

## Comparison of carpet fibers for COLARIS digital inkjet printing

	Nylon (PA)	Cationic Dyeable Polyester (CDPET)	Polyester (PET, PES)
<b>Specific weight</b>	1.12 g/ccm	1.38 g/ccm	1.38 g/ccm
<b>Mechanical strength</b>	highest wear resistance best resilience	moderate wear resilience moderate resilience	moderate wear resilience moderate resilience
<b>Anti-static properties</b>	moderate (low)	excellent	moderate (low)
<b>Price of yarn</b>	high (about \$ 4.00/kg for BCF)	about 10-15% higher in comparison to PET (about \$ 2.30/kg for BCF)	moderate (about \$ 2.00/kg for BCF)
<b>Drying speed</b>	moderate	fast	fast
<b>Moisture absorbance</b>	moderate	very good	moderate
<b>Recycling</b>	difficult	can be recycled like normal polyester	can be recycled
<b>Staining</b>	staining by acids like wine, coke, food, ...	does not stain easily	does not stain easily
<b>Dye class</b>	acid and reactive dyes	cationic dyes (or disperse dyes with restriction)	disperse dyes
<b>Dye (ink) consumption</b>	100%	To achieve the same shade in comparison to acid ink on PA only 50 - 70% is needed. This results in lower ink cost and also in higher production speed.	100%
<b>Penetration</b>	To get good penetration pre-washing is recommended.	Penetration is much easier in comparison to PA and normal polyester. Pre-washing will not be needed on all qualities	Penetration is difficult. Pre-washing does not really help. Blind ink consumption is high.
<b>Brilliancy</b>	limited	very good; most intense colors	good
<b>Dye fixation</b>	5 min at saturated steam at 100°C > no smoke development and no oil residues from fiber > back coated carpet can be printed	2-3 min at saturated steam at 100°C > no smoke development and no oil residues from fiber > back coated carpet can be printed	drying and hot air fixation at 180°C for about 3-5 min. > polyester primary backing must be used > smoke development and oily residues in dryer > printing on coated carpet is critical because of high temperature
<b>Energy consumption for dye fixation</b>	100%	about 80% compared to Nylon	about 150% compared to Nylon
<b>Washing after dye fixation</b>	cold water washing with vacuum extraction	cold water washing with vacuum extraction	(cold rinsing) > reductive washing at 70°C > cold rinsing waste water treatment might be needed
<b>Water consumption</b>	about 10 l/kg	about 3 l/kg	about 30 l/kg
<b>Light fastness</b>	5-6 on dark shades; 4-5 on light shades	5-6 on dark shades; 4-5 on light shades	5-6 on dark shades; 4-5 on light shades
<b>Water fastness</b>	4-5	5	4-5
<b>Chlorine fastness</b>	1-2	3-4	2-3
<b>Crock fastness</b>	very good	very good	good
<b>Application</b>	contract carpet; carpet tiles	rugs, mats, semi-contract applications	rugs
<b>Availability of yarn</b>	widely available	available in Asia and especially in China	widely available
<b>Line layout</b>	Nylon and CDPET can use the same process and print line layout. This enables also to use mixed configuration: 5 acid colors for nylon/wool + 5 cationic colors for CDPET + Acrylic	Nylon and CDPET can use the same process and print line layout. This enables also to use mixed configuration: 5 acid colors for nylon/wool + 5 cationic colors for CDPET + Acrylic	Polyester needs a special line layout which works for PET only.
<b>General comment</b>	Nylon is widely used for dyed and printed carpet. Especially where high wear resistance is not used CDPET is a better alternative.	CDPET has a high potential to take over market share from printed nylon and polyester because of its low environmental impact during printing and dyeing and low dye consumption for brilliant shades. It also will take over market shares from woven PP carpets because of its competitive price.	PET is a low cost fiber but needs a lot of energy for dye fixation and a lot of water for washing off unfixed dye. Line layout is different to a print line for PA and CDPET.