# UPFFRONT.COM SMARTSAILING GUIDE

## STANDARD RIGGING MATERIALS

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# ROD/WIRE vs DYNEEMA® SK99

## Composite Rigging

At Upffront we are big believers in reducing rigging weight on even the smallest coastal cruising boats. Reduced rig weight means lower loads, higher safety factors, less healing, pitching and even less rolling at anchor!
On smaller boats we have found Gottifredi Maffioli's Ultrawire 99 to be an excellent product. This has an SK99 core and a very tight Dyneema® braid which makes it so stiff that it almost feels like wire! It makes excellent backstays, runners, checkstays and removable inner forestays, but on boats under 35ft it is also an option to replace wire / rod side shrouds.

## Stiffness is King

When changing out-standing rigging materials the most important criteria is cable stiffness (EA = Youngs Modulus (E) of the material by its area A and measured in Mega Newtons MNm²). The reason this is so important is that the mast in your boat has been designed to bend in a certain way but needs to be supported to avoid overbending, which may lead to failure. Masts are specifically designed to be supported by cables of a certain stiffness.

## Comparing Stiffness of Materials

It is not that easy! Manufacturers use different terminology for different materials, so when we first started working with Gottifredi Maffioli Ultrawire and needed to know which diameter to use in which application, we trawled through the data sheets and created the table on the next page. The three tables on the right show which Gottifredi Maffioli Ultrawire (UW) diameter we recommend for 1x19 wire, Dyform and Nitronic 50 Rod, but you also might find the tables useful for wire/Dyform comparisons plus appropriate thread sizes at each diameter.

We hope you find these tables useful. Any questions, please contact us at [support@upffront.com](mailto:support@upffront.com)

| Dia (mm) | UW 99 | UNF | Metric |
|---|---|---|---|
| 3 | 7 | 1/4" | M6 |
| 4 | 7 | 1/4" | M6 |
| 5 | 8 | 5/16" | M8 |
| 6 | 8 | 3/8" | M10 |
| 7 | 8 | 3/8" | M10 |
| 8 | 10 | 7/16" | M12 |
| 10 | N/A | 5/8" | M16 |
| 11 | N/A | 5/8" | M16 |

| Dia (mm) | UW 99 | UNF | Metric |
|---|---|---|---|
| 3 | 7 | 1/4" | M6 |
| 4 | 7 | 1/4" | M6 |
| 5 | 8 | 3/8" | M10 |
| 6 | 8 | 3/8" | M10 |
| 7 | 10 | 7/16" | M12 |
| 8 | 10 | 1/2" | M14 |
| 10 | N/A | 3/4" | M20 |

| Dash | Dia (mm) | UW 99 | UNF | Metric |
|---|---|---|---|---|
| 4 | 4,4 | 8 | 3/8" | M10 |
| 6 | 5,0 | 8 | 3/8" | M10 |
| 8 | 5,7 | 8 | 7/16" | M12 |
| 10 | 6,4 | 10 | 7/16" | M12 |
| 12 | 7,1 | 10 | 1/2" | M14 |
| 15 | 7,5 | N/A | 1/2" | M14 |
| 17 | 8,4 | N/A | 5/8" | M16 |
| 22 | 9,5 | N/A | 3/4" | M20 |

