



2024 USA-CAN Standard Scoring Models

These appear on Page 2 of all ORC certificates issued in the USA and CAN and test certificates run in the ORC Sailor Services system. The ratings are also available for use by scoring software systems by downloading in RMS, JSON or CSV format from the ORC server at <https://orc.org/race-management/rms-files>.

In general, the closer a race manager can describe the wind conditions of a race and choose an appropriate scoring option that matches that description, the more accurate and fair will be the ratings and race results. Greater discussion of this will be given in the **2024 ORC Race Management Guidebook, USA-CAN edition**.

1. Single Number rating options are used when conditions are too variable to select a specific wind range for scoring a race. These include 2 simple models: **Windward/Leeward** (50% VMG beat + 50% VMG run) and **All Purpose** (APH - an equal mix of all wind angles).

Single Number Scoring Options		
Course	Time On Distance	Time On Time
Windward / Leeward	698.1	0.8595
All purpose	577.5	1.0390

The wind speed distribution for these single number ratings is as follows:

TWS (kt)	6	8	10	12	14	16	20
Time Allowance percentage	5%	10%	20%	30%	20%	10%	5%

2. When the wind speed during a race can be confined within a specified range, another scoring option to consider is the **Triple Number** for APH and Windward/Leeward courses. This is the wind speed distribution for **Low, Medium** and **High** wind ranges. Note the average for each:

TWS	6	8	10	12	14	16	20	Average
Low	50%	50%						7.0
Medium		8.40%	33.3%	33.3%	25%			11.5
High					25%	37.5%	37.5%	17.0

3. When the race course has a wind direction that is mostly beating, reaching or running, especially for longer races, the **Predominant course models** should be considered. When wind speed is undefined then the AP mix of wind speeds shown above and is used with the following mix of wind angles for **Upwind, Reaching** and **Downwind** single number scoring options:

True Wind Angle	Upwind	Downwind	Reaching
Beat VMG	32%	8%	8%
52 deg	34%	11%	18%
90 deg	15%	15%	38%
135 deg	11%	34%	28%
Run VMG	8%	32%	8%

4. When the wind speed during any course type can be further refined into a more specific range of wind speeds, the **5-Band system** should be considered to yield even more accurate results. This system identifies ratings for **Low, Low-Medium, Medium, Medium-High** and **High** ranges.

The formulations for each depend on the course type and are summarized here:

For **Windward-Leeward** courses with equal numbers of upwind and downwind legs, the 5-Band **Low, Low-Medium, Medium, Medium-High** and **High** range formulations are summarized here:

TWS	6	8	10	12	14	16	20	24	TWS Avg
Low	77.3	22.7	0	0	0	0	0	0	6.5
Low/Med	14.7	35.3	35.3	14.7	0	0	0	0	9
Med	0	7.7	19.2	46.2	19.2	7.7	0	0	12
Med/High	0	0	0	7.7	19.2	55.8	17.3	0	16
High	0	0	0	0	0	17.3	65.4	17.3	20

For **Windward-Leeward** courses with 3 upwind and 2 downwind legs, the 5-Band **Low, Low-Medium, Medium, Medium-High** and **High** range formulations are summarized here:

60/40 WL 5-Band Low: avg TWS 6.5 kts			
TWS	6	8	TWA %
Beat VMG	46.4	13.6	60
Run VMG	30.9	9.1	40
TWS %	77.3	22.7	100

60/40 WL 5-Band Low-Med: avg TWS 9 kts					
TWS	6	8	10	12	TWA %
Beat VMG	8.8	21.2	21.2	8.8	60
Run VMG	5.9	14.1	14.1	5.9	40
TWS %	14.7	35.3	35.3	14.7	100

60/40 WL 5-Band Medium: avg TWS 12 kts						
TWS	8	10	12	14	16	TWA %
Beat VMG	4.6	11.5	27.7	11.5	4.6	60
Run VMG	3.1	7.7	18.5	7.7	3.1	40
TWS %	7.7	19.2	46.2	19.2	7.7	100

