FAI Sporting Code

Fédération Aéronautique Internationale

Section 7E – WPRS

The World Pilot Ranking System

for all Hang gliding and Paragliding disciplines

2020 Edition
Revision 2
Effective 1st May 2020

Maison du Sport International
Av. de Rhodanie 54
CH-1007 Lausanne
(Switzerland)
Tél. +41 (0)21 345 10 70
Fax +41 (0)21 345 10 77
E-mail: sec@fai.org
Web: www.fai.org

FEDERATION AERONAUTIQUE INTERNATIONALE
MSI - Avenue de Rhodanie 54 – CH-1007 Lausanne – Switzerland

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1	FAI Statutes,	Chapter 1,	para. 1.6	
2	FAI Sporting Code,	Gen. Section,	Chapter 4,	para 4.1.2
3	FAI Statutes,	Chapter 1,	para 1.8.1	
4	FAI Statutes,	Chapter 2,	para 2.1.1; 2.4.2; 2.5.2 and 2.7.2	
5	FAI By-Laws,	Chapter 1,	para 1.2.1	
6	FAI Statutes,	Chapter 2,	para 2.4.2.2.5	
7	FAI By-Laws,	Chapter 1,	paras 1.2.2 to 1.2.5	
8	FAI Statutes,	Chapter 5,	paras 5.1.1, 5.2, 5.2.3 and 5..2.3.3	
9	FAI Sporting Code,	Gen. Section,	Chapter 4,	para 4.1.5
10	FAI Sporting Code,	Gen. Section,	Chapter 2,	para 2.2.
11	FAI Statutes,	Chapter 5,	para 5.2.3.3.7	
12	FAI Statutes,	Chapter 6,	para 6.1.2.1.3	

Editors Note:

This version of the WPRS formula was accepted at the CIVL Plenary meeting in Austria 2009 and corrected in April 2018 with all the decisions taken in 2009 - 2018.

The formula is used for all disciplines in both Hang gliding and Paragliding.

There are some differences between classes, like minimum number of tasks and competitors and number of tasks required for full value of the competition.

The main aim of the WPRS is to rank pilots around the world in a fair manner, so the rankings will show the strength of each individual pilot, based on the competitions in which they have participated.

This version of the formula took effect from March 1st 2009. All rankings from that date use the new formulas and show the competitions in the last 3 years recalculated using the new formula.

Older rankings are unchanged in the WPRS system.

The pilot (participant) points are based on the sum of 4 best competitions in the last 3 years with time devaluation (Td) as it has been. Time devaluation is important in the formula because the value of the competition should decrease over time, otherwise we would have an "all time best in last 3 years" ranking instead of a current ranking.

The rankings are for each class and discipline of hang- and paraglider competitions.

A pilot can be ranked in any of the rankings based on his participation in sanctioned competitions.

On following pages, the formula is described in detail.

1 More detailed explanation of the WPRS formula

Factors to consider:

1. Position ranking (**Pp**):
The value of a participant's effort in a competition relative to the other participants in the same competition.
This is calculated from the actual total scores from the competition (GAP or other scoring formula).

2. Competition ranking (**Pq, Pn, Ta**):
The value of the competition relative to other competitions in the same ranking (using the competitions in the last ranking prior to the competition as benchmark). It is obligatory to use GAP scoring formula for Hang gliding XC because it is required for **Ta** calculation.

3. Time devaluation (**Td**):
The value of the competition should decrease over time, otherwise we would have a "all time best" ranking instead of a current ranking.

4. The number of results that should count for a participant in the ranking. It is sum of the points of 4 best competitions in the last 3 years.

2 The actual WPRS formula:

WPR = Pp*Pq*Pn*Ta*Td

To make the points more readable it is multiplied by 100 and round to 1 decimal.

WPR = round(Pp*Pq*Pn*Ta*Td*100, 1)

The participant's place in a given ranking (at a ranking date) is decided by the sum of the top 4 results in the last 3 years.

The **competition ranking factor** is based on **real differences** in the number of top-ranked pilots participating and the number of pilots participating in the competition relative to the number of pilots in the ranking and in the average competition for the given ranking.

2.1 Pilot Points (Pp)

The value of a person's effort in a competition relative to the other participants is calculated as a curve.
The curve is using the Pq so in competition with high ranked pilots the curve is fairly steep, but in competitions with lower ranked pilots it gets close to be straight line.
Pq has the value of 0.2 to 1.0 based on the rankings of the pilots in the competition.
As the formula uses Pq as power creating a curve and Pq varies, the curve varies.
So the formula use the maximum value comparing the value based on the actual Pq and if this was the highest valued competition with Pq = 1.0.

Pp=max(Pplacing^(1+Pq), Pplacing^2)
where Pplacing is (last place - pilot place+1)/ last place

2.2 Competition ranking (Pq, Pn, Ta)

In a perfect competition with all the top pilots participating the competition ranking should be 1.0.
So, what to do with all those other competitions? Winning a competition with only beginner pilots or a competition with only one participant should give a competition ranking close to 0.0.
We use three factors in the WPRS formula to measure the value of a competition:
1. The quality of the participants (**Pq**).
2. The number of participants compared to other competitions in same ranking (**Pn**).
3. The success of the competition (**Ta**).

Pq*Pn*Ta

2.3 Participant quality (Pq)

Presumption: A competition with maximum quality of participants would be a competition where all the top ranked pilots participated.

For Paragliding XC, Aerobatics, Hang gliding
To find **Pq** we use the last ranking prior to the competition and find the sum of ranking-points for the top 1/2 ranked pilots that are entered in the competition. Then we find the sum of ranking-points as if those pilots would have been the top ranked pilots of the world. This gives us 1.0 if the top ranked pilots had actually entered and 0.0 if no ranked pilots are entered.
To avoid **Pq** = 0 for comps with no ranked pilots set a lower limit of 0.2.