# COMPARISON OF ROD, DYFORM AND 1X19 WIRE WITH GOTTIFREDI MAFFIOLI ULTRAWIRE 99

| Nitronic 50 | | | | | | Dyform | | | | | 1x19 Wire | | | | | Gottifredi Maffioli UW99 | | | | Thread UNF | | | Thread Metric | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dash | EA (MN) | Diameter (mm) | Min BL (kg) | MWL (kg) | Stretch (mm/mm/1000kg) | EA (MN) | Diameter (mm) | Min BL (kg) | MWL (kg) | Stretch (mm/mm/1000kg) | EA (MN) | Diameter (mm) | Min BL (kg) | MWL (kg) | Stretch (mm/mm/1000kg) | EA (MN) | Diameter (mm) | Min BL (kg) | MWL (kg) | Thread | Min BL (kg) | MWL (kg) | Thread | Min BL (kg) | MWL (kg) |
| | | | | | | | | | | | | | | | | 0,5 | 6,0 | 4700 | 940 | | | | | | |
| | | | | | | | | | | | 0,8 | 3,0 | 720 | 288 | 0,012872 | | | | | | | | | | |
| | | | | | | 1,0 | 3,0 | 1000 | 400 | 0,010085 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | 1,3 | 4,0 | 1280 | 512 | 0,007378 | | | | | 1/4" | 1300 | 520 | M6 | 1300 | 520 |
| | | | | | | 1,7 | 4,0 | 1780 | 712 | 0,005673 | | | | | | 1,7 | 7,0 | 6500 | 1300 | | | | | | |
| | | | | | | | | | | | 2,1 | 5,0 | 2000 | 800 | 0,004627 | | | | | 5/16" | 2200 | 880 | M8 | 2200 | 880 |
| 4,0 | 2,5 | 4,4 | 2130 | 852 | 0,00387 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | 2,6 | 5,0 | 2440 | 976 | 0,003728 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | 3,0 | 6,0 | 2880 | 1152 | 0,003224 | | | | | | | | | | |
| 6,0 | 3,4 | 5,0 | 2860 | 1144 | 0,00292 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | 3,8 | 6,0 | 3550 | 1420 | 0,002589 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8,0 | 4,3 | 5,7 | 3720 | 1488 | 0,00226 | | | | | | 4,3 | 7,0 | 3550 | 1420 | 0,002274 | | | | | 3/8" | 3500 | 1400 | M10 | 3500 | 1400 |
| | | | | | | | | | | | | | | | | 4,6 | 8,0 | 8450 | 1690 | | | | | | |
| | | | | | | 5,2 | 7,0 | 4910 | 1964 | 0,001902 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10,0 | 5,4 | 6,4 | 4670 | 1868 | 0,00183 | | | | | | 5,4 | 8,0 | 4640 | 1856 | 0,001833 | | | | | 7/16" | 4500 | 1800 | M12 | 5000 | 2000 |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | 6,7 | 8,0 | 6150 | 2460 | 0,001456 | | | | | | | | | | | | | | | |
| 12,0 | 6,8 | 7,1 | 5670 | 2268 | 0,00145 | | | | | | | | | | | 6,9 | 10,0 | 13100 | 2620 | | | | | | |
| 15,0 | 7,5 | 7,5 | 6460 | 2584 | 0,00131 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | 1/2" | 6000 | 2400 | M14 | 7000 | 2800 |
| | | | | | | | | | | | 8,5 | 10,0 | 7250 | 2900 | 0,001157 | | | | | | | | | | |
| 17,0 | 9,3 | 8,4 | 7940 | 3176 | 0,00105 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | 10,5 | 10,0 | 9770 | 3908 | 0,000932 | 10,5 | 11,0 | 8770 | 3508 | 0,000936 | | | | | 5/8" | 9000 | 3600 | M16 | 9000 | 3600 |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22,0 | 12,1 | 9,5 | 10200 | 4080 | 0,00081 | | | | | | 12,1 | 12,0 | 10400 | 4160 | 0,000806 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | 15,2 | 12,0 | 14400 | 5760 | 0,000647 | | | | | | | | | | | | | | | |
| 30,0 | 16,4 | 11,1 | 13600 | 5440 | 0,0006 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | 17,3 | 14,0 | 14180 | 5672 | 0,000566 | | | | | 3/4" | 14000 | 5600 | M20 | 14000 | 5600 |
| | | | | | | 20,6 | 14,0 | 19300 | 7720 | 0,000476 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | 21,3 | 16,0 | 18560 | 7424 | 0,00046 | | | | | | | | | | |

Assumed primary driver = stiffness / EA  Secondary check = SWL  Averaged Thread BL's - they do vary by manufacturer  Assumed x2.5 FOS on wire/rod and x5.0 FOS on UW99

Lines in the table above have been ordered by cable stiffness (EA), which is the governing factor for specifying standing rigging. Changing material, you need to go for the same, or greater, stiffness. For example, 8mm UW99 can be used to replace 7mm wire, 6mm Dyform or a Dash 8 Rod