New Flying Competition

2027

Competition Task

Version 1.1

April 2nd, 2026

Change Log

Version	Release Date
1.0	March 31st 2026
1.1	April 2nd 2026

Section	New Version	Old	New
-	1.1	1.0	• Fixed broken cross-references • Inconsistency with FDR pages fixed • FDR table outdated cross-references fixed • Fixed Appendix H table cross-references • Fixed inconsistency for the scoring of the performance flight • Fixed inconsistency in the definition of what is scored in the humanitarian Aid mission • Added preliminary constrained Guideline on the flight box horizontal dimensions • S004 fixed spelling error for LiPo-HV

Content

1 Introduction

The **New Flying Competition (NFC)** invites university teams from across the globe to design, manufacture and fly aircraft built to take on real-world problems. For each competition, industrial partners provide insights that are translated into a design challenge with a specific theme, designated flight tasks, and design constraints that reflect the authentic complexities of the modern aviation sector. Participating teams are expected to apply scientific methods acquired from theory and hands-on experiences and document their design process and results in detailed design reports.

The NFC is built upon four central goals:

- Applying real-world industrial design processes and criteria to the field of model aircraft.
- Transferring academic theory acquired at university into hands-on engineering experience.
- Facilitating meaningful interaction and networking between students in the aviation field and Hamburg's aviation industry.
- Fostering a diverse, international student body to share different cultural and technical approaches to aerospace challenges.

To translate our goals into a measurable technical trial, this competition requires teams to design and optimize an aircraft for humanitarian and disaster-relief operations. Beyond mere flight capability, the aircraft must also be capable of operating within typical aircraft infrastructure.

A defining feature of this edition of the NFC is the emphasis on predictive accuracy. In alignment with the "digital twin" methodologies utilized by major manufacturers, teams will be evaluated not only on flight performance but also on the accuracy of their theoretical models. By comparing predicted performance against real-world flight data, participants will validate their design phases and refine the predictive tools essential for their future professional careers. The Jury – separate from the organizing team - is responsible for all evaluation tasks to score the teams' performances.

While the NFC imposes the structural constraints typical of global aerospace operations, we have intentionally kept these parameters focused to empower maximum creative freedom. We invite teams to explore novel solutions, push the boundaries of conventional design, and contribute to a more efficient, responsive future for humanitarian aviation.

2 General Remarks

The rules and regulations for 2027 Competition are described in the following:

- Competition Task (this document)
- Rules of the New Flying Competition 2027

Both are available on our website, and this access should be considered primary for these documents unless otherwise communicated later. They can be found on:

https://neuesfliegen.de/competition/nfc-2027/

The document *Competition Task* (this document) contains guidelines specific to the NFC2027, which must be followed by teams to take part in the competition. The overarching topics covered include Participation, Challenge, Safety Check, Flight Tasks, Reports, Scoring, and a timetable.

The document *Rules of the New Flying Competition 2027*, on the other hand, contains general rules and regulations during the competition that teams must follow. Failure to do so during the competition will lead to disqualification of the offending team.

All deadlines (submissions, payments, etc.) must be made by the end of the specified day, which is defined as **11:59 pm (CEST)**. All submissions must be done over E-Mail, however, hosting of videos and pictures on external services is allowed.

3 Participating in the Competition

3.1 Registration

Teams must register by sending an email to the following email address:

Neuesfliegen.ev@gmail.com

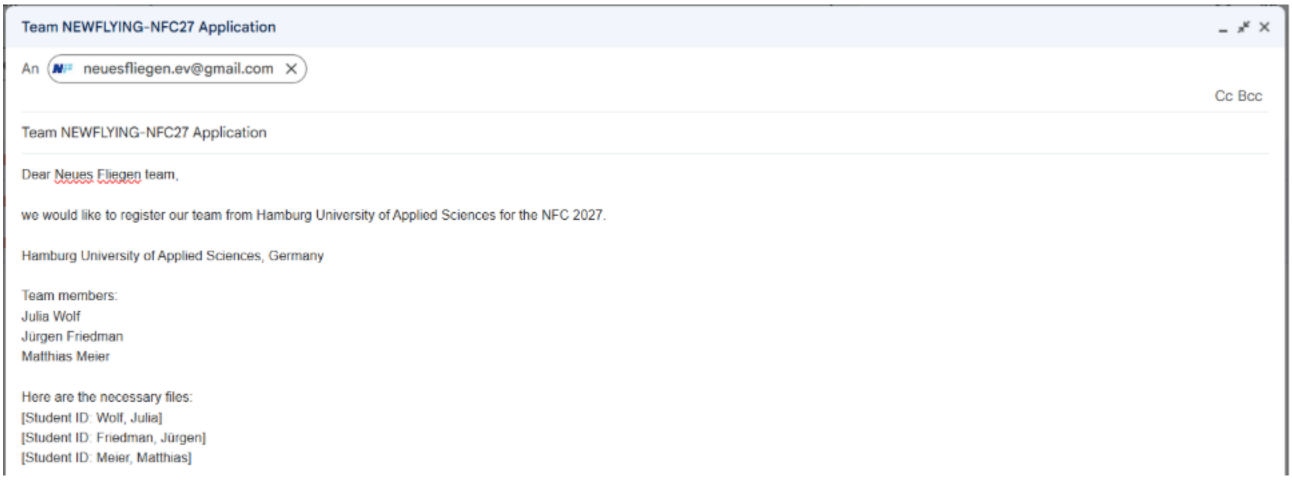
The competition is limited to 9 teams, who will be admitted on a first come, first served basis. In exceptional cases, more than 9 teams may be admitted, this is decided by the organizing team.

The registration opens on April 1st, 2026. The official deadline for the registration is July 31st, 2026. No applications will be accepted after the deadline.

The registration becomes valid once all the following requirements have been fulfilled:

1. The team representative has sent an application email including the following:
    - Name of team as the email subject (e.g. Team XYZ-NFC27 application)
    - University name and country of participating team
    - Full names of all team members (may be provisional)
    - Copies of documents issued by the respective university of the team, proving that all team members are students (exceptions: see *Rules of the New Flying Competition 2027*, Section 4)

See Figure 1 as a reference for sending the registration email.


Team NEWFLYING-NFC27 Application

An neuesfliegen.ev@gmail.com

Cc Bcc

Team NEWFLYING-NFC27 Application

Dear Neues Fliegen team,

we would like to register our team from Hamburg University of Applied Sciences for the NFC 2027.

Hamburg University of Applied Sciences, Germany

Team members:
Julia Wolf
Jürgen Friedman
Matthias Meier

Here are the necessary files:
[Student ID: Wolf, Julia]
[Student ID: Friedman, Jürgen]
[Student ID: Meier, Matthias]

Figure 1: Application Email Reference

2. The applying team has received a confirmation email from the NFC Team including an invoice.
3. The team has paid the starting fee within four weeks of receiving the invoice. This can be done even after the registration phase ends until the starting fee deadline on August 31st, 2026.

The registration will be cancelled if the fees are not paid on time. Teams may pay the starting fee until August 31st, 2026. However, refunds of paid participation fees are only granted for cancellations received by July 31st, 2026. No refunds are issued after that date.

The payment of the member fee is for the number of members the team will bring. A final list of participants must be submitted 6 weeks before the start of the competition week. Only listed members will be accommodated (food and drinks, transportation to the airfield, etc.). Accompanying people (spectators, family members, etc.) may still join, but they will not be counted for accommodation.

3.2 Registration Fee

There are two fees to enter the competition: the starting fee and the member fee. The starting fee is 800 Euros per team, regardless of the number of team members. The member fee is 100 Euros per attendee, which will be used for meals and transportation between the team gathering spot and the airfield.

The starting fee must be paid within four weeks of receiving the invoice. The invoice will be sent together with the confirmation email for the team registration. The member fee must be paid until August 31st, 2026.

Table 1: List of fees

Fee	**Amount to be paid**	**Deadline**
Starting fee	800 Euros	Within four weeks after receiving the invoice
Member fee	100 Euros per team member	August 31st, 2026

3.3 Team Size

There is no limit to the number of people involved in developing the competition aircraft, provided they comply with the requirements (see *Rules of the New Flying Competition 2027*, Section 4). Each team is restricted to 12 active, registered members. While additional guests and spectators may attend, they do so at their own expense and will not be eligible for compensation or official event materials.

4 Challenge

4.1 Flight Goal Overview

Each team must compete against the reference aircraft designed and built by the organizing team and compete against the theoretical results the teams presented in their respective FDRs. During the mission-based competition each team that outperforms the organizers aircraft will receive positive points, while the opposite is true when performance is worse. The scoring system is explained in detail in section 4.4.

The focus for this competition is based on the conditions that emerge from regions impacted by natural disasters provide unique difficulties for aircraft trying to deliver aid. Assistance to regions hit by natural disasters can be categorized into disaster relief and humanitarian aid. While the former is usually handled by smaller aircraft which provide flexible and immediate response, the latter provides a constant stream of resources and will be the scope for this competition.

