The Technical Association of Refractories, Japan

Certified Reference Material Series for X-ray Fluorescence Analysis of Refractories

ＪＲＲＭ　５０１　(Chrome-Magnesia Refractory)

Results of Analyses

Unit : mass%

Constituent		SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	CaO	MgO	Cr_2O_3	Uncertified value			
										P_2O_5	V_2O_5	NiO	ZnO
Certified value		0.92$_8$	2.92$_6$	4.81$_3$	0.00$_6$	0.02$_0$	0.92$_4$	87.7$_2$	2.83$_2$	0.03$_6$	0.01$_9$	0.01$_8$	0.00$_6$
Laboratories	L_1	0.94$_2$	2.90$_7$	4.84$_1$	0.00$_5$	0.01$_9$	0.92$_8$	87.7$_9$	2.84$_5$	0.04$_3$	0.02$_1$	0.01$_4$	0.00$_9$
	L_2	0.91$_5$	2.86$_8$	4.77$_7$	0.00$_6$	—	0.93$_1$	87.6$_1$	2.85$_3$	—	—	—	—
	L_3	0.94$_5$	2.86$_2$	4.80$_2$	0.00$_7$	0.01$_8$	0.93$_6$	87.7$_0$	2.79$_4$	0.03$_7$	0.01$_7$	0.01$_9$	0.00$_2$
	L_4	0.94$_1$	3.01$_0$	4.81$_4$	0.00$_7$	—	0.91$_5$	87.8$_0$	2.82$_0$	—	—	—	—
	L_5	0.89$_5$	2.94$_0$	4.85$_6$	0.01$_0$	0.02$_4$	0.91$_4$	87.6$_5$	2.81$_3$	0.02$_6$	0.01$_6$	0.03$_1$	0.01$_0$
	L_6	0.92$_1$	2.95$_1$	4.83$_2$	0.00$_2$	0.01$_9$	0.94$_1$	88.0$_9$	2.81$_6$	—	—	—	—
	L_7	0.90$_9$	2.86$_7$	4.82$_2$	0.00$_6$	0.02$_0$	0.91$_7$	87.7$_3$	2.87$_6$	0.04$_0$	0.02$_1$	0.00$_8$	0.00$_2$
	L_8	0.94$_7$	2.96$_5$	4.80$_1$	0.00$_6$	0.02$_0$	0.92$_7$	87.5$_8$	2.86$_4$	—	—	—	—
	L_9	0.93$_3$	2.96$_1$	4.77$_0$	0.00$_7$	0.01$_9$	0.90$_9$	87.5$_6$	2.80$_6$	—	—	—	—
Average ($\overline{\overline{X}}$)		0.927$_6$	2.925$_7$	4.812$_8$	0.006$_2$	0.019$_9$	0.924$_2$	87.72$_3$	2.831$_9$	0.036$_5$	0.018$_8$	0.018$_0$	0.005$_8$
Standard deviation (Reproducibility)	$s_{\bar{x}}$	0.018$_3$	0.052$_3$	0.026$_9$	0.002$_0$	0.002$_3$	0.010$_7$	0.15$_6$	0.028$_7$	—	—	—	—
deviation (Reproducibility without laboratories)	$s_{I(T)}$ *1	0.012$_5$	0.046$_4$	0.015$_9$	0.001$_2$	0.001$_2$	0.015$_6$	0.09$_8$	0.047$_7$	—	—	—	—
Uncertainty C (95%) *2		0.01$_4$	0.04$_0$	0.02$_1$	0.00$_2$	0.00$_2$	0.00$_8$	0.1$_2$	0.02$_2$	—	—	—	—

(Note) ＊1 $s_{I(T)}$ is intermediate precision without a time condition.　　＊2 The half-width confidence interval C (95%) = $t_{\ell-1,0.05} \times s_{\bar{x}} / \sqrt{\ell}$　(ℓ = number of laboratories)

(1) List of laboratories ： Krosaki Corporation, Kyushu Refractories Co.,Ltd., Kawasaki Refractories Co.,Ltd., Yotai Refractories Co.,Ltd., Asahi Glass Co.,Ltd., Harima Ceramic Co.,Ltd., Shinagawa Refractories Co.,Ltd., Toshiba Ceramics Co.,Ltd., Toshiba Monofrax Co.,Ltd.

(2) Analytical techniques ： JIS R 2212-5(Method for chemical analysis of refractory products — Part 5:Chrome-magnesia refractories)

(3) Analytical values ：Each value is the average of two values obtained by two measurements on different days. These analysis values are shown converted into LOI (Loss on ignition) component free values from the February 22, 2008 v20080222 version on.

