Johnson Matthey Fuel Cells

HiSPEC Fuel Cell Catalysts

		HiSPEC 1000	HiSPEC 2000	HiSPEC 3000	HiSPEC 4000	HiSPEC 4100	HiSPEC 5000	HiSPEC 5100	HiSPEC 6000	HiSPEC 7000	HiSPEC 8000	HiSPEC 8100	HiSPEC 9000	HiSPEC 9100	HiSPEC 10000	HiSPEC 10100	HiSPEC 11100
Customer Specifications	Product	Pt Black	Pt/ XC72R	Pt/ XC72R	Pt/ XC72R	Pt/ AC01	Pt-Ru/ XC72R	Pt-Ru/ AC01	Pt/Ru Black	Pt-Ru/ XC72R	Pt/ XC72R	Pt/ AC01	Pt/ XC72R	Pt/ AC01	Pt-Ru/ XC72R	Pt-Ru / AC01	Pt/ AC01
	Product Ref/ Part Number	S128511	S128512	S128513	S128514	S128524	S128515	S128525	S128516	S128517	S128518	S128528	S128519	S128529	S128520	S128521	S128523
	Appearance	Black Powder	Black Powder	Black Powder	Black Powder	Black Powder	Black Powder	Black Powder	Black Powder	Black Powder	Black Powder	Black Powder	Black Powder	Black Powder	Black Powder	Black Powder	Black Powder
	Platinum, wt%(dry basis)	>95	9.5 to 10.5	19.0 to 21.0	38.0 to 41.0	37.0 to 39.0	18.0 to 21.0	18.5 to 20.5	57.0 to 61.0	27.0 to 31.0	47.0 to 50.0	46.5 to 48.5	56.0 to 60.0	55.5 to 58.5	37.0 to 41.0	37.0 to 41.0	65.5 to 68.5
	Ruthenium, wt% (dry basis)	n/a	n/a	n/a	n/a	n/a	9.0 to 11.0	9.0 to 11.0	29.0 to 31.0	14.0 to 16.5	n/a	n/a	n/a	n/a	18.0 to 21.0	18.5 to 21.0	n/a
	Platinum Atomic % (from total metal)						47.0 to 53.0	48.0 to 52.0	48.0 to 52.0	46.0 to 54.0					45.0 to 55.0	48.0 to 52.0	
	Ruthenium Atomic % (from total metal)	n/a	n/a	n/a	n/a	n/a	47.0 to 53.0	48.0 to 52.0	48.0 to 52.0	46.0 to 64.0	n/a	n/a	n/a	n/a	45.0 to 55.0	48.0 to 52.0	n/a
	Moisture, wt%	1.0 maximum	2.0 maximum	2.0 maximum	2.0 maximum	2.0 maximum	2.0 maximum	2.0 maximum	2.0 maximum	2.0 maximum	2.0 maximum	2.0 maximum	2.0 maximum	2.0 maximum	2.0 maximum	2.0 maximum	2.0 maximum
	Loss on Reduction, wt%	1.9 to 3.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Total Chloride, wt%	0.08 maximum	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Hydrolyzable Chloride, ppm	n/a	300 maximum	300 maximum	500 maximum	300 maximum	500 maximum	300 maximum	300 maximum	1000 maximum	300 maximum	300 maximum	300 maximum	300 maximum	1000 maximum	300 maximum	300 maximum
	Metal Surface Area (CO chemis.), m2/g	n/a	105 minimum	90 minimum	60 minimum	130 minimum	n/a	n/a	n/a	n/a	50 minimum	100 minimum	40 minimum	85 minimum	n/a	n/a	60 minimum
	Tap Density after screening (typical), g/cc			~0.4	~0.5	~0.25	~0.5	~0.3	0.7-1.1	~0.6	~0.65	~0.3	~0.75	~0.45	~0.7	~0.6	~0.6
	XRD Crystallite Size, nm		3.0 maximum	3.5 maximum	4.5 maximum	2.3 maximum	3.5 maximum	2.8 maximum	4.0 maximum	4.0 maximum	5.0 maximum	2.4 maximum	5.0 maximum	2.8 maximum	4.0 maximum	2.8 maximum	3.5 maximum
	Lattice Parameter, nm	----	----	----	----	----	0.390 maximum	0.390 maximum	0.389 maximum	0.390 maximum	----	----	----	----	0.390 maximum	0.390 maximum	----
	Total Metallic Impurities, ppm (spectroscopic emission)	320 maximum	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Impurities (ppm wt catalyst) (Al+Ca+Co+Cr+Cu+Fe+Mg+ Ni+Pb - acid leach, AA/ICP)	n/a	500 total maximum	500 total maximum	500 total maximum	500 total maximum	500 total maximum	500 total maximum	1000 total maximum	1000 total maximum	500 total maximum	500 total maximum	500 total maximum	500 total maximum	1000 total maximum	1000 total maximum	500 total maximum

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the power within

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