60/40 WL 5-Band Med-High: avg TWS 16 kts					
TWS	12	14	16	20	TWA %
Beat VMG	4.6	11.5	33.5	10.4	60
Run VMG	3.1	7.7	22.3	6.9	40
TWS %	7.7	19.2	55.8	17.3	100

60/40 WL 5-Band High: avg TWS 20 kts				
TWS	16	20	24	TWA %
Beat VMG	10.4	39.2	10.4	60
Run VMG	6.9	26.2	6.9	40
TWS %	17.3	65.4	17.3	100

For **All Purpose** courses, wind angles are equally distributed across all wind angles from VMG upwind to VMG downwind, and wind speeds described in the 5-Band **Low, Low-Medium, Medium, Medium-High**

All Purpose 5-Band TWS for all TWA's <small>Linked from Basic Tab</small>										
TWS	6	8	10	12	14	16	20	24	TWS Avg	Sum %
Low	77.3	22.7	0	0	0	0	0	0	6.5	100
Low-Med	14.7	35.3	35.3	14.7	0	0	0	0	9	100
Medium	0	7.7	19.2	46.2	19.2	7.7	0	0	12	100
Med-High	0	0	0	7.7	19.2	55.8	17.3	0	16	100
High	0	0	0	0	0	17.3	65.4	17.3	20	100

For **Predominant** courses when the wind speed cannot be defined, there are **Upwind**, **Reaching** and **Downwind single number** rating options that are summarized here:

Predominantly Upwind Single Number - average TWS 11.6 kts				
	8	12	16	
Beat VMG	10.24	14.72	7.04	
52 deg	10.88	15.64	7.48	
90 deg	4.8	6.9	3.3	
135 deg	3.52	5.06	2.42	
Run VMG	2.56	3.68	1.76	

Predominantly Downwind Single Number - Average TWS 11.6 kt				
TWS	8	12	16	
Beat VMG	2.56	3.68	1.76	
52 deg	3.52	5.06	2.42	
90 deg	4.8	6.9	3.3	
135 deg	10.88	15.64	7.48	
Run VMG	10.24	14.72	7.04	

Predominantly Reaching Single Number - average TWS 11.6 kts				
TWS	8	12	16	
Beat VMG	2.56	3.68	1.76	
52 deg	5.76	8.28	3.96	
90 deg	12.16	17.48	8.36	
135 deg	8.96	12.88	6.16	
Run VMG	2.56	3.68	1.76	

For **Predominant Upwind** courses when the wind speed can be described, the 5-Band **Low**, **Low-Medium**, **Medium**, **Medium-High** and **High** wind angle percentage formulations vary and are summarized here:

Predom. Upwind 5-Band Low: avg TWS 6.5 kts		
TWS	6	8
Beat VMG	24.736	7.264
52 deg	26.282	7.718
90 deg	11.595	3.405
135 deg	8.503	2.497
Run VMG	6.184	1.816

Predom Upwind 5-Band Low-Med: avg TWS 9 kts				
TWS	6	8	10	12
Beat VMG	4.704	11.296	11.296	4.704
52 deg	4.998	12.002	12.002	4.998
90 deg	2.205	5.295	5.295	2.205
135 deg	1.617	3.883	3.883	1.617
Run VMG	1.176	2.824	2.824	1.176

Predom Upwind 5-Band Medium: avg TWS 12 kts					
TWS	8	10	12	14	16
Beat VMG	2.464	6.144	14.784	6.144	2.464
52 deg	2.618	6.528	15.708	6.528	2.618
90 deg	1.155	2.88	6.93	2.88	1.155
135 deg	0.847	2.112	5.082	2.112	0.847
Run VMG	0.616	1.536	3.696	1.536	0.616

Predom Upwind 5-Band Med-High: avg TWS 16 kts				
TWS	12	14	16	20
Beat VMG	2.464	6.144	17.856	5.536
52 deg	2.618	6.528	18.972	5.882
90 deg	1.155	2.88	8.37	2.595
135 deg	0.847	2.112	6.138	1.903
Run VMG	0.616	1.536	4.464	1.384