Aircraft in this category are defined by their short take-off and landing (STOL) capabilities, high payloads, and rapid deployment with minimal ground support. However, to address the integration challenges of flexible cargo handling at this scale, the aircraft must utilize the Standardized Cargo Payload defined in Appendix E Standardized Cargo Payload. This payload consists of L-shaped units weighing 4kg each—with a required capacity of one to three units. This should ideally be managed by an integrated cargo system designed to minimize unloading times.

The aircraft shall be designed for humanitarian aid and must fly the mission defined in Section 4.1.2. The central aspect of this mission is the intermediate landing and take-off to simulate humanitarian aid, during which the aircraft must unload the cargo. More details on scoring can be found in section 4.4.3.4.

Reflecting the humanitarian aid focus of the competition, the flight profile consists of two distinct legs. The aircraft must depart from a designated base of operations, land in a simulated crisis area to deliver cargo, and then perform a second take-off to return to base.

The last important aspect of the flight goal during the competition is the second primary scoring system used during this competition. Physical performance during the competition will be scored by itself and in addition also scored with a comparison approach for the virtual performance provided in the FDR, for further information reference section 4.3.2.

A comprehensive list of requirements that need to be fulfilled by the attending teams is outlined in Appendix B Design Requirements.

4.1.1 Competition Flights

The competition comprises three flights: two performance-based and one humanitarian aid mission. Data from the Performance Flights will be used to calculate aerodynamic metrics for comparison against the teams' initial FDR predictions. In contrast, the humanitarian mission focuses on operational utility, where the aircraft is scored based on the plane's real-world performance by measuring tangible physical quantities like time and distance.

For the Performance Flights, specific tasks must be flown to evaluate the average performance quantities and compare them with the predicted performance from the FDR. In general, the smaller the error between these the higher the score for the team. More information can be found in section 4.4.3.7.

The humanitarian aid mission is flown as a simulated aid delivery mission where the teams must carry payload to a distant area, which has experienced a natural disaster. As such, the flight incorporates an initial take-off and final landing, but also an intermediate landing and take-off, during which the payload must be removed.

The scoring here is entirely based on the measurable metrics in relation to the arrival to and departure from the disaster area. Initial take-off, climb and the final landing are not part of the scoring because the scenario of the humanitarian aid mission assumes that the take-off and landing base has appropriate infrastructure. Further details on the scoring of this mission can be found in section 4.4.3.1.

4.1.2 Humanitarian Aid Flight

This section explains the mission profile for the humanitarian aid mission; a general schematic of the mission can be found in Appendix C Humanitarian Aid Mission Profile.

All the physical flight performances achieved during this segment are scored in reference to the organizer's aircraft.

The team must take off with the standardized cargo payload from anywhere within the designated runway on the field. As this section is not scored the take-off location does not matter and neither does the direction of take-off.

The team must climb to 80m and then initiate the cruise segment. The cruise segment does not have a maximum altitude directly imposed; this is, however, superimposed by legal limits which remain to be defined. A minimum altitude of 20m is imposed on the cruise segment, but the teams are free to fly at any other altitude. The team must be able to judge the flown distance of 20km themselves.

After the cruise segment, the humanitarian aid landing is to be initiated. This landing must happen behind the runway line (R/W-line) (see 4.4.3.3) although the direction does not matter. The landing distance is the most important part, but the distance itself is measured from the R/W-line. It is measured orthogonal to the R/W-line. It's identical to the strategy outlined in section 4.4.3.3.

Following the landing the team has a time window to get to their aircraft, during which the aircraft must not be touched. This time window and the one mentioned later on are outlined in section 4.4.3.4. After this time window, the team must remove the payload from their aircraft, during which the aircraft may not be damaged. This segment is now timed for scoring. When the cargo has been unloaded, the pilot must give a signal to the judges that the operation has concluded, at which point the timer is stopped. After the unloading phase, the aircraft must not be touched anymore, and the pilot must ensure that the aircraft is airworthy. Airworthiness must be checked during the scored time window where the cargo is unloaded.

Afterwards another time window opens, during which the team may remove their additional unloading helpers and the payload from the flight area. During this time the aircraft may also be positioned on the R/W-line again by taxiing it.

Now the team must take off and climb to 80m. This window is scored with a lower time leading to a higher score. The direction of take-off does not matter.

After the climb, the loiter segment begins where the team must fly the maximum endurance that the aircraft can still manage. Higher time achieves higher scores. The team must make sure to not run out of battery during this time, otherwise the flight is not scored. After the team decides to end the loiter segment, the team must land. The landing is not scored.

4.1.3 Performance Flights

The Performance Flight is the base used for determining the scoring in relation to the difference in predicted and actual performance. Hence, the Performance Flight does not require any payload to be onboard. While each flight task has its own guidelines to follow it is important to note that the attending team may choose not to do any of the tasks given. Each task that was not completed will be scored by no points in this segment.

The tasks should be flown in a constant heading if required to and should not deviate from the required flight profile. The Jury could decide not to score a specific segment if the data provided by this segment cannot be used to effectively evaluate quantities.

4.1.4 Flight Environment

As much as the organizers would appreciate the ability to fly anywhere within Hamburg, this is unfortunately not the reality. The event will have to take place on a regulated airfield, which may house either a grass runway or an asphalt runway. The teams should design their landing gears for grass airfields.

The organizers ensure that the event location will provide adequate runway dimensions, flight-area dimensions and vertical limits without much vegetation. For the time, we can provide a preliminary flight box of a semi-circle with a radius of 500m. Keep in mind, this value represents the limit, as such the aircraft should fly with a margin to this distance.

The true flight box will be communicated with enough time before the competition. Logistical equipment like electricity or restrooms will be provided by the organizers. The teams will be given an on-site location for them to assemble and test their aircraft. The organizers will provide some shade, but the teams are encouraged to bring their own. Lunch is provided by the organizers.

4.1.5 Standardized Cargo Payload

This section outlines the considerations for the payload.

- The centre of gravity is in the geometric centre of the payload. This may deviate slightly from the ideal position, but no more than 1-2%.
- The payload is produced by the organizing team.
- General tolerances apply according to ISO 2768-2

Refer to Appendix E Standardized Cargo Payload for the technical drawing of the standardized cargo payload. Material and proof of center of gravity location will be provided by the organizing teams before the competition.

4.2 Safety Check

At the start of the competition, each aircraft will be subjected to a safety check. The points listed in Table 2 are checked by the officials.

Table 2: Checklist for Safety Check

Subject of the Audit	**Description**	**Check**
General Check for Airworthiness	Experts check the aircraft for proper cable connections, functional servo motors and control linkages, ...	
Structural Test	The aircraft must be lifted with the planned take-off mass at both wings at 2/3 of the wingspan.	
Pilot Briefing	Airfield Rules review	
	Check eID	
	Check A1/A3 certificate	
	Final review of flight plans	
	Check emergency procedures understanding	

Safety Switch Test	It must be shown that the motors do not start while the switch is disengaged.	
Flight Logger Fitting	The Flight Logger box must be installed as a test.	
	Verification of Flight Logger orientation	
Centre of Gravity check	The team must show that the centre of gravity is within the calculated range by lifting the aircraft.	
Failsafe check	Check failsafe functionality	

In addition to the points mentioned above, the officials may ask questions about the aircraft based on the FDR in case of any uncertainties (e.g. about the emergency function).

Teams must fill out the given safety check form and either send it to the NFC Staff or bring it printed out.

4.3 Design Reports

Each Team is required to submit two design reports: the Preliminary Design Report (PDR) and the Final Design Report (FDR).

4.3.1 Preliminary Design Report (PDR)

The preliminary design phase concludes once a feasible baseline design layout has been identified. The PDR must be submitted as a presentation poster. The posters must be submitted as a PDF file. Please note that the posters will be printed by us in DIN A1 format, and the content must be readable from a distance of one meter. The content requirement for the PDR can be seen in Table 3.

By submitting the PDR, the team agrees that the PDR poster may be published in any form deemed appropriate by Neues Fliegen e.V. It also certifies that no proprietary/classified information is contained therein. Furthermore, the team certifies that all photographed material and/or persons are free to be published by Neues Fliegen e.V. The teams must check this in advance, especially with any external parties like manufacturing partners.

The PDR must be submitted by the deadline stated in Table 9.

Section 4.4.2 describes how the PDR is included in the scoring.

Table 3: Checklist for PDR contents

Content		Check
List of considered aircraft configurations including their "pros" and "cons" with respect to the mission profile		
First estimates for the selected aircraft configuration	Weight	
	Wing and thrust loading	
	Centre of gravity calculations	
	Maximum and minimum flight speed	
	Maximum flight distance	
	Preliminary wing and empennage design	
	Proposed payload configuration	
(Preliminary)Project schedule		
3-view drawing of the baseline design		
Rendering of the baseline design		

4.3.2 Final Design Report (FDR)

The FDR contains a detailed description and detailed technical specifications of the aircraft in the form of a document of up to 80 pages. The FDR also indicates the method of construction of the various parts of the aircraft and is supplemented by a 3-view drawing.

