

3

“

”

2017

2006-

2020

2025

“

”

2017

15% 20% 30 50

5 /

6 31

5 (2016 - 2020)

2016 6 12

39 2017 6 19

2016

2017

2017 20

70-140 13.149

1 1

(1.1)

1-2

4

5

5 1

1

“ 1-2 ”

2

2

2

1.

1.1

/

-

-

45%

55%

2015

8%

2015

30%

1.2

- -

10%

80%

20%

1.3

-

-

-

-

80%

20

95%

-

-

1.4

5

5

3

2015

$\geq 30\text{GPa}\cdot$			
1000MPa	≥ 35	1200MPa	≥ 30
1500MPa	≥ 20	1000-1500MPa	
			8-21%

2.2

		$\geq 1330\text{MPa}$	
390-450HB			20%
5			$\geq 1380\text{MPa}$
$\geq 12\%$	-20	$\geq 60\text{MPa}\cdot\text{m}^{1/2}$	
		3	

3

2.3

450MPa
-40 U 40
390MPa
30
500MPa
25
350
3

460MPa 690MPa
 ≤ 0.85 $\geq 18\%$

600 3 2/3 70

3

2.5

100

420MPa

690MPa

420MPa -40 $\geq 70\%$ ≤ 75
 ≤ 0.85 2000MPa 8
1
690MPa ≤ 0.85
12.9
100 0.9
[H]_c ≥ 3 ppm
100
3.
3.1

/

Φ1422
31.8 21.4 555MPa
-40 ≥245 450
/ -40
0.076 /
2

3.2
-196

5-60 Ni
9Ni
9Ni 20% “ - ” “ -

”

200MPa 350MPa

180

, Ni

3.3

400 500HB

90%

1.5

65

3.4

700

700

5

650 10 $\geq 100\text{MPa}$

675 10

$\geq 100\text{MPa}$ 700 10

$\geq 100\text{MPa}$

3.5

100mm

Cr-Mo

$\Phi 2000 \times 700$

T/2 RTNDT ≤ -60 350

$\geq 600\text{MPa}$ 4000 $\times 60$

T/4 Rel $\geq 485\text{MPa}$

Rm 655-795MPa 150 $R_{p0.2} \geq 440\text{MPa}$

$R_m \geq 620 \text{MPa}$ -45 $K_{V8} \geq 54$
 ≥ 30 150-200 Cr-Mo T/2

4. /

4.1 /

/

/

Au Ag $\geq 6N$ Pt Pd Ru Ir Re Co Ni Ti W
 Mo Ta $\geq 5N$ C N O H S

GDMS

LA-ICP-MS

40-70

1-2 10^{-9} - 10^{-11}

/ ≥ 5 ≥ 150

$\leq 0.5\%$ 1 30

Au Ag Pt Pd Ru Ir Co Ni 1 5

/

4.2

/

/

/

/

TFT()

Pt	Ru	Ir	$\geq 5N$	40-70
≥ 150			$\geq 99.5\%$	$\leq 50\text{ppm}()$
			/	$\leq 100\text{ppm}()$
)		≤ 80	
	$\leq 5\%$		≥ 200	
$\geq 4N$		$\leq 5\text{ppm}()$		≤ 150
		≥ 2.5		± 0.1

4.3

/ 1-2 /
 / $\Phi \geq 1000$
 ≥ 1200 ≥ 18.5 / ≤ 50
 ≥ 800 ≥ 800
 0.1 ± 2 $\geq 6N$
 ≥ 600 $\geq 5N$
 $\text{Na+K+Li} \leq 1\text{ppm}$ () $\geq 99.5\%$
 ≤ 20 $\geq 11N$
 ≥ 300 Si $\geq 4N$ $\geq 90\%$
 $\leq \pm 5\%$
 1500 /
 4.4 /
 :
 / /
 : 100-1200 /
 $35-300\text{MPa}$ < 40 > 21 /
 . . 20-38 15-25

15-5	2-11	74	5%
C O	<300ppm(>90%) 0.01-0.03	1.2

0.01-0.05	0.005-0.008
48	6 ≤30 .

2000 / 8

5.

