle_target | bit 24-31 | signed | ° | 0.5 |
| | Brake_hydr_actual | bit 32-39 | unsigned | % | |
| | Brake_hydr_target | bit 40-47 | unsigned | % | |
| | Motor_moment_actual | bit 48-55 | signed | % | |
| Motor_moment_target | bit 56-63 | signed | % | | |
| 0x501 | DV driving dynamics 2 | 6 B | | | |
| | Acceleration longitudinal | bit 0-15 | signed | m/s ² | $\frac{1}{512}$ |
| | Acceleration lateral | bit 16-31 | signed | m/s ² | $\frac{1}{512}$ |
| | Yaw rate | bit 32-47 | signed | °/s | $\frac{1}{128}$ |
| 0x502 | DV system status | 5 B | | | |
| | AS_status_off | | 1 | | |
| | AS_status_ready | | 2 | | |
| | AS_status_driving | bit 0-2 | 3 | | |
| | AS_status_emergency | | 4 | | |
| | AS_status_finished | | 5 | | |
| | ASB_EBS_state_deactivated | | 1 | | |
| | ASB_EBS_state_initial_checkup_passed | bit 3-4 | 2 | | |
| | ASB_EBS_state_activated | | 3 | | |
| | AMI_state_acceleration | | 1 | | |
| | AMI_state_skidpad | | 2 | | |
| | AMI_state_trackdrive | bit 5-7 | 3 | | |
| | AMI_state_braketest | | 4 | | |
| | AMI_state_inspection | | 5 | | |
| | AMI_state_autocross | | 6 | | |
| | Steering_state | bit 8 | bool | | |
| | ASB_redundancy_state_deactivated | | 1 | | |
| | ASB_redundancy_state_engaged | bit 9-10 | 2 | | |
| | ASB_redundancy_state_initial_checkup_passed | | 3 | | |
| | Lap_counter | bit 11-14 | unsigned | | |
| Cones_count_actual | bit 15-22 | unsigned | | | |
| Cones_count_all | bit 23-39 | unsigned | | | |

Table 4: Message definition of logged general DV data

DE8.4.2 All RES must be of the latest 2022 hardware revision (with E-Key).

- SIL3 (EN61508) certified
- EMV certified
- communication in 430 MHz to 440 MHz band
- increased signal strength of 88 mW
- 12V to 24V supply voltage (0.26 A @12V)
- 450 g, 173 mm × 113 mm × 35 mm
- IP20 (receiver) / IP65 (sender)

DE8.4.3 Please contact Mr. Keller (christian.keller@grossfunk.de) at Gross-Funk for purchasing.



Figure 6: RES sender & receiver

- DE8.4.4 Regarding the increased signal strength, the BNetzA registration for Hockenheim will be provided by the officials.
- DE8.4.5 The receiver includes a normally-open (NO) relay which must be part of shut-down circuit. It opens on switching shutdown, on signal loss, and on power loss. Maximum current rating is 4 A.

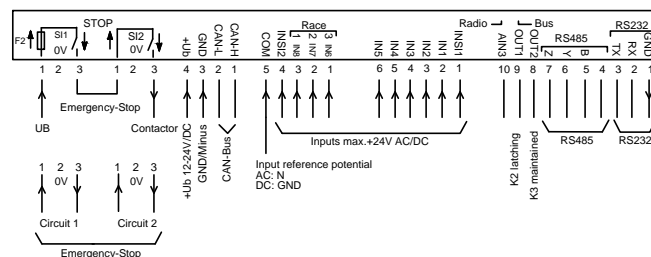


Figure 7: Connections at the RES receiver

- DE8.4.6 The CANopen interface of the receiver has the following properties:
- 1000 kbit/s, 125 kbit/s, 250 kbit/s and 500 kbit/s in standard configuration.
 - Cyclic PDOs containing states of switches (Go-signal) and radio
 - Warns if signal loss detected (200 ms in advance to shutdown, contained in cyclic PDO)
- DE8.4.7 The Node-ID and baud rate settings of the vehicle-side installed receiver can be configured with the external DIP switch:
- DE8.4.8 The Node-ID has to be set to 0x011 during the competition. Only in severe cases, there will be an exception. Please give a detailed problem description with the request.
- DE8.4.9 The receiver is booted up and sends a message to signalize its initialization (NMT message with CAN-ID 0x700 + Node-ID and a single data byte 0x00). A CAN/CANopen master device must set the receiver to operational mode (NMT message CAN-ID = 0x000, byte 0 = 0x01 (requested state), byte 1 = addressed



| DIP SW | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Baud Rate |
|---------|---------|----|----|----|-----|-----|-----------|---|------------|
| Node-ID | +1 | +2 | +4 | +8 | +16 | +32 | 0 | 0 | 1 Mbit/s |
| Bit | 0 | 1 | 2 | 3 | 4 | 5 | 1 | 0 | 125 kbit/s |
| | | | | | | | 0 | 1 | 250 kbit/s |
| | | | | | | | 1 | 1 | 500 kbit/s |
| | Node-ID | | | | | | Baud Rate | | |

Table 5: DIP switch configuration RES.

Node-ID or 0x00 for all). After setting to operational mode, the receiver starts sending a status message of 8 bytes containing PDOs 2000 - 2007 (one byte each, CAN-ID = 0x180 + Node-ID) every 30 ms.

DE8.4.10 Manually resetting the RES before sending the operational mode message may be used to check if the device is online (NMT message CAN-ID = 0x000, byte 1 = 0x80 (requested state), byte 2 = addressed Node-ID). This will be answered with the boot-up message.