The FDR must be submitted by the deadline stated in Table 9.

The FDR must be submitted with the contents listed below. However, it is possible to add further information if needed. If a section is required for a component that does not exist in the aircraft (e.g. flight controller), then write a brief explanation in this section as to why this component is not used.

Teams are kindly asked to adhere to the order of the chapters to ease review and correction. However, this is not mandatory.

Teams are encouraged, though not mandated, to utilise Ansys Fluent for their CFD simulations. For more information, see https://neuesfliegen.de.

Table 4: Checklist for FDR contents

Chapter Title	**Content**	**Check**
Introduction	Brief description of the aircraft	
PDR Changes	Overview of changes from the aircraft design in the PDR to the final design	
Aircraft Configuration	Explanation of the aircraft configuration choice in relation to the flight mission	
Design Details	Description of the individual aircraft components	
	Fuselage*	
	Wing*	
	Control surfaces of the aircraft*	
	Landing Gear	
	Motor-Propeller-Combination**	
	Electrical Systems (selected components and interconnection diagram)	
	Flight Controller (selected components)	
Cargo compartment details	Cargo jig overview (can be detailed in the fuselage section of design details, a small overview here is however required to ease safety check operations)	
	Cargo loading/unloading operations overview	
Emergency Procedures [1]	Emergency procedures in case of radio link loss (See requirement S007)	
	Brief description of the emergency fireproof box (See requirement Sf002)	

[1] Teams can look to provided emergency procedures document templates for guidance.

<table>
<tr><td>Specification Details</td><td colspan="2">

- Calculation of weight
- Calculation of wing area for scoring
- Calculation of wing-lift
- Calculation of thrust loading
- Calculation of centre of gravity
- Calculation of stability margin
- Calculation of maximum and minimum flight speed

All calculations must be done (at least) analytically. Each parameter/variable must be named at least once (see General Report Structure in Table 5)
The equations must be explained to a proper and stringent degree.
Any assumptions and approximations must be explicitly explained. For example, an assumption about the drag coefficient based on experience is valid, if it is so written/explained.
Mass breakdown according to Appendix H (Standardized Mass Breakdown)</td><td></td></tr>
<tr><td rowspan="12">Simulation</td><td colspan="2">Simulation Overview</td><td></td></tr>
<tr><td colspan="2">Simulation Methodology</td><td></td></tr>
<tr><td rowspan="10">Simulation Results</td><td>Lift coefficient curve from -4° to stall with $\Delta\alpha = 1°$</td><td></td></tr>
<tr><td>Lift coefficient table from -4° to stall with $\Delta\alpha = 1$</td><td></td></tr>
<tr><td>Drag coefficient polar for Lift coefficients as above.</td><td></td></tr>
<tr><td>Drag Coefficient table for Lift coefficients as above.</td><td></td></tr>
<tr><td>Pitching Moment curve for -4° to stall with $\Delta\alpha = 1$</td><td></td></tr>
<tr><td>Pitching Moment table for -4° to stall with $\Delta\alpha = 1$</td><td></td></tr>
<tr><td>Induced Drag Factor</td><td></td></tr>
<tr><td>Neutral Point location</td><td></td></tr>
<tr><td>Performance Quantities (scored)
• V_{max}</td><td></td></tr>
</table>

		• ROC_{max} • V_{stall}**** • Δx_{LDG} • $\Delta x_{T/O}$	
Reference Basis Table	A comprehensive table used as a foundation for the comparison to the flight performance. • Reference Wing Area • Mean aerodynamic chord • Reference mass • Reference CG location • Battery Configuration • Propulsion Configuration • Flight Logger Installation • Atmospheric Reference • Reynolds-number and Reference • Angle conventions • Reference Coordinate System		
List of Costs	Overview of project costs in the form of a table		
Adapted Project Schedule	• Comparison between planned project schedule (PDR) and actual project progress • Brief description of the problems encountered		
Flight Testing	• Type and number of flight tests • Preparation for flight tests • Results of the flight tests		
Drawing	3-view drawing of the detailed design		
Manufacturing	Pictures or videos showing that the fuselage, wings and tail unit were made by the team themselves*** Brief description of the manufacturing process Description of externally manufactured custom parts if present Inclusion of repairs if needed (for example after testing flights) Photos of the wiring of the batteries and other critical electrical components (must be a separate subsection and clearly marked)		

	This may be included in the FDR and is encouraged to be kept within schedule, however the date stated in Table 9 is the deadline.	

** Section must include component material, description of relevant design decisions and all relevant calculations*

*** Section must contain selected model and power specification. If components are manufactured by the team, all relevant calculations must be included, and a video of the test run must be provided with the FDR.*

**** Manufacturing images and videos do not have to be integrated into the PDF file of the report. Instead, all images and video parts can be combined into one video (for images as a slideshow) and uploaded to YouTube. The link to access the video must be specified in the FDR.*

***** The stall speeds will not be flown due to safety concerns but remains a typical performance metric calculated during aircraft design and should be provided.*

Section 4.4.2 describes how the FDR is included in the scoring.

4.3.3 Formatting of the FDR

Please use a document editing software to create the FDR, such as LaTeX or MS Word. The teams are advised to check whether the PDF export has worked properly (i.e. If the captions can be recognized by PDF readers and if the quotations work properly). Citations must also be done befitting to an academic standard.

Texts and images must be readable from a reasonable distance. Bad formatting will influence the score of the FDR. Teams are advised to check any pictures (especially figures, graphs and diagrams) for readability.

The sections for emergency procedures (see table above) will not be counted for the max number of pages. Teams must format these pages together in a tabled structure similar to the template given. However, using the template itself is not mandatory. The pages concerning the emergency procedures and fireproof box will be printed out and used for safety and documentation purposes on the competition week. Teams are advised to keep that in mind.

Table 5: Format Regulations for the Final Design Report

Report Language	English
General Report Content	a) Cover Page b) List of Contents c) List of abbreviations and symbols d) Your content including paragraphs, pictures, charts and tables (See Table 4) e) Attachments f) Bibliography
Header	On each page except cover page: • Left hand side: name of university • Right hand side: team name
Footer	On each page except cover page: • Left hand side: Date of submission • Right hand side: page number/total number of pages
Max. no. of pages	• 50 for content (d) 30 for attachments (e) • The sections for Emergency Procedures and Cargo compartment details are not counted.
Cover page <u>must</u> state:	• Type of report (Final Design Report) • Name and address of your university and model flying club (if applicable) • Team name • Name of team captain (first name, family name, e-Mail address) • Names of team members (first name, family name, callsign (if they already have one), E-Mail address, role/position) • Name of supervising faculty member (if applicable) • Date of submission
Paper Format	DIN A4 or letter (8.5“ x 11“), portrait orientation
General Formatting	LaTeX standard font General text: 11pt Footnotes: 8pt

Line spacing within text	Single
Line spacing before and after paragraphs	Double
Line spacing between paragraphs	Double
Page margins	Top: 2 cm; Bottom: 2 cm; Left: 2 cm; Right: 2 cm
Report file format (digital)	PDF

4.4 Scoring

4.4.1 Final Score

The total score is the sum of the points earned from the flights as well as the reports.

$$S_{total} = S_{flight} + S_{report}$$

The goal of the competition is to get as many points as possible. The winning team will be the team which earns the highest total score. In case of equal score for two teams, the higher score for the humanitarian aid mission will determine the winner.

4.4.2 Report Score

Each team can earn up to 100 points from the PDR and the FDR combined.

$$S_{report} = S_{PDR} + S_{FDR}$$

To limit the workload of the reports, the PDR will not be assessed in detail. However, 20 points will be rewarded for the timely submission of the PDR containing the contents listed in section 4.3.1. The Jury decides whether the PDR meets the content requirements. Up to 80 points are awarded for the FDR. The number of points awarded depends on the quality of the report. The Jury will assess the quality of the FDR and thus on the number of points awarded for it.

4.4.3 Flight Score

The flight score is calculated based on two groups of data that will be collected during the flight performances.

The first dataset is used to derive aerodynamic coefficients that are calculated from specific trimmed flights, which are then compared with theoretical work provided by the team in the FDR. The score for this first dataset will be based on the calculated ϵ_{error} . The smaller the difference between the theoretical values from the FDR and calculated values from the actual flights, the higher the score will be.

The second dataset is used for calculating physical performance, such as distance and time. These will be scored in reference to the aircraft provided by the organizing team.

Hence, teams are encouraged not only to design an easily evaluated aircraft but also to make decisions which can provide the best performance for the mission at hand.

The total score for the flights is the sum of the scores obtained from the Humanitarian Aid Mission and the Performance Flight. To avoid negative scores, each team will start with 75 points. From here on, the flights for the second dataset will be referred to as the "Humanitarian Aid Mission", and the flights for the first dataset will be referred to as the "Performance Flight".

The equation below shows the calculation of the score for the flights.

$$S_{flight} = S_{HA} + S_{PF} + 75$$

The weight of the aircraft measured during the competition and the reference quantities, such as area or length, provided in the FDR will be used to determine aerodynamic coefficients. If the attending aircraft's reference quantities deviate significantly from those provided in the FDR, the team may not compete. The threshold for significant deviation is 3% from the values provided in the FDR.