5.1 3D /

3D

3D

≤53

≥40%

≥70%,

D₅₀≤45

D₅₀≤35

≥90%

≥50%

≤30

1000 /

5.2

, / /
20% 50%

BET()>3.5 / <0.4%
d

		90%		8-10
5.3			/	/
				≥850
≥800		≥900MPa		≥15%
+/-200MPa	≥100		≥60	/
	200		≥500MPa	≥10%
	150		≥600MPa	≥10%
	100ppm()		L×1500×
0.6-6		≥1000MPa		≥10%
		≥99%		±0.3%
≥99%		≤30		≥500MPa
			3000	/

6. / /

6.1 /

/

/ / /

/

630 / 2 : $\geq 70\text{MPa}$

D_{50} 80~95 $\leq 200\text{ppm}$ (

) $\geq 60\%$ HRC ≥ 53

≥ 500 ≥ 0.5

2

≤ 1 / . 10 $\leq 10^{-7}$

/ . $\geq 80\%$ 700 ≥ 1.8 /

300 / 10000

/

$\sigma_{0.005} \geq 950\text{ MPa}$ $\geq 135 \times 10^3\text{ MPa}$ \geq

8% IACS() 100 /100 $\leq 2\%$
 $3.5\% \text{Cl}^- + 0.5\% \text{S}^{2-}$ ≤ 0.015 / ,
 $\pm 2.5\%$ ≤ 0.10 ≤ 0.05
 1 /
 6.2 /
 /

$R_m \geq 900 \text{MPa}$ $A \geq 10\%$ 400
 $R_m \geq 580 \text{MPa}$ $A \geq 12\%$
 $R_m \geq 1150 \text{MPa}$
 $A \geq 10\%$ T L U Z
 90-3000 1.6-16
 ≥ 4 ≤ 1.5 /
 $\leq 2^\circ$ 4.5 $R_z \leq 80$
 2000
 ≤ 4.5
 $R_z \leq 25$ 200

1

6.3

/

3D

$R_m \geq 425 \text{MPa}$

$R_{p0.2} \geq 350 \text{MPa}$

$A \geq 7\%$

EB

exfoliation B

A

B C D

,

≥ 4

≤ 0.5

$R_m \geq 420 \text{MPa}$

$R_{p0.2} \geq 300 \text{MPa}$

$A \geq 7\%$

≥ 3

≥ 6

$\leq 5\%$

≤ 0.5

≤ 0.2

≥ 14

1

3

3D

6.4

/

/

-

-

/

/

/

2500

20%

50-80 /

100-150 /

15%

2-3 /

7.

7.1

-

-

;

95%

RON \geq 95 -

\geq 500 / \geq 27% 10

/ \leq 1.4

20vol%

RON 0.5

10 / , <18% RON 20%

-

RON 92 300

95%

20

2 2 4

7.2

/

15%

30%

10

2

2

4

7.3

FT

API API +

α-

α-

F-T

PAO

GF-5

GF-6

GF-6

EGR

CI-4

2%-4%

API

≥122 API +

≥130

α-

500 /

		-1	13%	C ₈	C ₁₀	C ₁₂	
35%	α-		92%	α-		PAO	
		<-60		>130	1	PAO	
		GF-5		GF-6		API	
	CI-4		API				
15			3			2	
	2						
7.4							
						GF-5	
						<-20	
2-10	/		>122			GF-5	
	API					,	API
	1						
40%			5				3
		1					

8.

8.1

$\geq 8\text{kg}/100\text{kg}$

$\geq 95\%$

205/55 R16

(GB/T2978-2014)

$\geq 8\text{kg}/100\text{kg}$

$\geq 96\%$

12R22.5

(GB/T2977-2008 GB/T9770-2013)

$\text{Mn} \geq 20$

$\text{Mw}/\text{Mn} = 2.5-3.5$

(225/40 R18)

B

$\text{Mn} \geq 8$

$\text{Mw}/\text{Mn} = 1.5-2.6$

-40°C

15

5

8.2

				TPV
				100
/	1000%		$\leq 10\%$	800%
	1		$\leq 10\%$	2-3
			$\geq 12\text{MPa}$	≤ 0.15
	/1.61			

(GB/T2978-2014)

TPV	A	50-80		5-15 MPa
200	1000s^{-1}	$\leq 300\text{Pa}\cdot\text{s}$		
			15	5
8.3				
/				

	3	/
		/
1,2-		$\geq 55\%$

3-10

$M_w/M_n \leq 1.6$

≤ 380

/

$M_w \geq 100$

$M_w/M_n \geq 3.5$

$M_z/M_w \geq 2.0$

$\geq 36\%$

$\geq 90\%$

$\geq 90\%$

≤ 1800

/

≤ 110

/

$\geq 96\%$

$M_w/M_n \leq 2.3$

≥ 2.0

225/55R16

B

≥ 600

20

5

9.