DE8.4.11 Beside the CAN-IDs mentioned in DE8.4.9 and DE8.4.10, be aware not to use the CANopen-related IDs listed in Table 6 on the bus¹².

| Communication object | CAN-ID | Slave nodes |
|----------------------|-----------------|-----------------|
| NMT node control | 0x000 | Receive only |
| Sync | 0x080 | Receive only |
| Emergency | 0x080 + Node-ID | Transmit |
| TimeStamp | 0x100 | Receive only |
| PDO | 0x180 + Node-ID | 1. Transmit PDO |
| | 0x200 + Node-ID | 1. Receive PDO |
| SDO | 0x580 + Node-ID | Transmit |
| | 0x600 + Node-ID | Receive |
| NMT node monitoring | 0x700 + Node-ID | Transmit |
| LSS | 0x7E4 | Transmit |
| | 0x7E5 | Receive |

Table 6: Reserved message IDs for RES.

DE8.4.12 System misbehavior and faulty logs caused by misuse of these messages eliminates the demand for a re-run and may lead to a disqualification. Same counts for any kind of hardware manipulation to the sender and receiver or improper antennas modifications. In doubt, the logs available on the official DL, see DE8.3, count.

DE8.4.13 The status of the switch (K2) and the button (K3) at the sender is contained in the PDO 2000 (bit 1 and 2) as well as on the digital outputs, see Figure 7. The E-Stop is signalized by PDO 2000 bit 0 and PDO 2003 bit 7. PDO 2006 contains the radio quality (0 % to 100 %) whereas PDO 2007 summarizes several radio states, i.e. the pre-alarm radio communication interruption (bit 6, 200 ms in advance to shutdown).

DE8.4.14 Either K2 or K3 are allowed to be used to signalize the Go-signal for switching from "Ready" to "Driving" state, see T14.8, Figure 15. Both the CAN message or the digital outs can be used.

DE8.4.15 For dynamic disciplines, the officials will hand-out a Race E-Key that has to replace the team's Training E-Key for the time of the run (switching the RES to

¹²<https://fsg.one/canopen-poster>



a different set of frequencies within the range listed in DE8.4.2). It must be returned to the officials immediately after the run has been finished.

- DE8.4.16 In order to enable the Race E-Key frequencies at the receiver, the input "Race 1" has to be set to high (by bridging the input with supply "+Ub"). That needs to be done upon receipt of the E-Key with a flip switch in proximity to the Autonomous Mission Indicator (AMI), see T14.10. Race mode position has to be marked with an "R". Correct mode selection can be traced via the input's LED as well as in PDO 2007, bit 7.
- DE8.4.17 Before Thursday 2025-08-21 12:00 CEST the Race E-Key will be available at the EBS Test, see IN11.2, to verify the proper function within the vehicle.

DE 8.5 Maximum Sound Level

- DE8.5.1 The maximum sound level of any noise source of the vehicle is 110 dB(C) at any time.
- DE8.5.2 The sound level can be measured at any time during the competition. The distance from which the measurement is taken is 0.5 m.

DE 9 Vehicle Shipping

DE 9.1 Shipping Address

- DE9.1.1 Teams that wish to ship their vehicle to the competition must use the following address:

Name of University
c/o Hockenheimring GmbH
Sachshaus - FSG - **Car XXX**
Am Motodrom
68766 Hockenheim
GERMANY

phone +49 (6205) 950141 [Hockenheimring GmbH]

DE 9.2 Incoming Shipments

- DE9.2.1 The earliest possible delivery date is Monday 2025-08-18 08:00 CEST.
- DE9.2.2 All paperwork, documentation and/or forms required for inbound/outbound shipping or customs clearance must be completed and supplied by the school/university. The paperwork is the sole responsibility of the team.
- DE9.2.3 Inspecting shipments, reporting and documenting damage to the shipment is the sole responsibility of the receiving team.

DE 9.3 Shipping Crates/Containers

- DE9.3.1 All shipping containers must have the school's name permanently and clearly marked.
- DE9.3.2 Shipping crates/containers must have hi-low fork lift access from ends and sides.
- DE9.3.3 The forklift at Hockenheim cannot lift more than 5 metric tons.



DE9.3.4 Crates are stored outside and should be weatherproof.

DE9.3.5 Crating/Loading and uncrating/unloading is the sole responsibility of the team.

DE 9.4 Outgoing Shipments

DE9.4.1 The latest possible pick-up date is Monday 2025-08-25 12:00 CEST.

DE9.4.2 It is each university's responsibility to schedule the pick-up of your outgoing shipment and prepare the shipment and all the paperwork required for the shipment.

DE9.4.3 All shipping and customs forms must be filled out by team/university representatives.

DE9.4.4 All shipments must be packed and the crates properly sealed and labelled before the team leaves the site on Monday.

DE9.4.5 If your shipment is not removed from the Hockenheimring by the date and time specified in DE9.4.1 you will be charged at least 250€ per day for storage and handling. After 5 days our shipping company will pick it up and take the shipment into custody.

DE 9.5 Shipment Information Upload

DE9.5.1 You must upload all information for any shipment to Hockenheim as one multipage pdf file (containing at least one page per shipment) in your team area, as a deadline upload and when the shipment has been sent. The upload must contain

- Car number, university name, university city, country, contact person(s) on site during delivery/pickup and their mobile phone number(s) and email
- Shipping company, [if available: contact name, phone number, email]
- Shipment identification number
- Important customs documents for international shipments like a copy of Carnet ATA
- Number and size of your shipments