4.4.3.1 Humanitarian Aid Mission

This mission defines the objective for the aircraft design. The profile for the mission can be seen in Appendix C Humanitarian Aid Mission Profile, although the reader should be aware that the shown profile is only a schematic. The actual flown mission will include more turns to satisfy the cruise, landing and loiter segments.

To score the aircraft in reference to the organizational team's aircraft, the equation below is presented which is a summation of all mission segments, where ϕ represents some generic performance quantity measured.

$$S_{HA} = \sum W_i \cdot \tanh\left(\frac{\phi_{team,i}}{\phi_{ref,i}} - 1\right) + S_{cargo}$$

Each mission segment has a weight, which can be positive or negative, and is transformed by the hyperbolic tangent. The reason for this is to disallow unproportional design decisions in a specific segment, which could result in a high score of that aircraft while negatively impacting its general performance. The function introduces diminishing returns for each team's performance in reference to the performance of the organizing team. Table 6 summarizes the scoring weights for each mission segment. Keep in mind that a negative weight does not result in negative scoring but just constitutes what direction leads to higher scores. Negative weights lead to higher scores with lower evaluated quantities, while positive weights do the opposite.

Table 6: Segment Weight for the Humanitarian Aid Mission

Segment	Quantity	Weight W_i
Cruise	t_{cruise}	-16
Landing	Δx_{LDG}	-18
Unloading	$t_{unloading}$	-12
Climb	t_{climb}	-18
Loiter	t_{loiter}	12

A special scoring is applied to the cargo carried by each team during the Humanitarian Aid Mission. The scoring will not be linear. Teams that put in the effort to carry the maximum of 3 packages are rewarded more than teams that decide to carry the minimum of one package. Flat points are rewarded for each configuration of cargo and added to the total score as outline from the equation. Table 7 summarizes the scoring for the cargo.

Table 7: Number, weight and score for the cargo configurations.

Number Carried	Combined Weight [kg]	S_{cargo}
1	4	9
2	8	15
3	12	36

The segments are outlined in more detail in the following sections.

4.4.3.2 Cruise

This segment represents the initial transport of resources to the region. The scoring for this segment is based off the time taken to fly 20km, recorded using GPS coordinate data from the Flight Logger, which will be provided by the organising team, with lower times correlating to higher scores. The teams are free to choose the altitude at which to cruise at, but a minimum altitude of 20m may not be crossed. Local height restrictions imposed, not by the organizing team (i.e. airfield authorities), may be introduced later. A reasonable maximum altitude to assume is 150m. If the team does not manage to achieve the required 20km distance travelled, then the entire mission is not scored. Keep in mind, this decision was made since ignoring this segment may lead to significant scores in the loiter segment. The organizing team will not provide confirmation that the distance travelled was the required distance, the teams will have to judge this themselves. The point from which the distance is measured is immediately after the successful climb to 80m altitude.

4.4.3.3 Humanitarian Landing

To achieve a high score in the landing segment, the team needs to land within a short distance. A R/W line is placed by the organizing team, which is marked by two pylons and a line in between, marking the runway for both initial take-off and intermediate landing. See Appendix D Performance Tasks 05 for an illustration on this procedure and the distance used for the landing segment. The aircraft must stay orthogonal to the runway line while on the ground and may not drift off the designated runway, this is judged by the Jury. In addition, the runway also has two lengthwise borders that define its width, crossing them violates the previous statement about significant drift.

4.4.3.4 Cargo Unloading

Once the aircraft has landed and come to a safe stop, the pilot must disengage the safety switch and a timer of 5 minutes will start, during which the aircraft may not be touched. The team will be able to get more people onto the airfield and then arrive at their aircraft's location and prepare. Once the timer is over the team will have to unload the cargo as fast as possible with the timing being recorded and scored. The pilot must provide the final check that the cargo is unloaded, that the aircraft is safe to fly again, and must signal that the timing should be stopped. The aircraft may only be touched during the unloading phase – members must refrain from touching the aircraft after the final check from the pilot. At this point, the timer is stopped and the time for unloading is recorded. The time to unload is used for scoring; a shorter unloading time will result in a higher score.

4.4.3.5 Climb

The team must bring the cargo and additional members off the field and into the safe viewing area. Another time window of 8 minutes is provided to achieve this. During this time the aircraft may also be taxied back into position for take-off at the R/W-line. Upon reaching this safe viewing area the airfield must be clear of other participants and only then may the pilot take-off again after the timer is over. The timer for the climb segment starts when the 8-minute timer reaches its end. The aircraft must not take off before the end of the timer. The Flight Logger is used to score this segment by measuring the time it takes the pilot to climb to 80m, where a low time for the climb will result in a higher score.

4.4.3.6 Loiter

The last segment of this mission profile before the landing, which is scored, is a loiter for maximum endurance. To perform this loiter safely, there must be at least 15% of total charge inside the batteries to land with. If the team at any point falls below this limit, the entire mission is not scored. A gliding landing with no battery charge left is also not scored. The final landing after this loiter must be done according to the guidelines outlined before, but will not be scored.

4.4.3.7 Performance Flight

Unlike the Humanitarian Aid Mission, the Performance Flight is designed to produce results relative to the FDR benchmark. These relative values are used to calculate an error, which is then converted into a score. The scoring approach is therefore fundamentally different: it is error-based rather than absolute. A cut-off threshold applies—errors larger than this threshold receive no points. Errors below the cut-off earn positive points, but the points increase non-linearly rather than scaling in a straight line with decreasing error.

To score a Performance Flight, the teams are required to oblige by the specific guidelines for each task outlined in their respective chapter. A general schematic overview of the Performance Flight tasks can be found in Appendix D Performance Tasks. It is important to note that the participating team may choose to perform any or none of the manoeuvres. Neither the order nor the number of Flight Tasks performed affect if a flight is scored or not. Any flight task performed successfully will be scored accordingly, and any missing flight tasks will result in no score. To score a manoeuvre, it is important that the data must clearly indicate that one of the manoeuvres was performed, otherwise the segment is not scored.

In addition, a more compressed list of quantities important during this flight is given in Appendix G List of Important quantities for Performance Flights. This also includes flowcharts for how quantities are determined for scoring. Keep in mind that aerodynamic curves are required by the teams for the lift and drag coefficients, however maintaining a specific angle of attack and speed is impossible. As such there needs to be interpolation to achieve a good comparison. The interpolation method will be piecewise linear interpolation between the provided points.

The equation used for determining the full score of the Performance Flight is seen below.

$$S_{PF} = \sum W_i \cdot \begin{cases} \left(1 - \frac{\epsilon_{error}}{\epsilon_{cut-off}}\right)^2, & \epsilon_{error} < \epsilon_{cut-off} \\ 0, & \epsilon_{error} > \epsilon_{cut-off} \end{cases}$$

As with the previous segment, Table 8 below presents the tasks, evaluated quantity and weighing factor.

Table 8: Segment Weight and Error Cut-Off for Performance Flight Tasks

Task	Quantity	Weight W_i	$\epsilon_{cut-off}$ [%]
Lift	C_L [-]	16	10
Lift Curve Slope	$\frac{\delta C_L}{\delta \alpha}$[-]	12	15
Drag	C_D [-]	20	20
Induced Drag Factor	K [-]	10	20
Speed	V_{max} [m/s]	12	10
Climb	ROC_{max}[m/s]	8	10
Take-Off	$\Delta X_{T/O}$[m]	12	20
Landing	ΔX_{LDG}[m]	7	20

The Performance Flight tasks are outlined further below in more detail to fully convey what the Jury requires for evaluation.

4.4.3.8 Lift Curve and Slope

For the task of lift determination, the team must fly the performance task outlined in Appendix D Performance Tasks. Constant altitude, speed and wings level must be flown for the trimmed flight. This leads to the assumptions for lift determination being valid. An altitude of 80m ±3m needs to be maintained. Any flight manoeuvres out of the altitude boundaries will not be scored. It is required to fly two of these flights. The window of measurement is 10 seconds long from the time the wings are level and the velocity is constant

The mean of the two flights is used for velocity. The mean of the filtered lift coefficient between the two flights are used. The task itself must be flown for two different lift coefficients, as two different speeds are required. The speeds must have a minimum difference of 3m/s but can be chosen by the teams. The teams may choose this speed. No speeds in non-linear areas of the lift slope are allowed. The lift curve slope is then determined from the line connecting the two datapoints.

