

# SIGRAFLEX® nuclear grade yarns

## High-purity graphite yarns meeting specific requirements for high-end braided packings for nuclear power plants

Materials used in the nuclear industry need to guarantee extreme safety, reliability and longevity. SGL Carbon's SIGRAFLEX nuclear grade graphite yarns are characterized by their very high degree of purity and outstanding temperature and oxidation resistance. Depending on the application, SGL Carbon offers both graphite rayon as well as reinforced flexible graphite yarns.

The continuous filament rayon yarns with 1000 filaments per ply are coated with a high purity colloidal solution of graphite suitable for nuclear applications. The rayon yarns are certifiable to General Electric's specifications D50YP12, NEDC-31735P, and MIL-P-24583B.

### Material data of SIGRAFLEX® nuclear grade continuous filament graphite rayon yarns

Typical values of yarn grade<sup>1)</sup>

Properties	Test methods	Units	GRC06S08NU05	GRC14S17NU05
			GRC06Z08NU05	GRC14Z17NU05
Base material			Rayon	Rayon
Coating			Graphite	Graphite
Coating content	ASTM D1907	%	5	5
Carbon content	ASTM D5373	%	99.8	99.8
Ash content	ASTM C561	%	0.1	0.1
Moisture content	ASTM C562	%	0.3	0.3
Total sulfur content	ASTM D4239	ppm	< 200	< 200
Total nitrate content	ASTM D4327	ppm	< 30	< 30
Total halogen content	ASTM D4208 / D4327	ppm	< 250	< 250
Individual embrittling metal <sup>2)</sup>	ICP-OES <sup>3)</sup>	ppm	< 10	< 10
Total embrittling metals <sup>2)</sup>	ICP-OES <sup>3)</sup>	ppm	< 25	< 25
Density	ASTM D3800	g/cm <sup>3</sup>	1.43	1.46
Linear weight	ASTM D1907	g/m	0.63	1.43
Break strength	ASTM D2256	kg [lb]	7 [16]	14 [30]
Twist	ASTM D1423	TPI [TPM]	1.8 [71]	1.4 [55]
Available twists			S, Z	S, Z
# of plies			8	17

<sup>1)</sup> Values are non-binding and nominal unless stated otherwise. They may be subject to change and do not constitute an actual specification value.

<sup>2)</sup> Embrittling metals are Ag, As, Bi, Cd, Ga, Hg, In, Pb, Sb, Sn, Zn.

<sup>3)</sup> Ion-coupled plasma optical emission spectroscopy.

## Material data of SIGRAFLEX® nuclear grade flexible graphite yarns

Typical values of yarn grade<sup>1)</sup>

Properties	Test methods	Units	GFK3001UC00-Z + Inconel®	GFK3001UC00-N + Inconel®
			SIGRAFLEX Z foil	SIGRAFLEX N foil
Base material			Inconel 601	Inconel 601
Reinforcement <sup>2)</sup>				
Carbon content <sup>3)</sup>	ASTM D5373	%	≥ 99.85 <sup>3)</sup>	≥ 99.5 <sup>3)</sup>
Ash content <sup>3)</sup>	ASTM C561	%	≤ 0.15 <sup>3)</sup>	≤ 0.5 <sup>3)</sup>
Moisture content	ASTM C562	%	< 1 <sup>3)</sup>	< 0.5 <sup>3)</sup>
Total sulfur content	ASTM D4239	ppm	< 300	< 300
Total nitrate content	ASTM D4327	ppm	< 30	< 25
Total nitrite content	ASTM D4327	ppm	< 5	< 5
Total halogen content	ASTM D4208/D4327	ppm	≤ 40	≤ 30
Individual embrittling metal content <sup>3), 4)</sup>	ICP-OES <sup>5)</sup>	ppm	< 10	< 75
Total embrittling metals content <sup>3), 4)</sup>	ICP-OES <sup>5)</sup>	ppm	< 25	< 150
Density <sup>3)</sup>	ASTM D3800	g/cm <sup>3</sup>	1.00	1.12
Linear weight <sup>3)</sup>	ASTM D1907	g/m	3	3
Break strength	ASTM D2256	kg [lb]	8 [18]	8 [18]

<sup>1)</sup> Values are non-binding and nominal unless stated otherwise. They may be subject to change and do not constitute an actual specification value.

<sup>2)</sup> Reinforcement diameter: 100 µm, content: 35 %

<sup>3)</sup> Property of graphite precursor material.

<sup>4)</sup> Embrittling metals are Ag, As, Bi, Cd, Ga, Hg, In, Pb, Sb, Sn, Zn.

<sup>5)</sup> Ion-coupled plasma optical emission spectroscopy.

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