9.1

/

			$\geq 90\%$	/	
S/C	$\geq 10^4$	$\geq 80\%$		$\geq 98\%$	
	$\geq 98\%$	500	/		(S)-
ee	$\geq 95\%$		$\geq 99\%$		$\geq 90\%$
		1000	/	2,6-	
		≥ 2		$\geq 90\%$	
	$\geq 95\%$		$\geq 98\%$	100	/
			$\geq 95\%$	$\geq 65\%$	
100	/			$\geq 98\%$	
	$\geq 80\%$			15	

9.2

-

			$\geq 95\%$	$\geq 95\%$
				≥ 4000
100 /				
$\geq 90\%$	$\geq 97\%$			100
$\geq 99.9\%$				10
/				
$\leq 0.6\%$		100 /		
			≥ 450 /	
	≥ 4000		CO_2	
20%		10		
9.3				

- -

M-5G

167

14

4
 / S/C $\geq 10^4$
 ≤ 4 M-5G
 5%-10% 167
 5% 20%
 $\geq 35\%$ 14
 5% 90%
 15
 9.4

α - N- -L-
 50 /
 50% $\geq 45\%$ 50 / α -
 50%,
 $\geq 75\%$ 30 / N, N- -L- N-
 -L- NAC NAC $\geq 85\%$
 $\geq 45\%$ 50 / DL-

$\geq 85\%$ 500 /
 10
 10.
 10.1
 TLCP
 PI
 PI
 PI
 1313
 13T 5000 /
 TLCP PI
 3.8GPa $\geq 140\text{GPa}$
 ≥ 240 N-
 $\geq 96\text{MPa}$ $\geq 3.6\text{GPa}$
 ≥ 250 1313 $\geq 40\text{MPa}$
 $\geq 4.5\text{kJ/m}^2$ 13T $\geq 70\text{MPa}$
 4.5kJ/m^2
 $\geq 30\text{MPa}$ $\geq 70\text{MPa}$
 ≥ 130 $\geq 90\%$ TLCP

≥ 300 L ≥ 86 b ≤ 10 20
 5
 10.2
 POSS
 POSS POSS
 Si-O-Si POSS
 POSS $\geq 99\%$
 ≥ 550 POSS
 $\geq 95\%$ Tg
 ≥ 125 POSS $\geq 95\%$
 ≤ 3.0 1MHz 300 POSS
 POSS 50
 $\geq 99\%$ 50 /
 Tg ≥ 160 1.25-1.35
 $\geq 95\%$ PTFE PPVE
 $\geq 99\%$ PTFE 300-310
 10.3

7

5

0.5

ppm ppb

7N

6

100

4.2/

80%

11.

11.1

95% - 50%
≥60% 60
90%;
≥100 /
≥10000 / ≥10000 /
15%
20% 20
5
11.2

≥95%

≥95%

0.4

≥95% H11

≥120 / .

≥85%

0.4

≥70% F9

≥110 /

≥5000 /

10

4

11.3

PBO

/

/

PBO

PBO

550

35%

≥3000 / 40 /

≥3.00 / ,

≥1.5%

BMS8-124

1.83-48

≥2.48

10

4

11.4

/

$\leq 0.27\%$ $\text{tg}\delta$ 100 $\leq 0.25\%$ ≥ 460
 $\leq 20\%$ 150 168
 ≥ 8.0 / ≥ 11 /
 ≥ 30 /
 ≤ 20 / ≥ 24 /10
0.08 0.1 ≤ 5 0.1
0 / ≤ 6.0 .
 ≥ 5000 /
 ≥ 100 / 10 4
11.5

0.12
 270 , ≥ 1000 34%
 0.08 ≥ 25
 / 300 $\leq 0.3\%$ ≥ 25 /
 220 ≥ 1000 /
 10 4
 12.
 12.1