Figure 2 can be used to reference how the error to the theory is calculated. Pitch is assumed to be equal to angle of attack. Below are the equations used to determine quantities. A significant deviation from the required trimmed flight will result in no scoring. This is determined by the Jury.

$$\theta_{pitch} = \alpha_{angle\ of\ attack}$$

$$W = L$$

$$v_{pitot,mean} = \frac{v_{pitot,stretch1} + v_{pitot,stretch2}}{2}$$

$$C_L = \frac{2L}{\rho v_{mean}^2 S_{ref}}$$

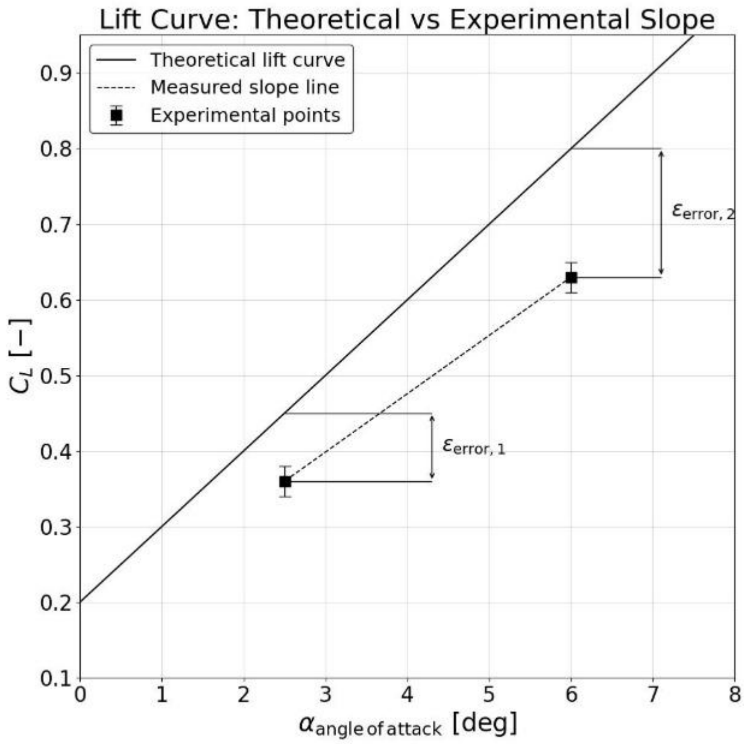


Figure 2: Lift Coefficient plot and errors

4.4.3.9 Glide Drag Polar and Induced Drag Factor

The aircraft must be flown in a trimmed glide with power off and constant speed as seen in Appendix D Performance Tasks. The manoeuvre must start at an altitude of 80 meters.

The Task starts at an altitude of h>80m and the collection of data starts at h = 80m

The task must be done with at least three different speeds to achieve the desired datapoints. The speeds are chosen by the attending teams, but must have a minimum difference of at least 3 m/s. Each task needs to be done twice. The velocity is an average identical to the previous section. The window of measurement is within a descent of 20m.

During this trimmed flight, the following relationships hold.

$$L = W \cos \gamma_G$$

$$D = W \sin -\gamma_G$$

This makes it easy to determine the drag and lift coefficients. To counteract wind during the task, the Performance Flight is divided into two stretches, one downwind and one upwind. The aircraft must climb back to 80 meters and initiate the next manoeuvre immediately after the turn.

The Flight Logger will use $V_{GPS,V}$, V_{Pitot}, and $h_{baro.}$ to determine the flight path angle.

$$\gamma_G = \arcsin\left(\frac{V_{GPS,V}}{V_{Pitot}}\right)$$

With the provided weight, wing area and velocity the coefficients can be calculated.

$$C_L = \frac{2L}{\rho V^2 S_{ref}}$$

$$C_D = \frac{2D}{\rho V^2 S_{ref}}$$

An example of what this might look like plotted along the theoretical curve is provided below.

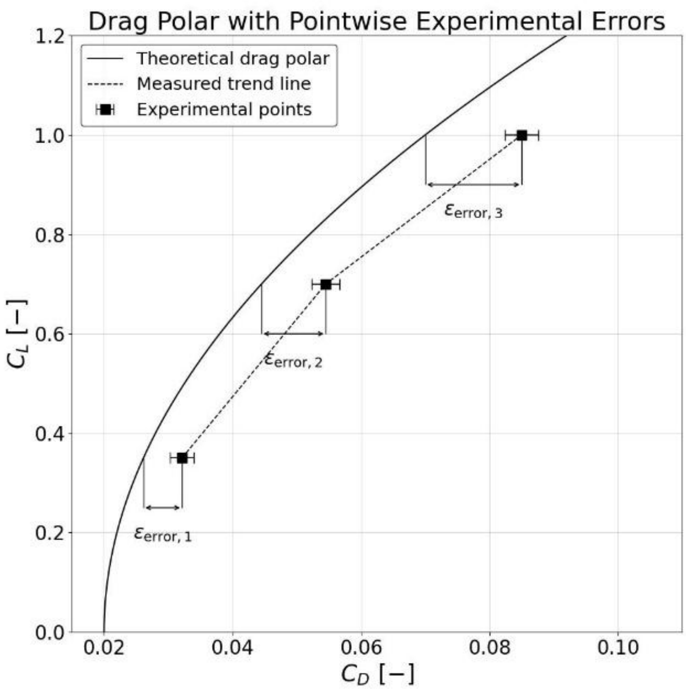


Figure 3: Drag Polar with Pointwise Experimental Errors

The organizing team will use regression to determine the induced drag factor K, which will use least squares regression to fit the curve to the data derived. This is applied to the already filtered points from the raw data.

4.4.3.10 Maximum Horizontal Speed

The aircraft must be flown with the wings level at constant altitude and achieve the highest speed it can, with a higher speed resulting in a higher score. The window of measurement is for as long as the plane is flying level and inside bounds. A constant altitude of 80m with a tolerance of ±3m must be maintained. The task is split into a downwind and upwind component. The speed is recorded by the Flight Logger.

4.4.3.11 Maximum Constant Climb Rate

The aircraft must start climbing from 20m altitude wings level. The initial part of the climb will not be constant and as such not scored. As soon as the data presents a constant velocity (ΔV ±1,5m) of the aircraft the scoring window will begin and the aircraft must climb 80m from this point on.

The time it takes the aircraft to climb this distance is used for determining the rate of climb and scoring. The task is divided into upwind and downwind components to counteract wind. Velocity and rate of climb will be taken as the mean from both segments, like previous sections. The altitude and time are recorded by the Flight Logger.

4.4.3.12 Take-Off

The distance it takes the aircraft to climb to a barometric altitude of 5 meters AGL is used for scoring. The aircraft must not significantly deviate from the orthogonal line in respect to the R/W line, this is judged by the Jury. The aircraft is placed with its nosewheel on the R/W line for the take-off. The distance is recorded by the Flight Logger. The direction to take off from is chosen by the team.

There will be boundary lines provided to signal the imaginary runway.

4.4.3.13 Landing

The R/W line implies a static runway, where the distance to land is taken from the start of the R/W line and measured by hand orthogonal to the R/W line. The aircraft must not significantly deviate from the orthogonal line to the R/W line. The aircraft must not be touched until the landing distance is recorded by the Jury. If a team lands before the runway line, the landing is not scored. The direction to land from is chosen by the team.

There will be boundary lines provided to signal the imaginary runway.

5 Key Dates and Timetables

This section provides an overview of all major milestones and deadlines prior to the competition, along with the planned structure of the competition week. Please note that, unless stated otherwise, all deadlines (submissions, payments, etc.) are due by the end of the specified day, which is defined as **11:59 pm (CEST, Germany)**.

5.1 Important Dates and Deadlines

Table 9: Important dates and deadlines

Date	**Activity**
July 31st, 2026	Registration deadline
October 31st, 2026	PDR submission
August 31st, 2026	Participation fee payment deadline
6 weeks before NFC	Submission of the final list of participants
March 31st, 2027	FDR submission
May 31st, 2027	Submission of manufacturing pictures and videos
July 31st, 2027	Submission of proof-of-flight video
August 23rd – August 29th, 2027	New Flying Competition (competition week)

5.1.1 Competition Week Timetable

The competition week takes place between August 23rd and August 29th, 2027.

Table 10. Competition week timetable

Mon	Tue	Wed	Thu	Fri	Sat	Sun
Arrival / check-in + Welcome briefing	Safety check	Competition flights (see Table 11)			NFC Party / Sightseeing	Award Ceremony / Departure / check-out

Note: A more detailed schedule with time slots will be published shortly before the competition. The timetable above is only a general outline of the competition week and can be subject to change.

5.2 Competition Flights Timetable

Table 11. Competition flights timetable

Wed	Thu	Fri
Performance Flight	Performance Flight	Humanitarian Aid Mission

For competition flights, one or more flight days may be cancelled due to weather conditions. There are no replacement flight days. If a flight day is cancelled, the number of Performance Flight attempts will be reduced accordingly. The decision on whether the weather conditions are suitable for flying will be made by the officials at the beginning or during each scheduled flight day. Priority is given to Performance Flights rather than the humanitarian aid mission.

Teams are advised that flights will be held in Nordic German weather conditions, i.e. a degree of windiness is always to be expected.

6 Disclaimer

No set of regulations is flawless. Therefore, corrections and changes may be made even after publication. Any new version of this document will be announced on the website. In addition, every team that is registered at that time will be notified of the change by email.

