

## WATER REPELLENCY OF SYNTHETIC ROPES BY A PTFE FREE COATING

By HvdC, LH, KvG

### SUMMARY

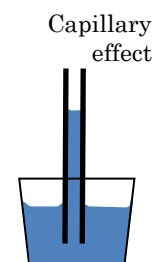
A comparison is made to study the effect of coatings on the water repellency of PA, PES and HMPE ropes. To improve the water repellency **ICO-REPEL 20** is advised to be used as a single coating and/or in combination with our **ICO-THANE's**.

**ICO-REPEL 20** is completely PTFE free and replaces **ICO-REPEL** which contained a PTFE, based on C6 technology. It can be used as a single coating on PA, PES and HMPE.

For PA and PES ropes it can also be combined with **ICO-THANE 10**. On HMPE ropes the combination with **ICO-THANE 10** performs best in these tests, when a small amount of **LAGO 45** is added to the recipe.

### BACKGROUND

Generally wettability will vary from fibre to fibre and initially can be influenced by the spin finish. However, a standard spin finish will wash out. To verify the effect of a coating on the capillary effect, a simple test was conducted where the coated rope was immersed in water with a blue colorant. By measuring the height a relative comparison can be made between the different systems, see also sketch.



### COATINGS TESTED

Three different polyurethanes were tested in combination with a PTFE free coating, to determine the relative water repellency:

**ICO-THANE 10** is a medium-soft, flexible, light-fast polyester-based aqueous aliphatic polyurethane dispersion compound. Applied on a rope or twine it will give a smooth touch.

**ICO-THANE 32** is a medium, soft flexible, light-fast polyester-based aqueous aliphatic polyurethane dispersion compound.

**ICO-REPEL 20** is a medium soft, flexible, acrylic, methacrylic esters, wax based dispersion with excellent water-repellence characteristics. It was especially developed to improve the water repellence of a strand, braid, rope or belt.

**LAGO 45** is a synthetic polymer based anionic polyurethane, especially developed for the impregnation and the textile finishes of ropes, twines and fishing nets made from HMPE fibres.

### RESULTS

All the tests described here, were conducted on small diameter braided ropes, with a standard construction. Please note that the capillarity effect is also influenced by the spin finish on the fibre and the rope construction. The results given here are indicative and for critical use, the actual performance should be verified in a representative design.

In the tests, the best results were obtained, when the coated ropes were cured after drying at a temperature of 80° - 90°C. When the coated rope is dried at room temperature, then at least two weeks should be allowed before the coated rope reaches its maximum water repellency.

Coating	PA				PES			
	dilution	coating pick-up	uptake cm	WR	dilution	coating pick-up	uptake cm	WR
Uncoated			17	0%			10	0%
<b>ICO-THANE 10</b>	(1:2)	4-6%	10	41%	(1:2)	3-5%	9	10%
<b>ICO-THANE 32</b>	(1:2)	4-6%	16	6%	(1:2)	3-5%	9,5	5%
<b>ICO-REPEL 20</b>	(1:2)	7-8%	0,2	99%	(1:2)	4-6%	0,2	98%
<b>ICO-THANE 10 90% + 10% ICO-REPEL</b>	(1:2)	4-6%	0,3	99%	(1:2)	3-4%	0,2	98%

**ICO-REPEL 20** was applied in a dilution of 1 to 2 with water, giving 7-8% of dry coating weight on the rope.

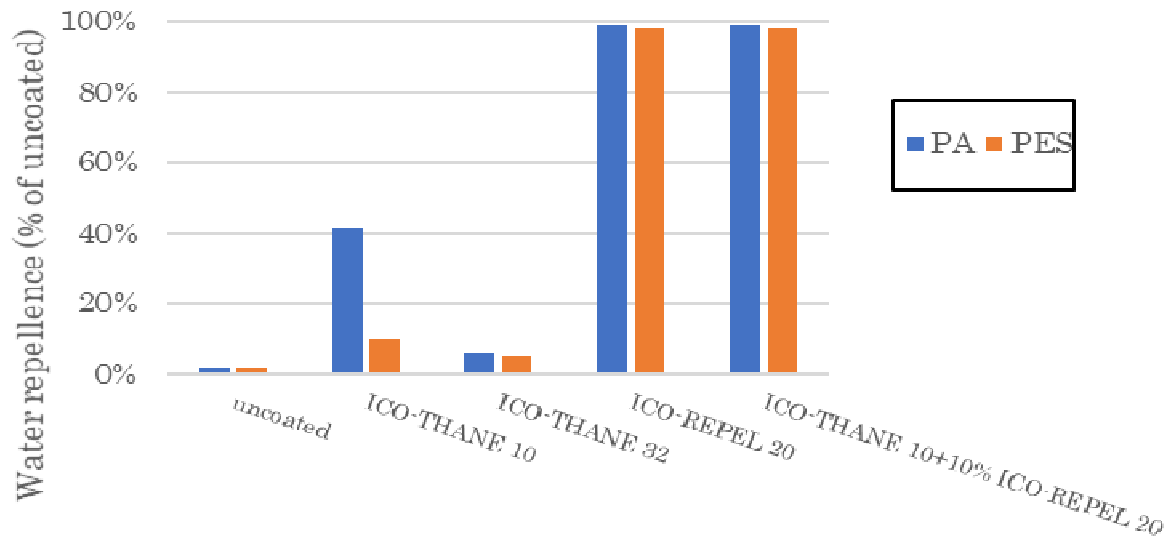
Also in combination with the **ICO-THANE 10**, the water repellency of **ICO-REPEL 20** is excellent on polyamide and polyester braided ropes. In the tests done here only 10% is needed to improve the water repellency of the **ICO-THANE 10**. For this recipe also a dilution of 1:2 with water is used, adding 4-6% of coating weight on the rope after drying. It was used as reference.