-

				$\geq 10,000$	/
					/
≤ 100			/	≤ 0.3	pH ≥ 9
	$\geq 80\%$				
		50%		COD	SS
		65%			20
		8			
12.2					
			/		
-					/
	APEO	≤ 100	/	$\leq 2\%$	
80%				85	≤ 20
/	VOC	≤ 100	/	Cr ≤ 50	/ Cr $^{6+} \leq 3$
/	Al	Zr	≤ 50	/	4

3

1000 /

20

8

12.3

/

:

/

-

/

/

$\leq 2\%$

$\geq 40\%$

$\geq 50\%$

40-50

/

1000 /
 10 /
 500 / 20
 8
 13.
 13.1

;

5
 ≥1000 / 90%
 90% LD₅₀≥2000 /
 ≥99% ≥98% ≥95%
 10 5 ,
 1

13.2

,

5
 ≥ 1000 /

$\geq 98.5\%$ 1%
 ≥ 5 / $\geq 90\%$
 10^{-3} / 90%

$\geq 90\%$ ≥ 1.7 /
10

5 1

14.

14.1

-

	UL94 V0		$\geq 3.5\text{cN/dtex}$	
	$\geq 32\%$		≤ 2	≤ 100
UL94 V0			$\geq 2.5\text{cN/dtex}$	
$\geq 28\%$		≤ 3		≤ 100
			$\geq 2.5\text{cN/dtex}$	
$\geq 28\%$		≤ 5		≤ 150
		$> 28\%$	50	
2020			50	10
		5		
14.2				

	CV $\leq 1.2\%$	$\geq 3.5\text{cN/dtex}$	
	≥ 180	≥ 0.22 /	
		≥ 135	
≥ 160		≥ 0.22 /	≥ 0.24
/	10		5
14.3			

			$\geq 60\%$
	$\geq 270^\circ$		≥ 4
≤ 15		$\geq 330^\circ$	
≥ 4	≥ 4	10	
5			

15.

15.1

0.5%

$\geq 3.5 \text{cN/dtex}$

10

15.2

$\leq \pm 0.02 \text{dl/g}$

$\leq \pm 3.0\%$

≥ 200

5

$\leq \pm 0.02 \text{ dl/g}$

≥ 220

b ≤ 5

$\geq 3.0 \text{ cN/dtex}$

$\leq \pm 0.04$

$\geq 3.0 \text{ cN/dtex}$

10

5

15.3

N-

-N-

NMMO

$\geq 3.6 \text{cN/dtex}$ $\geq 3.2 \text{cN/dtex}$ 5
/100 $\geq 99.5\%$

$\geq 2.0 \text{cN/dtex}$
30%

10

5

16.

16.1

- -

≥ 1

≥ 20

≥ 4

≥ 4

≥ 3

10

3-5

16.2

-

≥ 4 ≥ 4 ≥ 30 / 20% 30%

≥ 4 ≥ 4 ≥ 3 ≥ 4

10 2-3 5 95

16.3 6-7

3000 /

	6		
≥ 4		≥ 3	
≥ 4			
100%		$\geq 85\%$	$\geq 92\%$
	20%	30%	
	2-3	5	1
	10		6-7
17.			
17.1			

	$\leq 3.5 \times 10^{-12}$	/	
$1 \times 10^{15} \text{ n/}$			10%
			1
	10~12		40
	5~7		

17.2

		25%
5	$\geq 30\%$	25%

3.063TjC2Q 1 Tf0.00371Tc 2.5430 Td<0062>10F06E608E00E5E041B06E60

17.3

40%			30~40
3		20%	
30%		7	5 28
100×10^{-6}			50%
			50%
90%		30	50~100
			/
		5~8	
	8~10	≥ 300	
2		30	5~

18.

18.1

G8.5

$\pm 10\%$ $\leq \pm 0.05$

100

0.1

1 ≥ 20 /

40 3

19.