Predom. Upwind 5-Band High: avg TWS 20 kts			
TWS	16	20	24
Beat VMG	5.536	20.928	5.536
52 deg	5.882	22.236	5.882
90 deg	2.595	9.81	2.595
135 deg	1.903	7.194	1.903
Run VMG	1.384	5.232	1.384

For **Predominant Reaching** courses when the wind speed can be described, the 5-Band **Low**, **Low-Medium**, **Medium**, **Medium-High** and **High** wind angle percentage formulations vary and are summarized here:

Predom. Reaching 5-Band Low: avg TWS 6.5 kts		
TWS	6	8
Beat VMG	6.184	1.816
52 deg	13.914	4.086
90 deg	29.374	8.626
135 deg	21.644	6.356
Run VMG	6.184	1.816

Predom. Reaching 5-Band Low-Med: avg TWS 9 kts				
TWS	6	8	10	12
Beat VMG	1.176	2.824	2.824	1.176
52 deg	2.646	6.354	6.354	2.646
90 deg	5.586	13.414	13.414	5.586
135 deg	4.116	9.884	9.884	4.116
Run VMG	1.176	2.824	2.824	1.176

Predom. Reaching 5-Band Med - avg TWS 12 kts					
TWS	8	10	12	14	16
Beat VMG	0.616	1.536	3.696	1.536	0.616
52 deg	1.386	3.456	8.316	3.456	1.386
90 deg	2.926	7.296	17.556	7.296	2.926
135 deg	2.156	5.376	12.936	5.376	2.156
Run VMG	0.616	1.536	3.696	1.536	0.616

Predom. Reaching 5-Band Med-High: avg TWS 16 kts				
TWS	12	14	16	20
Beat VMG	0.616	1.536	4.464	1.384
52 deg	1.386	3.456	10.044	3.114
90 deg	2.926	7.296	21.204	6.574
135 deg	2.156	5.376	15.624	4.844
Run VMG	0.616	1.536	4.464	1.384

Predom. Reaching 5-Band High: TWS 20 kts			
TWS	16	20	24
Beat VMG	1.384	5.232	1.384
52 deg	3.114	11.772	3.114
90 deg	6.574	24.852	6.574
135 deg	4.844	18.312	4.844
Run VMG	1.384	5.232	1.384

For **Predominant Downwind** courses when the wind speed can be described, the 5-Band **Low, Low-Medium, Medium, Medium-High** and **High** wind angle percentage formulations vary and are summarized here:

Predom. Downwind 5-Band Low: avg TWS 6.5 kts			
TWS	6	8	10
Beat VMG	6.184	1.816	0
52 deg	8.503	2.497	0
90 deg	11.595	3.405	0
135 deg	26.282	7.718	0
Run VMG	24.736	7.264	0

Predom. Downwind 5-Band Low-Med: avg TWS 9 kts				
TWS	6	8	10	12
Beat VMG	1.176	2.824	2.824	1.176
52 deg	1.617	3.883	3.883	1.617
90 deg	2.205	5.295	5.295	2.205
135 deg	4.998	12.002	12.002	4.998
Run VMG	4.704	11.296	11.296	4.704

Predom. Downwind 5-Band Medium: avg TWS 12 kts					
TWS	8	10	12	14	16
Beat VMG	0.616	1.536	3.696	1.536	0.616
52 deg	0.847	2.112	5.082	2.112	0.847
90 deg	1.155	2.88	6.93	2.88	1.155
135 deg	2.618	6.528	15.708	6.528	2.618
Run VMG	2.464	6.144	14.784	6.144	2.464

Predom. Downwind 5-Band Med-High: avg TWS 16 kts				
TWS	12	14	16	20
Beat VMG	0.616	1.536	4.464	1.384
52 deg	0.847	2.112	6.138	1.903
90 deg	1.155	2.88	8.37	2.595
135 deg	2.618	6.528	18.972	5.882
Run VMG	2.464	6.144	17.856	5.536