Pq = Pq_srp / Pq_srtp * (1 - Pq_min) + Pq_min

Pq_srp = "sum ranking-points of the top 1/2 ranked participants"
Pq_srtp = "sum ranking-points if they had been the top-ranked pilots of the world"
Pq_min = "minimum Pq"
Virtually no competition will get Pq = 1.0. Top competitions may get between 0.7 and 0.8 and there will be a difference between these.

For Paragliding Accuracy
We calculate this parameter within the same number of pilots (first ½) but limited to 30.
Pq_srp = "sum ranking points of the top 1/2, max 30, ranked participants"

2.4 Number of participants (Pn)

Pn = square root ("number of participants" / "avg. number of participants in competitions last 12 months")
if (**Pn** > Pn_max) **Pn** = Pn_max

Pn_max = 1.2, saying that a competition with slightly more than average number of participants is a good benchmark.

Looking at WPRS data on 01.01.2007 the average number of pilots in PG XC competitions is 69 pilots.
In HG class 1 the average number of pilots in competitions at that date is 43 pilots.

This formula handles the issue of **Pn** on the average in competitions for each discipline. It will also take into account change of average number of participants in competitions, like increasing interest in Paragliding Accuracy and Paragliding Aerobatics. For aerobatics the number of pilots is based on the average number of pilots in syncro and solo as if it is separate competitions.

No formula change is needed if the average numbers of pilots change in the next years.

2.5 Success (Ta)

One last thing one may consider is the success of the competition (**Ta**), i.e. was it a fair competition. There are many ways to measure this, none is very objective or accurate.
As competitions in paragliding mostly involve a number of tasks we tend to use this as a measure of success.

Ta values for Paragliding XC, Aerobatics:

2.5.1
1 task: 0.5
2 tasks: 0.8
3 tasks: 1.0

2.5.2
Ta values for Paragliding Accuracy

Number of rounds	Ta value
1	0.50
2	0.60
3	0.70
4	0.75
5	0.80
6	0.84
7	0.87
8	0.90
9	0.93
10	0.96
11	0.98
12	1.00

Application of this coefficient means that a Paragliding competition has full value if there are 3 valid tasks, but a Hang gliding competition has only full value if there are 6 or more tasks.

For hang gliding, it is recognised that competition success is not dependent solely on the number of tasks, but rather on the sum of the quality of all tasks (TQ or 'total quality').

The only consistent way we currently have to assess task quality, is the number of points available for a task, calculated by the GAP formula, therefore Cat 1 & Cat2 competitions are now required to use GAP if they intend to be listed in WPRS.

Thus, TQ is calculated as the sum of the number of available points calculated by GAP, over all tasks.

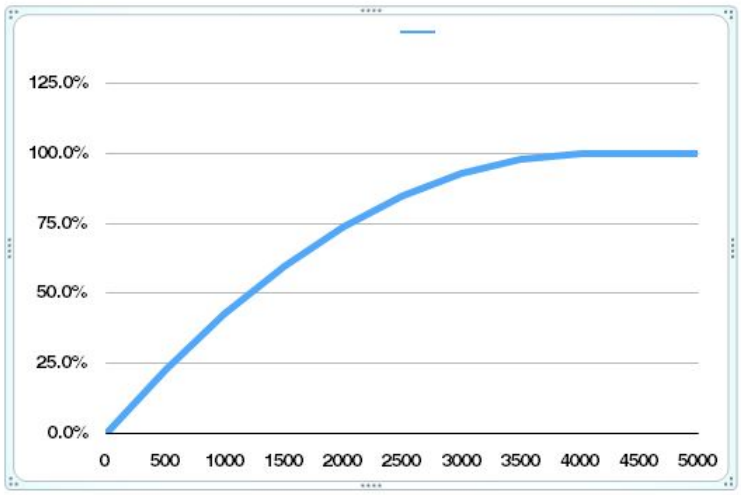
To ensure that the task qualities calculated by GAP are meaningful, the scoring software that uses GAP must be configured to use at least 1 hour for the nominal time parameter.

So, Ta is expressed as a function of TQ:

Ta = (100 - 1.0787E-5 * (4000 - points) ^ 1.9342) / 100
where points = the total number of available points in the competition (sum of available points of all valid task days).

This is a function defined by 0% for 0 points, 85% for 2500 & 100% for 4000.

4000	4000	100
2500	1500	85
	-1.897120E+00	
	-9.808293E-01	
b	1.934200E+00	
a	1.078687E-05	
0	0.0%	
500	22.8%	
1000	42.7%	
1500	59.7%	
2000	73.8%	
2500	85.0%	
3000	93.2%	
3500	98.2%	
4000	100.0%	
4500	100.0%	
5000	100.0%	



Notice:
May 25, 2020.
Due to technical reasons in the years 2017-2020 it was impossible to get the task validity in WPRS. When the new WPRS system is in place it will use the rule written above. Currently Ta is calculated in the following way:

Ta values for hang gliding depend on the competition winner's score WS:

Ta = Max(0.0, Min(1.0, (0.51 * WS- 0.0000643 * WS^2)/1000)) (for TQ < 3800, 1.0 otherwise)

2.6 Time devaluation (Td)

Td = 1/(1+ Td_a ^(DaysSinceEndOfComp /1096* Td_b - Td_b/2))

This gives an s-curve with X in the range 0 to 1096 (days or 3 years) and Y going from 1.0 to 0.0.
Td_a = 2, **Td_b** = 20 (changing these will change shape of the s-curve).