Annex B Description of compulsory manoeuvres F3C-Freestyle

General:

The competitor or his caller must announce the name and start and finish of each manoeuvre. All aerobatic manoeuvres start and end with a straight and level flight of 10 metres minimum length parallel to the judges line. All manoeuvres from stationary flight start and end with a hovering of at least 1 second with the model parallel or vertical to the flight line.
All manoeuvres (considering also entry and exit) should be performed symmetrical to the center line. For safety reasons, a minimum altitude of 5 metres on aerobatic and 2 metres on hovering manoeuvres should be kept.
The drawings in Annex C shall illustrate the manoeuvres, in case of a dispute the following text takes precedence over the drawings. All manoeuvres can also be flown in opposite direction as shown in the drawings.

Nr.:	Name and description	K-factor
1.	**Immelmann** Model executes a half inside loop immediatly followed by a half roll to upright flight.	3
2.	**Split-S** Model executes a half roll to inverted flight, immediatly followed by a half loop to upright flight.	3
3.	**Half outside loop** Model performs a half outside loop to inverted flight.	3
4.	**Double inside loop** Model enters the first loop, immediatly followed by the second loop. Loops are in same plane and location (superimposed).	3,5
5.	**Inverted hovering** Model approaches slowly in inverted flight, stops in an altitude of 5-10 metres for at least 2 seconds and transitions to a slow inverted forward flight.	3,5
6.	**Double Immelmann** Model executes a half inside loop immediatly followed by a half roll to upright flight. After a straight flight of about 20 metres model performs a half outside loop, again immediatly followed by a half roll to upright flight.	4
7.	**Half flip** Model hovers in upright position, then executes a half flip sideways with a lateral offset of 2 metres max., hovers again and transitions to an inverted forward flight.	4
8.	**Circle backwards** Model enters the manoeuvre backwards in upright flight and executes a horizontal circle aligned to the center line.	4
9.	**2-point roll** Model enters in upright flight, then performs a half roll followed by a recognisable straight segment in inverted flight and another half roll back to upright flight.	4
10.	**Inverted landing approach** Model enters in inverted forward flight and descends constantly. It executes a 180° turn followed by a straight flight while descending to a stop in an altitude of 5 metres for about 2 seconds over the helipad. Model then transitions to inverted forward flight.	5
11.	**Flip forward** Model hovers and enters a flip forward (outside) back to upright hovering position.	5
12.	**Outside loop with half rolls** Model executes a half roll to inverted flight, followed by a recognisable straight segment and then enters an outside loop (upward). After the loop, model flies another recognisable straight segment, followed by a half roll to upright flight.	5,5
13.	**4-point roll** Model enters in upright forward flight and then performs 4 quarter rolls, separated each by a recognisable straight segment of the same duration.	5,5
14.	**Inverted figure 8** Model enters in inverted forward flight parallel to the judges line, executes a 90°-turn to a straight flight over the center line and then performs a horizontal eight, consisting of two 360° circles.	5,5

15. **Loop with half pirouette** **6**
Model enters in upright backward flight and performs a half inside loop. On the top it executes a 180°-pirouette followed by another half inside loop to upright forward flight

16. **Cuban eight** **6**
Model enters in upright forward flight and executes a 5/8 inside loop to a 45°-descent. It performs a half roll, followed by a ¾ inside loop and another half roll in 45°.descent. Model then finishes the first partial loop to upright flight.

17. **Loop sideways** **6**
Model enters in upright sideward flight and performs an inside loop with the longitudinal axis always vertical to the flight path.

18. **Backwards figure 8** **6**
Model enters in upright backward flight parallel to the judges line, executes a 90°-turn to a straight flight over the center line and then performs a horizontal eight, consisting of two 360° circles.

19. **Death spiral** **6,5**
Model enters in upright flight and transitions to a vertical descend with the longitudinal axis vertical to the flight path. During the descend model performs at least one rotation about the lateral axis and then exits to upright flight.

20. **Inverted pirouette** **6,5**
Model hovers in inverted flight and performs a slow (at least 4 seconds) 360°-pirouette, maintaining its lateral position.

21. **Loop backwards** **6,5**
Model enters in upright backward flight and performs an inside loop with the tail always pointing in flight direction.

22. **Inverted 540°-turn** **7**
Model enters in inverted forward flight and executes a quarter (outside) loop to a vertical climb. Just before the stall, model executes a 540°-pirouette to a vertical dive, followed by another quarter (outside) loop to inverted flight.

23. **Double outside loop** **7**
Model enters the first loop from inverted forward flight, immediatly followed by the second loop. Loops are in same plane and location (superimposed).