Predom. Downwind 5-Band High: avg TWS 20 kts			
TWS	16	20	24
Beat VMG	1.384	5.232	1.384
52 deg	1.903	7.194	1.903
90 deg	2.595	9.81	2.595
135 deg	5.882	22.236	5.882
Run VMG	5.536	20.928	5.536

5. For 2024 there are also several scoring models that are specific to races held around the USA: these include the **Bayview Mackinac Race**, the **Chicago to Mackinac Race**, the **Harvest Moon Regatta** and the **St Francis YC's Rolex Big Boat Series**. Here is a summary of these models:

Harvest Moon Regatta - single number Time on Time, avg TWS 13.6 kts								
Wind Spd (kts)	6	8	10	12	14	16	20	Sum
Optimum Beat	0.5%	1.0%	1.0%	0.5%	0.5%	0.0%	0.0%	21.3%
60° Reach	1.0%	2.0%	2.0%	4.0%	4.0%	1.0%	0.0%	18.8%
90° Reach	0.0%	0.0%	5.0%	6.5%	6.5%	8.0%	5.0%	20.0%
120° Reach	0.0%	0.0%	1.0%	5.5%	8.0%	8.0%	4.0%	18.8%
150° Reach	0.0%	0.0%	1.0%	3.0%	5.0%	5.0%	4.0%	18.8%
Optimum run	0.5%	0.5%	0.5%	0.5%	2.0%	2.0%	1.0%	21.3%
	5.0%	15.0%	30.0%	30.0%	15.0%	15.0%	5.0%	100.0%

Bayview Mac Shore Course - single number Time on Time, avg TWS 9.7 kts						
Wind Spd (kts)	6	8	10	12	16	Sum%
VMG Upwind	5.0	5.3	5.0	3.0	1.0	19.3
60° reach	5.0	5.3	5.0	3.0	1.0	19.3
90° reach	3.0	4.8	5.0	5.0	3.0	20.8
120° reach	2.0	4.1	5.0	5.5	3.5	20.1
VMG Down	5.0	5.6	5.0	3.5	1.5	20.6
	20.0	25.0	25.0	20.0	10.0	100.0

Courses used in the **Chicago to Mackinac Race**. Each model yields a single number Time on Time rating:

Chicago Mac Race Upwind - avg TWS 11.5 kts							
Wind Spd (kts)	6	8	10	12	16	20	TWA
Optimum Beat	1.8%	5.3%	10.5%	10.5%	5.1%	1.6%	34.7%
52° Reach	1.4%	4.4%	9.0%	9.3%	5.1%	1.8%	31.0%
90° Reach	0.8%	2.3%	4.5%	4.5%	2.4%	0.9%	15.3%
135° Reach	0.6%	1.8%	3.3%	3.3%	1.5%	0.5%	11.0%
Optimum run	0.5%	1.4%	2.7%	2.4%	0.9%	0.3%	8.1%
TWS	5.0%	15.0%	30.0%	30.0%	15.0%	5.0%	100%

Chicago Mac Race Offwind - avg TWS 11.5 kts							
Wind Spd (kts)	6	8	10	12	16	20	TWA
Optimum Beat	0.5%	1.4%	2.7%	2.4%	0.9%	0.3%	8.1%
52° Reach	0.6%	1.8%	3.3%	3.3%	1.5%	0.5%	11.0%
90° Reach	0.8%	2.3%	4.5%	4.5%	2.4%	0.9%	15.3%
135° Reach	1.4%	4.4%	9.0%	9.3%	5.1%	1.8%	31.0%
Optimum run	1.8%	5.3%	10.5%	10.5%	5.1%	1.6%	34.7%
TWS	5.0%	15.0%	30.0%	30.0%	15.0%	5.0%	100%

