Airbus Cargo

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Version .....
Last Update .....

Green cells are calculated by formulars or are g

White cells are specific to the design entry; mandatory to be fi

Aircraft Data:

Aircraft name :

General Requierements

Description
Maximum Take-Off Mass
Air Density

Geometry Data:

Description
Wing Span
Aspect Ratio
Wing Area
Wing Loading (fixed wing mode)
Disc Loading (rotor disc)
Lift Propeller Area per Lift Propeller
Lift Propeller Diameter
Cruise Propeller Diameter
Cruise Propeller Area per Cruise Propeller
Number of Propeller for Hover
Number of Propeller for Cruise
Fuselage Length
Fuselage Diameter (max. Diameter)

Vertical Tail Surface
Vertical Tail Leaver Arm to CoG
Horizontal Tail/Canard Surface
Horizontal Tail/Canard Leaver Arm to CoG
Control Curface Area for Pitch
Control Surface Leaver Arm to CoG for Pitch
Control Surface Area for Roll
Control Surface Leaver Arm to CoG for Roll
Control Surface Area for Yaw
Control Surface Leaver Arm to CoG for Yaw

Mass and Balance Data:
Description
Structural Mass (wing, fuselage, empenage, nacelles, …)
Avionics Mass (see ignition kit)
Flight Control Actuation
Electric Motors and Controllers Mass (for hover)
Electric Motors and Controllers Mass (for cruise)
Propellers Mass (for hover)
Propellers Mass (for cruise)
Battery Mass
Additional Mass for Installations
Empty Mass
Payload Mass
Center of gravity location
x-location
y-location
z-location

Efficiencies:
Description
Efficiencies for Hover Flight
Electrical Motor Efficiency (incl. Motor controller efficiency)
Figure of Merit

Battery Efficiency
Power Management and Distribution Efficiency
Efficiencies for Cruise Flight
Electrical Motor Efficiency (incl. Motor controller efficiency)
Propeller Efficiency
Battery Efficiency
Power Management and Distribution Efficiency

Aerodynamics:
Description
Oswald Factor
Zero Lift Drag Coefficient
Cruise Lift Coefficient
Induced Drag Coefficient
Lift to Drag Ratio
Static Margin

Component specific Energy:
Description
Battery Specific Energy

Aircraft Range Performance Estimation:
Description
Required Cruise Thrust
Cruise Speed
Range
Required Cruise Power
Hover nz
Required Hover Power
Required Power for Avionics
Cruise Time
Hover Time
Battery Energy

Drone Challenge Frame Sheet

Participant Name(s) here]

..... V 1.00

..... 01.04.2016

iven (not changeable) requirement values

lled out by the participant as delivery item

Blue cells are optional delivery items

Air Nurse

Symbol	Value	Unit	Comment
m_{MTOM} =	25.0	kg	Shall stay below 25 kg
ρ=	0.954	kg/m³	@ 2000m MSL and ISA+20°C

Symbol	Value	Unit	Comment
b =	2.75	m	
AR =	10.57692308	-	
S_{ref} =	0.715	m²	
m/S_{ref} =	33	kg/m²	10 - 30 kg/m² recommendation
$m/S_{prop\ Lift}$ =	31.25	kg/m²	10 - 50 kg/m² recommendation
$S_{prop\ Lift}$ =	0.200	m²	
$D_{prop\ Lift}$ =	0.505	m	
$D_{prop\ Cruise}$ =	0.3	m	
$S_{prop\ Cruise}$ =	0.07	m	
$n_{propeller,hover}$ =	4	-	
$n_{propeller,cruise}$ =	1	-	
$L_{fuselage}$=	1.8	m	
$D_{fuselage}$=	0.3	m	

$S_{vertical\ tail}$ =	0.0385	m²
$l_{vertical\ tail}$ =	1.1	m
$S_{horizontal\ tail}$ =	0.0385	m²
$l_{horizontal\ tail}$ =	1.1	m
$S_{control,pitch}$ =	0.01925	m²
$l_{control,pitch}$ =	1.1	m
$S_{control,roll}$ =	0.052	m²
$l_{control,roll}$ =	0.55	m
$S_{control,yaw}$ =	0.01925	m²
$l_{control,yaw}$ =	1.1	m

	Symbol	Value	Unit	Comment
	m_{struct} =	5	kg	
	$m_{avionics}$ =	3.4	kg	
	$m_{actuation}$ =	0.55	kg	
	$m_{motors,hover}$ =	1.7	kg	
	$m_{motors,cruise}$ =	0.3	kg	
	$m_{propeller,hover}$ =	0.5	kg	
	$m_{propeller,cruise}$ =	0.1	kg	
	$m_{battery}$ =	6.420	kg	
	$m_{installtions}$ =	1	kg	mass for wiring, installations, etc.
$\sum$	m_{empty} =	18.970	kg	
	$m_{Payload} = m_{MTOM} - m_{empty}$ =	6.03	kg	

x_{CoG} =	0.73	m
y_{CoG} =	0	m
z_{CoG} =	0.3	m

	Symbol	Value	Unit	Comment
	$\eta_{elect.\ motor}$ =	88%		
	FOM =	0.6	-	

$\eta_{battery}$ =	97%	
η_{PMAD} =	99%	

$\eta_{elect.\ motor}$ =	88%	
$\eta_{propeller}$ =	82%	
$\eta_{battery}$ =	97%	
η_{PMAD} =	99%	

Symbol	Value	Unit	Comment
e =	0.88	-	
C_{D0}=	0.03	-	
$C_{L\ Cruise}$=	0.92	-	
$C_{Di\ Cruise}$=	0.03	-	
L/D_{Cruise} =	15.61	-	
SM =	10%		

Symbol	Value	Unit	Comment
$\omega_{battery}$ =	140.0	Wh/kg	

Symbol	Value	Unit	Comment
T_{cruise} =	15.7	N	
v_{cruise} =	28.0	m/s	
d_{range} =	60.0	km	
P_{cruise} =	633.5	W	
n_z=	1.1	-	
P_{hover} =	6730.3	W	
$P_{Avionics}$ =	91.0	W	
t_{cruise} =	40.7	min	including 5 min reserve
t_{hover} =	2.0	min	2 min Hover time is required
$E_{battery}$ =	719.0	Wh