Appendix A Flight Logger

A.1 General Definition

The Flight Logger is an onboard electronic system integrating sensors, data storage (micro-SD card), and a radio transmission module for recording and transmitting flight parameters provided by the organizing team. Flight parameters include flight data such as airspeed, altitude, GPS position, yaw, pitch, roll, acceleration, and heading for post-flight performance evaluation. The teams cannot rely on the Flight Logger transmissions to conduct their flights. The Flight Logger is powered by itself and does not need external power.

The final dimensions of the Flight Logger are subject to change; **only the maximum external dimensions** will be predefined.

The orientation of the Flight Logger must be fixed. The longer side of the Flight Logger will be aligned with the longitudinal axis of the aircraft. A GPS module will be placed, whose top face will be aligned with the lid of the Flight Logger. The roof of the fuselage should not be made with conductive materials (e.g., carbon fibre, aluminium components) to ensure proper function of the GPS.

A.2 Pitot Tube Integration Requirements

The pressure inlet on the pitot sensor module will be on the **front face of the Flight Logger enclosure** in the front half of the Flight Logger body. The teams are responsible for:

- ensuring the silicon tube between the pitot tube and the pressure inlet is less than one meter for accurate measurement.
- ensuring accurate airspeed measurement by placing the pitot tube in undisturbed airflow.
- installing a pitot tube which is compatible with a silicon tube with an outer diameter of 4 mm and an inner diameter of 2 mm.

A.3 Volume Requirements

Table 12: Maximum Flight Logger Dimensions

Parameter	Maximum Value	Unit
Length	190	mm
Width	140	mm
Height	60	mm
Antenna Length*	190	mm
Clearance Radius**	50	mm
Weight***	350	g

Given the above parameters, teams must provide a **clear, unobstructed volume of at least 20 × 15 × 7 cm** within the fuselage for the Flight Logger.

*The antenna length is the one quarter signal wavelength for 868 MHz radio communication.

**Clearance radius refers to the minimum required spacing from conductive materials around the antenna. The antenna will be on one side of the Flight Logger, and both sides must have clearance.

***The weight contains neither the weight of the silicon tubes connected to the pitot tube, nor the pitot tube supplied by the teams.

The 3D model and other helpful information will be found on Onshape:

[Onshape Flight Logger CAD Model]

Appendix B Design Requirements

A summary of design requirements is given which must be complied with to be deemed eligible for competition entry.

Table 13: Requirements list

ID	Topic	Requirement
A001	Aerodynamics	The aircraft must not be lighter than air. The forces for flight must be produced by lifting surfaces. The aircraft must not exceed a wingspan of 3.5m on the ground. On the Runway and in the Air a wingspan exceeding 3.5m is allowed, if the wing is actuated automatically.
P001	Propulsion	The aircraft must be powered by electric motors. Fuel cells are allowed, but any fuel cell system needs to be verified and permitted by the organizing team before the competition. Combustion engines or jet engines are not permitted.
S001	Systems	Only battery packs or fuel cell systems must be used as the energy source for systems. Internal/External energy systems such as rocket boosters or catapults may not be used.
S002	Systems	A physical safety switch must be integrated into the aircraft which provides the option of directly disconnecting the battery from the propulsion system. This safety switch must be easily accessible from the outside and clearly marked as such.
S003	Systems	There must be a separate battery system which powers peripheral components. The main system may only be used for the propulsion system.
S004	Systems	LiPo, LiIon, LiPo-HV, LiFePo are the only permitted battery systems.
S005	Systems	All system components, unless otherwise mentioned in this document, may be manufactured by the competing team. However ample evidence of their performance and reliability must be provided beforehand.

S006	Systems	Radio and receiver systems may not be manufactured by the team and must be commercial products, which are certified for use in Germany.
S007	Systems	Emergency procedure must be developed in case of radio link loss. This procedure must be outlined in the FDR.
S008	Systems	The aircraft must be able to house the Flight Logger from the organizing team for purposes of performance evaluation. Find specific metrics of the Flight Logger in the Appendix.
S009	Systems	The space designated for containing the Flight Logger must be kept away from carbon fiber or any highly conductive material that significantly attenuates radio signals (e.g., aluminium airframe components).
S010	Systems	One standardized cargo package must be carried, which is a weight of 4 kg. The maximum amount of cargo packages that can be carried by the competing teams is 3.
S011	Systems	The cargo must be fully enclosed within the fuselage of the aircraft. It may not be subjected to outside airflow.
S012	Systems	The cargo must be removable in a non-destructive manner.
S013	Systems	The cell count in series of the battery system must not exceed 12.
S014	Systems	The aircraft must have a pitot tube that can provide total pressure to the Flight Logger, which is used to determine the relative airspeed. This is necessary to ensure accurate air speeds for scoring. The team must provide adequate routing of this to the Flight Logger.
S015	Systems	The airplane must have a failsafe that detects radio contact loss and automatically drives all rudders to level and shuts off the motors.
S016	Systems	Flight Logger must be oriented in such way axis are correctly aligned (see Flight Logger section)
R001	Regulation	No automatic flight modes are allowed, as this would violate the open category for drones in Germany. Only manual or stabilized flight modes are allowed.
R002	Regulation	Take-off must happen under the aircrafts own power.
R003	Regulation	Once the aircraft is configured for take-off all the parts of the aircraft must remain attached. Cargo may be removed

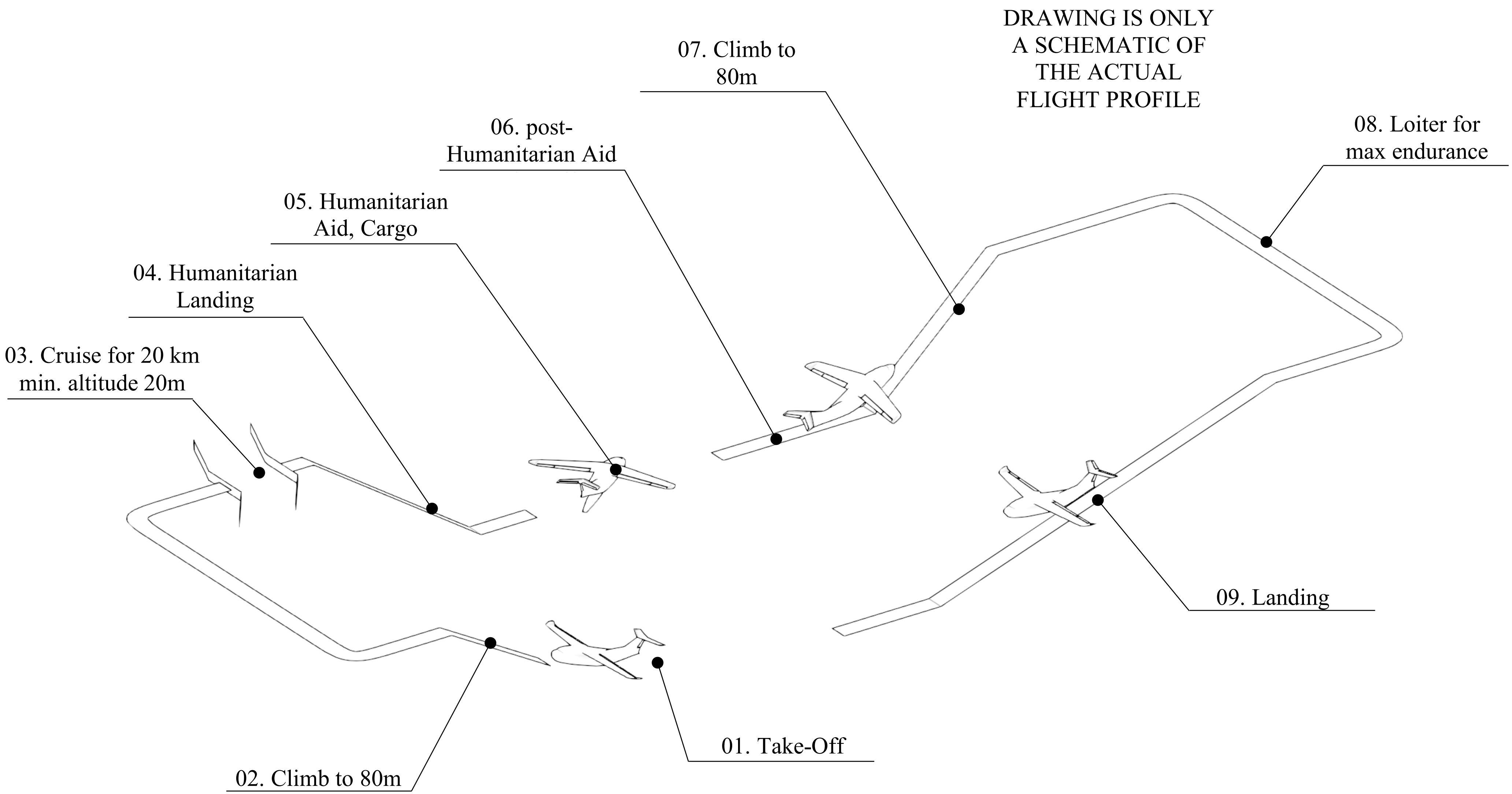
		during phases of the mission where necessary with the aircraft powered off.
R004	Regulation	The aircraft must have an eID attached to the outside of the fuselage to stay within regulation of the EU and Germany. See UAS Registration LBA for further details An eID is required to legally fly.
R005	Regulation	Pilot needs an A1/A3 license. More info here: EASA A1/A3 License for Open Category Hint: The license can be done free of charge in Luxembourg. In Germany it is about 25 €
St001	Structures	The aircraft must weigh a maximum of 20kg with payload
St002	Structures	The aircraft must sustain a limit load of positive 3g and negative -1g.
Sf001	Safety	The aircraft must not be flown in an unstable configuration in manual flight modes.
Sf002	Safety	The teams must have an accommodating fireproof container in case of a fire. This container must be kept close by on the field during maintenance. It is not needed on the runway.
Sf003	Safety	If custom components are used, then rigorous testing is required. Proof and validation of this must be provided to the organizing team.
Sf004	Safety	Proof of flight must be provided before admission of the aircraft for the competition. This proof must be provided by video proof as well as photos
Sf005	Safety	The aircraft must perform a motor test at the airfield before flight a single time, further tests are not required even on different days
Sf006	Safety	The aircraft may not be intentionally damaged and battery packs may not be deliberately undercharged to improve flight performance.
M001	Manufacturing	Any subassembly inside the aircraft may have up to 30% of its volume manufactured outside of the team. These parts must be designed by the team itself and proof must be provided. In case outsourcing of parts is chosen, then the team needs to provide a list of parts which state if the part was manufactured outside or inside the team and their