Chicago Mac Race All-Purpose - avg TWS 11.5 kts							
Wind Spd (kts)	6	8	10	12	16	20	TWA
Optimum Beat	1.5%	3.9%	6.9%	6.0%	2.4%	0.6%	21.3%
52° Reach	0.7%	2.4%	5.4%	6.0%	3.2%	1.1%	18.8%
90° Reach	0.7%	2.4%	5.4%	6.0%	3.9%	1.6%	20.0%
135° Reach	0.7%	2.4%	5.4%	6.0%	3.2%	1.1%	18.8%
Optimum run	1.5%	3.9%	6.9%	6.0%	2.4%	0.6%	21.3%
TWS	5.0%	15.0%	30.0%	30.0%	15.0%	5.0%	100%

Courses used in the **StFYC's Rolex Big Boat Series Bay Tour**. Each model yields a single number Time on Time rating:

Bay Tour 5-Band Low: avg TWS 6.5 kts			
TWS	6	8	TWA %
Beat VMG	38.19	11.22	49.41
52°	1.24	0.36	1.6
60°	0.00	0.00	0
75°	0.00	0.00	0
90°	0.00	0.00	0
110°	0.80	0.23	1.03
120°	2.14	0.63	2.77
135°	6.18	1.82	8
150°	6.88	2.02	8.9
Run VMG	21.87	6.42	28.29
TWS %	77.3	22.7	100

Bay Tour 5-Band Low/Med: avg TWS 9 kts					
TWS	6	8	10	12	TWA %
Beat VMG	7.26	17.44	17.44	7.26	49.41
52°	0.24	0.56	0.56	0.24	1.6
60°	0.00	0.00	0.00	0.00	0
75°	0.00	0.00	0.00	0.00	0
90°	0.00	0.00	0.00	0.00	0
110°	0.15	0.36	0.36	0.15	1.03
120°	0.41	0.98	0.98	0.41	2.77
135°	1.18	2.82	2.82	1.18	8
150°	1.31	3.14	3.14	1.31	8.9
Run VMG	4.16	9.99	9.99	4.16	28.29
TWS %	14.7	35.3	35.3	14.7	100

Bay Tour 5-Band Medium: avg TWS 12 kts						
TWS	8	10	12	14	16	TWA %
Beat VMG	3.80	9.49	22.83	9.49	3.80	49.41
52°	0.12	0.31	0.74	0.31	0.12	1.60
60°	0.00	0.00	0.00	0.00	0.00	0.00
75°	0.00	0.00	0.00	0.00	0.00	0.00
90°	0.00	0.00	0.00	0.00	0.00	0.00
110°	0.08	0.20	0.48	0.20	0.08	1.03
120°	0.21	0.53	1.28	0.53	0.21	2.77
135°	0.62	1.54	3.70	1.54	0.62	8.00
150°	0.69	1.71	4.11	1.71	0.69	8.90
Run VMG	2.18	5.43	13.07	5.43	2.18	28.29
TWS %	7.7	19.2	46.2	19.2	7.7	100

Bay Tour 5-Band Med/High: avg TWS 16 kts					
TWS	12	14	16	20	TWA %
Beat VMG	3.80	9.49	27.57	8.55	49.41
52°	0.12	0.31	0.89	0.28	1.60
60°	0.00	0.00	0.00	0.00	0.00
75°	0.00	0.00	0.00	0.00	0.00
90°	0.00	0.00	0.00	0.00	0.00
110°	0.08	0.20	0.57	0.18	1.03
120°	0.21	0.53	1.55	0.48	2.77
135°	0.62	1.54	4.46	1.38	8.00
150°	0.69	1.71	4.97	1.54	8.90
Run VMG	2.18	5.43	15.79	4.89	28.29
TWS %	7.7	19.2	55.8	17.3	100

Bay Tour 5-Band High: avg TWS 20 kts				
TWS	16	20	24	TWA %
Beat VMG	8.55	32.31	8.55	49.41
52°	0.28	1.05	0.28	1.6
60°	0.00	0.00	0.00	0
75°	0.00	0.00	0.00	0
90°	0.00	0.00	0.00	0
110°	0.18	0.67	0.18	1.03
120°	0.48	1.81	0.48	2.77
135°	1.38	5.23	1.38	8
150°	1.54	5.82	1.54	8.9
Run VMG	4.89	18.50	4.89	28.29
TWS %	17.3	65.4	17.3	100