Coating	HMPE 1				HMPE 2			
	dilution	pick-up	uptake cm	WR	dilution	pick-up	uptake cm	WR
uncoated			25	0%			12	0%
<b>ICO-THANE 10</b>	(1:2)	8-10%	20	20%	(1:2)	8-10%	11	8%
<b>ICO-THANE 32</b>	(1:2)	8-10%	25	0%	(1:2)	8-10%	8,5	29%
<b>ICO-REPEL 20</b>	(1:1)	11-14%	6	76%	(1:1)	11-14%	0,1	99%
<b>ICO-THANE 10 80% +20% ICO-REPEL 20</b>	(1:2)	8-10%	10,5	58%	(1:2)	8-10%	7,5	70%
<b>ICO-THANE 10 70% +20% ICO-REPEL 20 + 10% LAGO 45</b>	(1:2)	8-10%	1,7	93%	(1:2)	8-10%	0,5	98%

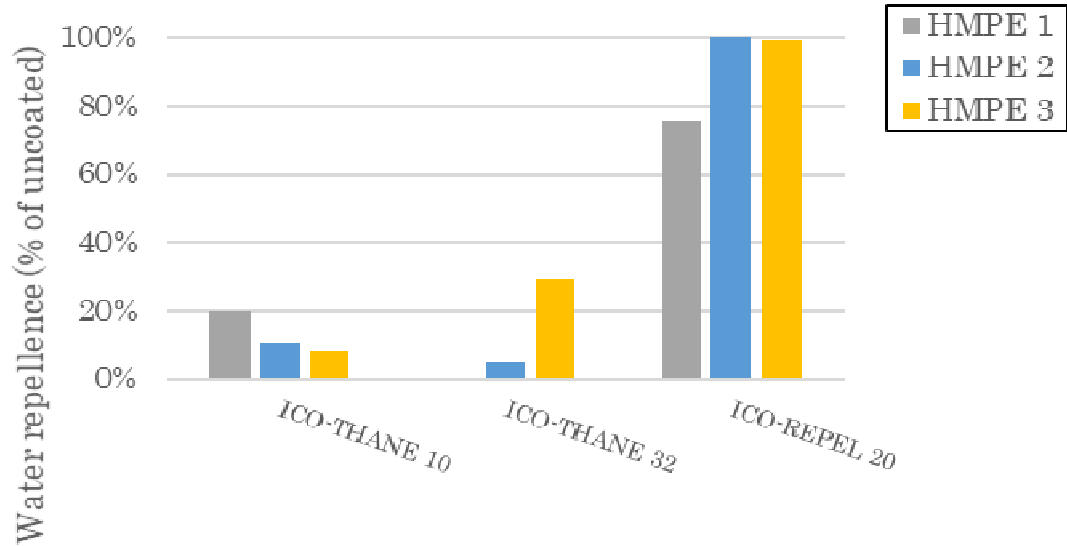
For HMPE's a slightly higher concentration of **ICO-REPEL 20** is needed to get a good water repellency. Here a dilution of 1:1 with water is used, adding 11-14% of dry coating weight on the rope.

In combination with **ICO-THANE 10** the best result is achieved when 20% **ICO-REPEL 20** and 10% **LAGO 45** are added to the recipe before dilution with water (1:2). See also graphs.

### Water repellence PA and PES



### Water repellence HMPE



**CONCLUSIONS**

**ICO-REPEL 20** is a newly developed PTFE-free coating, which renders PA, PES or HMPE ropes an excellent water-repellency

PA and PES ropes become highly water repellent, when 10% **ICO-REPEL 20** is added to 90% **ICO-THANE 10**

HMPE ropes become highly water repellent when 20% **ICO-REPEL 20** and 10% **LAGO 45** is added to 70% **ICO-THANE 10**

For maximum performance it is recommended that the coated ropes are dried and cured at 80 - 90°C.