		respective volume percentage of the subassembly. This must be submitted in the FDR or during manufacturing as an additional document to the organizing team. Reference Table 14 to see a structure for assembly logic.
M002	Manufacturing	Any parts manufactured by the team must provide proof of its manufacturing in the form of either video or photos. This must be shown latest by the date given in Table 9: Important dates and deadlines

Assembly	**Subassembly**	**Component**
Aircraft	Wing	Spar
		Ribs
	Landing Gear	Wheel
		Strut

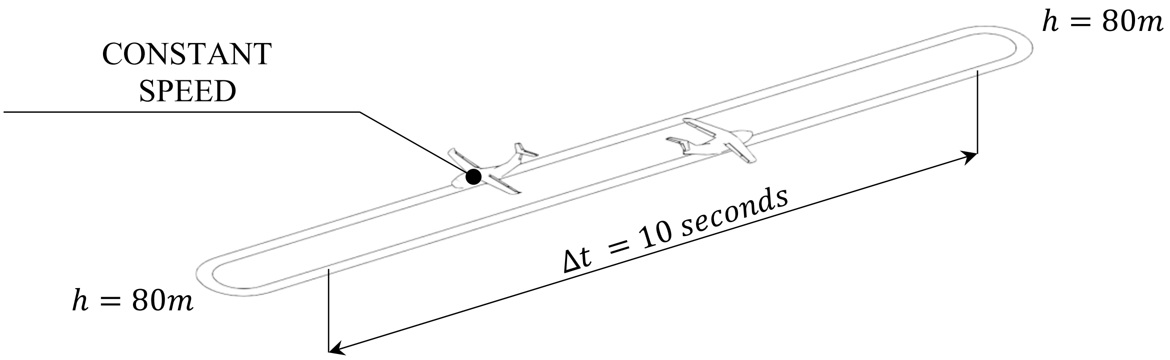
Table 14: Examples for Assemblies, Subassemblies and Components

Appendix C Humanitarian Aid Mission Profile

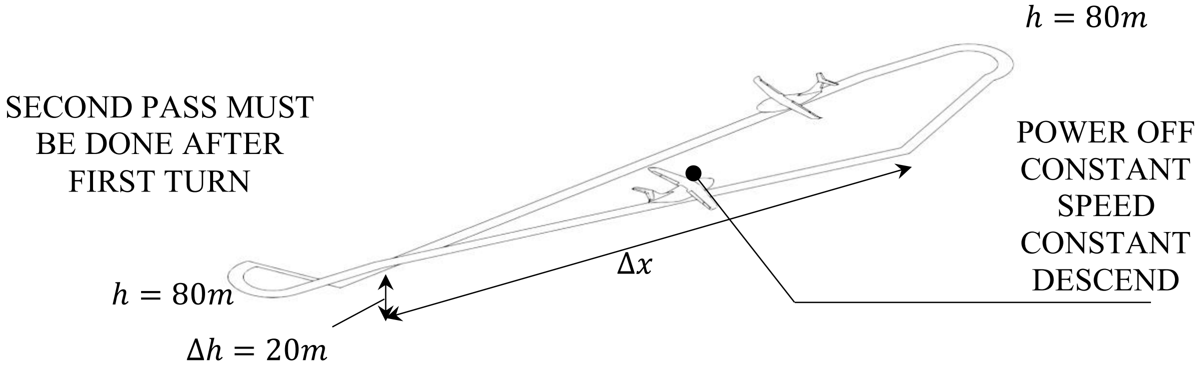


Appendix D Performance Tasks

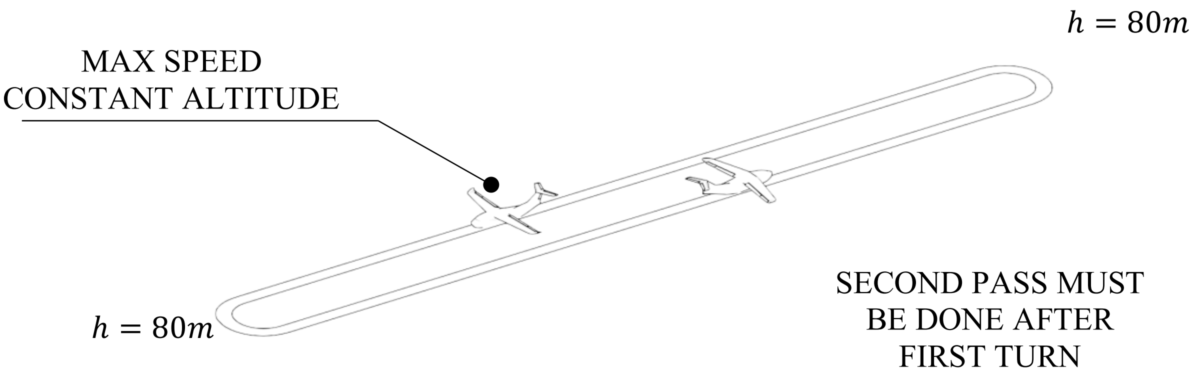
01. LIFT COEFFICIENT [-]



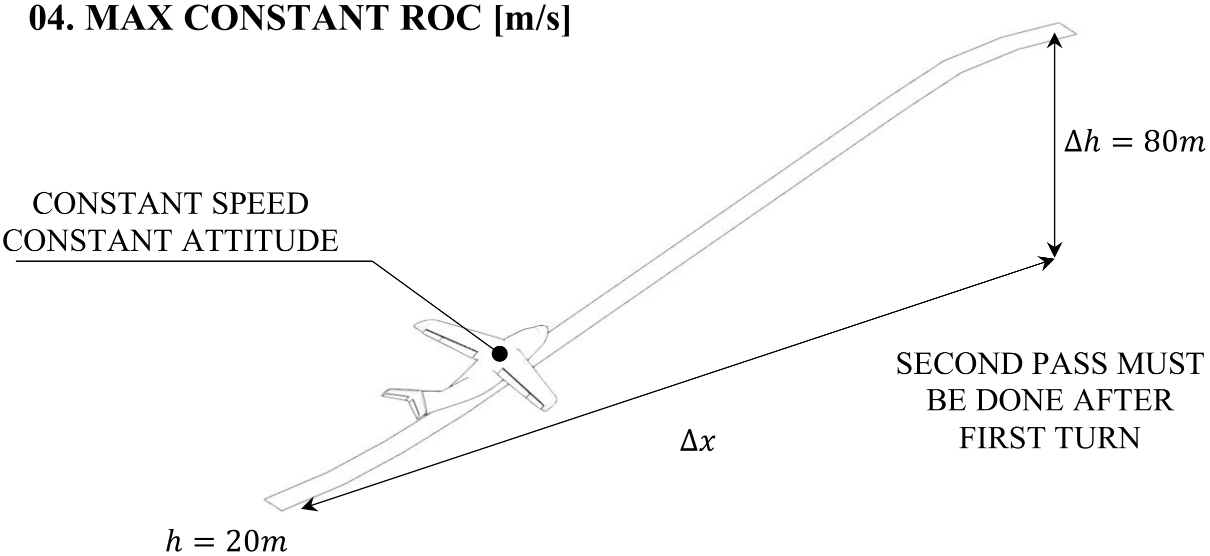
02. GLIDE DRAG [-]