19.1

AION

AIN

$\geq 99.9\%$ $D_{50} \leq 0.5$ 10
 $\geq 99.8\%$ $O \leq 0.9\%$ $D_{50} \leq 1$ 30
 $\geq 98.5\%$ $f_C \leq 0.25\%$
 $f_{Si} \leq 0.15\%$ $O \leq 0.85\%$ $Fe \leq 200\text{ppm}$
 $D_{50} \leq 0.5$ 5000 α
 $\geq 93\%$ $f_{Si} \leq 0.1\%$ $O \leq 1.5\%$ $Fe \leq 200\text{ppm}$ $D_{50} \leq 0.5$
1000 $\geq 99.99\%$ K $Na \leq 20\text{ppm}$
Si $Ca \leq 10\text{ppm}$ $Fe \leq 5\text{ppm}$ $D_{50} \leq 0.5$ 1000
10 2~3
19.2

$\leq \pm 1\%$ $\leq 5\mu\text{m}$
280~450
 $\geq 99.8\%$ $\geq 80\%$ 3
 $\geq 100 \text{ W}/(\text{m}\cdot\text{K})$ ≥ 0.3

	$\geq 100 \times 100$		
		30~70%	$\geq 100\text{MPa}$ 1000
	$\geq 35\text{MPa}$,		$\geq 1000 \text{ m}^3/(\text{m}^2 \cdot \text{h} \cdot \text{bar})$
15			2~3
	19.3		
		AION	YAG
	-		
			Ce:La Br ₃
	/	Nd:CaF ₂	Cr,Nd:LuAG
	/	/	/
	600	$\geq 82\%$	3.5
	$\geq 83\%$	$\geq 300\text{MPa}$	$\geq 2.0\text{MPa} \cdot \text{m}^{1/2}$
	$\geq \Phi 400$	$\geq \Phi 150$	Ce:LaBr ₃
		/	$\leq 5\%$
	$\geq 50000\text{ph/MeV}$	$\geq \Phi 150$	Nd:CaF ₂ Cr,Nd:LuAG
		/	$\leq 0.1\%/$
	$\geq \Phi 200$	15	2~3

19.4

/

≥ 3.10 /

$\geq 400\text{MPa}$ $\geq 3.5\text{MPa}\cdot\text{m}^{1/2}$

≥ 120 W/(m·K) ≥ 3000

90% 500

rms ≤ 5 800~1500

$\geq \phi 300$

$\geq 99.9\%$

$\geq 800\text{MPa}$ $\geq 8.5\text{MPa}\cdot\text{m}^{1/2}$

≥ 40 30~100 100 G20 100

>90%

≥ 1500 ≥ 60 W/(m·K) 1200 $\geq 350\text{MPa}$

$\geq 99\%$

≥ 3.0 / H₂ HCl ≥ 12

300
 15 2~3
 20.
 20.1

1300 350 ≤ 0.10 W/(m·K)
 20%~30%
 ≤ 200 / ≤ 0.045 W/(m·K)
 ≤ 0.8 40%
 1.5% 25
 5 100 /
 30 / 100 /

20.2

SCR

SCR

≤ 120		80%		24h
	$\geq 93\%$		90 /	
$\geq 88\%$		4	/100	COD
		COD	80%	
$\text{COD} \leq 100$	/	$\text{SS} \leq 20$	/	
		99% Cr	As	
			65%	30%
				$\text{K}_2\text{O} \geq 4\%$
$\text{SiO}_2 \geq 30\%$	$\text{CaO} \geq 30\%$			
$\geq 2.5 \times 10^{13}$	/		85%	

	$\geq 95\%$		$\geq 90\%$
35		7	$5000\text{m}^3/$
	SCR		5000 /
	3000 /		10 /
	1 /		

20.3

	$\geq 0.2\text{MPa}$		$\leq 5.0 \times 10^{-11} /$
	$\geq 85\%$		0.45-0.6N/tex
	$\geq 2600\text{MPa}$		$\geq 90\text{GPa}$
		≤ 10	$\geq 900\text{N}$
	$\geq 17.5\text{N/mm}^2$		
40%	28		28

≥ 1.0				5		
		$\geq 80\%$		≥ 5		≥ 1
		20%				$\geq 2000\text{mPa}\cdot\text{s}$
	≥ 8		≥ 98			
				$\pm 10\%$		
0.25	100	350		$\leq 0.8 \times 10^{-7} \text{cm}^3/$	N·m	
1.5	5		40			8
20	/			1500	/	
	500	/		3000	/	2000
/						