24. **4 half flips sideways** **7**
Model hovers in upright position, then executes four half flip sideways with a lateral offset of 3-5 metres each and separated by a hovering of about 2 seconds.

25. **4 half flips forward** **7**
Model hovers in upright position, then executes four half flip forward separated each by a hovering of about 2 seconds. Model maintains its position during the manoeuvre.

26. **0°-turn with half roll** **7,5**
Model enters in upright backward flight and performs a quarter inside loop to a vertical climb and a stop. During the following dive model executes a half roll and a quarter outside loop to inverted forward flight.

27. **Inverted nose-in circle** **7,5**
Model hovers or moves lateral slowly, then performs a horizontal circle with the nose of the model always pointing to the center of the circle and exits in the same manner as it started.

28. **Double roll backwards** **7,5**
Model enters in upright backward flight and executes two consecutive axial rolls.

29. **360°-turn with roll** **8**
Model enters in upright forward flight and executes a quarter (inside) loop to a vertical climb. Just before the stall, model executes a 360°-pirouette to a vertical (backward) dive, followed by another quarter (inside) loop to upright flight and an axial backward roll.

30. **Knife edge pirouette** **8**
Model enters in upright forward flight, transitions to a slight ascent (max 15°) and executes a quarter roll. After a recognisable straight segment model performs a 360°-pirouette, followed by another straight segment and a quarter roll in opposite direction to the first to upright flight.

31. **Inverted backwards figure 8** **8,5**
Model enters in inverted backward flight parallel to the judges line, executes a 90°-turn to a straight flight over the center line and then performs a horizontal eight, consisting of two 360° circles with the tail always pointing in flight direction.

32. **Autorotation backwards** **8,5**

Model enters in an altitude of at least 20 metres in backward flight. The engine stops or is running on an idle and the model descends in the auto rotation state to a smooth landing on the helipad.

33. Rolling circle **8,5**

Model executes a horizontal circle while it performs consecutive axial rolls. Model speed, rolling rate and the radius of the circle should be constant.

34. 4-point roll backwards **9**

Model enters in upright backward flight and then performs 4 quarter rolls, separated each by a recognisable straight segment of the same duration. The tail of the model always points in the flight direction-

35. Inverted pirouetting circle **9**

Model enters in inverted flight and executes a horizontal circle while it performs consecutive pirouettes. Model speed, pirouetting rate and the radius of the circle should be constant.

36. Pirouetting flip **9,5**

Model hovers or moves slowly and then starts pirouetting. At the same time or after one pirouette the model starts to flip but continues to perform pirouettes. There should be at least one pirouette during the 360°-flip (2 pirouettes are shown in the drawing). Both rotation should have a constant rate and the model maintains its position during the manoeuvre.

37. Cuban eight backwards **9,5**

Model enters in upright backward flight and executes a 5/8 inside loop to a 45°-descent. It performs a half roll, followed by a ¾ inside loop and another half roll in 45°.descent. Model then finishes the first partial loop to upright backward flight. The tail of the model always points in the flight direction.

38. Outside loop sideways **9,5**

Model enters in lateral upright flight and performs an outside loop. During the manoeuvre the longitudinal axis is always vertical to the flight path.

39. Circle with flips **10**

The model executes a horizontal circle while it rotates about its lateral axis and stops shortly in each vertical position. The manoeuvre can be described as a series of 0°-turns, connected by half loops on a circular path. The radii of the loops should be equal and all stops should reach the same altitude. Also the circle should be round and not polygonal.

40. Inverted autorotation **10**

Model enters in an altitude of at least 30 metres in inverted flight. The engine stops or is running on an idle and the model descends in the inverted auto rotation state for about 5 seconds. Then it is brought to upright position, either by a half roll or a flip and descends to a smooth landing on the helipad.

41. Rolling circle backwards **10**

Model enters in backward flight and executes a horizontal circle while it performs consecutive axial rolls. Model speed, rolling rate and the radius of the circle should be constant and the tail of the model always points in the flight direction.

42. Pirouetting loop **10**

Model enters in upright flight and starts performing pirouettes. Then it executes an inside loop while constantly rotating about the yaw axis. During the loop there have to be at least 2, max 6 pirouettes. The pirouettes should be distributed equal on the loop.

43. TicToc (Metronome) **9**

Model hovers or moves slowly and is brought to vertical position (Nose up). It maintains its position by rotating alternately about the lateral axis for about 45° in each direction. Both 45°-positions have to be reached at least three times. The tailrotor stays almost in the same position during the manoeuvre.