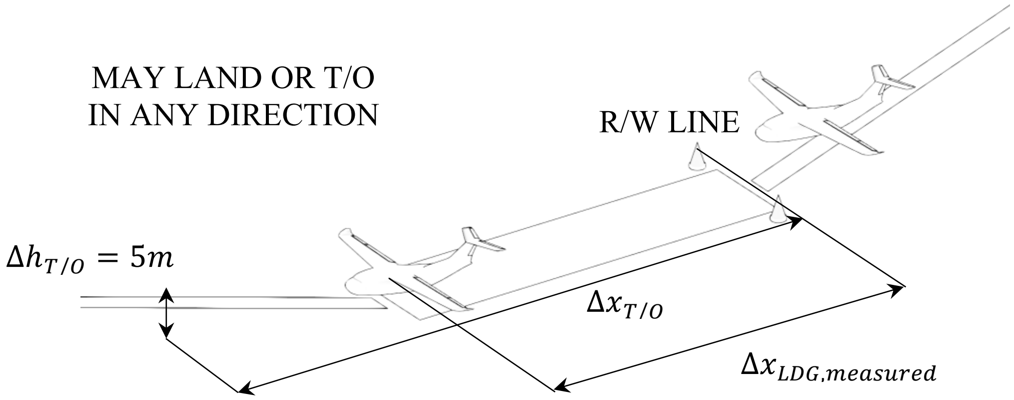
03. MAX VELOCITY [m/s]



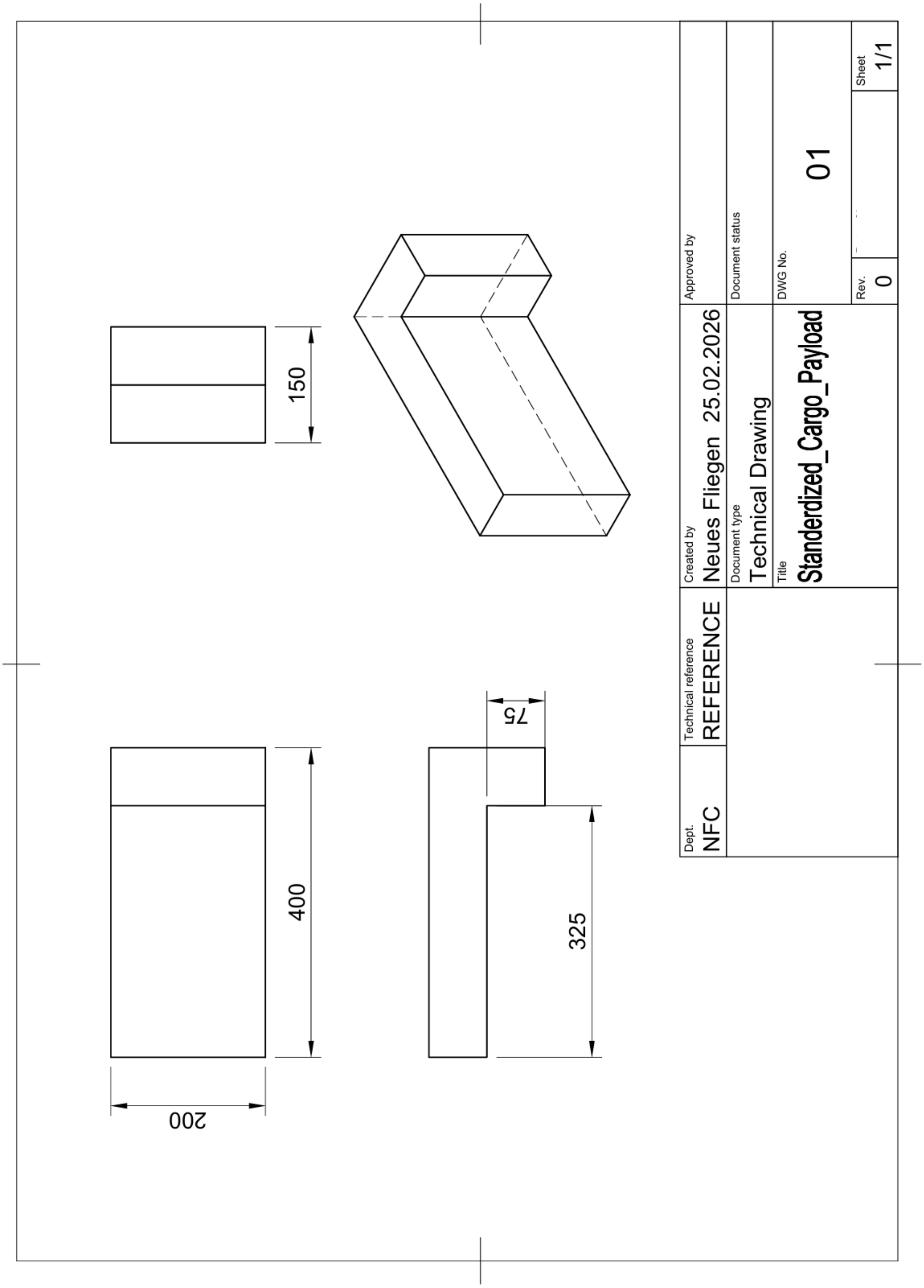
04. MAX CONSTANT ROC [m/s]



05. T/O AND LDG LENGTH [m]



Appendix E Standardized Cargo Payload



Appendix F Fireproof Container

For safety reasons, teams are required to provide a fireproof container in case their plane catches fire. This container does not have to fully enclose the whole aircraft but must hold the plane at 50% fuselage height in such a way that firefighting can be quickly and efficiently achieved. Teams are advised to combine the fireproof container with the regular container of their aircraft, so that transportation is simplified.

Teams are not required to provide firefighting equipment like extinguishers sand etc.

The description of the fireproof container in the FDR can be as brief as possible and should only include:

1. The features that make the container fireproof
2. A brief description how the plane could be thrown into the container if it is on fire

Appendix G List of Important quantities for Performance Flights

Geometric

- Reference Area identical to FDR, S_{ref}
- Mean aerodynamic chord identical to FDR, MAC

Aerodynamic

- Lift coefficients sweep over angles of attack, $C_L = f(\alpha)$
- Drag coefficients sweep over lift coefficients, $C_D = f(C_L)$
- Induced drag factor for drag polar, $K = f(AR, e)$

Performance

- Weight measured
- Maximum horizontal flight speed, $v_{h,max}$
- Maximum Constant Climb Rate, ROC_{max}
- Take-Off Distance Approximation, $\Delta x_{T/O}$
- Landing Distance Approximation, Δx_{LDG}

Appendix H Standardized Mass Breakdown

Mass Definitions

Total Empty Mass (TEM)

Defined as the mass of the complete aircraft in ready-to-fly condition, excluding payload. This includes all structural components, propulsion systems, energy storage systems, avionics, and any competition-specific equipment (e. g. Flight Logger).

Payload Mass (PM)

Defined as the total mass of the standardized cargo carried during the mission. Each cargo unit has a mass of 4 kg. The payload mass must correspond to the number of units carried.

Total Take-Off Mass (TOM)

Defined as the total mass of the aircraft at the moment of take-off. It is calculated as the sum of the Total Empty Mass and the Payload Mass.

The following formula is used for the relationship between the defined quantities:

$$TOM = TEM + PM$$

Mass Categories

The mass categories defined in Table 15 provide a standardized breakdown of the Total Take-Off Mass into functional subsystems of the aircraft, including payload.

Each category represents a distinct group of components with a specific function within the aircraft system. This classification is intended to ensure consistency in reporting and enable meaningful comparison of mass distribution between teams.

Table 15: Mass Categories

ID	Mass Category	Definition (What to include)	Notes / Examples
M1	Airframe Structure	All structural components of the aircraft	Fuselage, wings, tail, landing gear (no electronics)
M2	Propulsion System	Components required to generate thrust	Motors, propellers

M3	Energy Storage	All energy sources used for propulsion and systems	Batteries
M4	Avionics & Electronics	Control, sensing, and communication systems	Receiver, servos, wiring, flight controller
M5	Payload System	Mechanisms used to hold, secure, and release payload	Cargo bay, locking/release system
M6	Payload	Standardized cargo carried during mission	1 to 3 units, 4 kg each (4 to 12 kg total)
M7	Flight Test Equipment	Additional equipment required by competition	Flight Logger (≈350 g), pitot tube
M8	Miscellaneous	Any components not covered above	Fasteners, adhesives, paint
MT	**Total Take-Off Mass (TOM)**	Sum of all categories above	Must be ≤ 20 kg (design requirement St001)

Reporting and Measurement Rules

The following rules apply to the determination and reporting of all mass-related quantities:

Table 16: Measurement requirements list

ID	**Topic**	**Requirement**
MB001	Measurement Condition	All masses shall be measured in a ready-to-fly configuration, including all components required for normal flight operation.
MB002	Category Assignment	Each component must be assigned to exactly one mass category.
MB003	Payload Separation	Payload mass must be reported separately from the payload system.
MB004	Measurement Accuracy	All masses shall be measured with an accuracy of at least ±1% or ±50 g.
MB005	Mass Consistency	The sum of all reported mass categories must equal the Total Take-Off Mass. The Total Empty Mass shall correspond to the sum of all categories excluding the payload.