(4) Outlier tests were carried out by Grubbs test. The samples rejected by Grubbs tests were discussed in view of analytical techniques and it was determined whether the outliers should be adopted or not.

(5) Date of preparation : November, 1990

Prepared, and Values given and certified by

The Technical Association of Refractories, Japan
New Ginza Bldg., 3-13, Ginza 7-chome, Chuo-ku, Tokyo 104-0061, Japan
Telephone : 81-3-3572-0705　Fax : 81-3-3572-0175

Distributed by

SEISHIN TRADING CO., LTD.
1-4-4, Minatojima-Minamimachi, Chuo-ku, Kobe 650-0047, Japan
Telephone : 81-78-303-3810　Fax : 81-78-303-3822

The Technical Association of Refractories, Japan

Certified Reference Material Series for X-ray Fluorescence Analysis of Refractories

ＪＲＲＭ　５０２　(Chrome-Magnesia Refractory)

Results of Analyses

Unit : mass%

Constituent		SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	CaO	MgO	Cr_2O_3	Uncertified value			
										P_2O_5	V_2O_5	NiO	ZnO
Certified value		3.12$_0$	11.9$_9$	1.02$_2$	0.01$_3$	0.01$_8$	0.20$_1$	76.3$_3$	7.50$_3$	0.02$_6$	0.02$_4$	0.02$_6$	0.00$_4$
Laboratories	L_1	3.10$_1$	12.0$_6$	1.04$_2$	0.01$_0$	0.01$_6$	0.19$_6$	76.3$_1$	7.55$_9$	0.02$_8$	0.02$_3$	0.02$_4$	0.01$_0$
	L_2	3.16$_9$	11.9$_0$	1.01$_0$	0.01$_5$	—	0.19$_6$	76.4$_8$	7.44$_6$	—	—	—	—
	L_3	3.10$_8$	11.9$_9$	1.00$_9$	0.01$_6$	0.01$_6$	0.21$_0$	76.3$_3$	7.60$_9$	0.02$_1$	0.02$_2$	0.02$_7$	0.00$_4$
	L_4	3.10$_4$	11.9$_1$	1.01$_9$	0.01$_4$	—	0.20$_2$	76.5$_1$	7.43$_9$	—	—	—	—
	L_5	3.04$_1$	11.9$_7$	1.03$_1$	0.01$_6$	0.02$_0$	0.19$_8$	76.3$_1$	7.53$_5$	0.02$_8$	0.02$_0$	0.03$_4$	0.00$_2$
	L_6	3.08$_2$	12.0$_2$	1.03$_0$	0.01$_2$	0.01$_9$	0.20$_1$	76.5$_1$	7.36$_3$	—	—	—	—
	L_7	3.13$_2$	11.9$_5$	1.01$_2$	0.01$_3$	0.01$_9$	0.19$_8$	76.1$_2$	7.51$_0$	0.02$_5$	0.02$_9$	0.01$_9$	0.00$_2$
	L_8	3.14$_1$	12.0$_2$	1.01$_0$	0.01$_2$	0.02$_0$	0.19$_9$	76.0$_1$	7.49$_3$	—	—	—	—
	L_9	3.20$_3$	12.1$_1$	1.03$_1$	0.01$_2$	0.01$_8$	0.20$_6$	76.3$_7$	7.57$_2$	—	—	—	—
Average	$(\overline{\overline{X}})$	3.120$_1$	11.99$_2$	1.021$_6$	0.013$_3$	0.018$_3$	0.200$_7$	76.32$_8$	7.502$_9$	0.025$_5$	0.023$_5$	0.026$_0$	0.004$_5$
Standard deviation (Reproducibility)	$s_{\bar{x}}$	0.048$_2$	0.06$_8$	0.012$_0$	0.002$_1$	0.001$_7$	0.004$_7$	0.15$_5$	0.076$_3$	—	—	—	—
deviation (Reproducibility without laboratories)	$s_{I(T)}$ * 1	0.014$_0$	0.06$_4$	0.009$_6$	0.001$_2$	0.001$_4$	0.010$_6$	0.10$_8$	0.059$_0$	—	—	—	—
Uncertainty C (95%) * 2		0.03$_7$	0.0$_5$	0.00$_9$	0.00$_2$	0.00$_2$	0.00$_4$	0.1$_2$	0.05$_9$	—	—	—	—

(Note) * 1 $s_{I(T)}$ is intermediate precision without a time condition.　　* 2 The half-width confidence interval C (95%) = $t_{\ell-1,0.05} \times s_{\bar{x}} / \sqrt{\ell}$　(ℓ = number of laboratories)

(1) List of laboratories : Krosaki Corporation, Kyushu Refractories Co.,Ltd., Kawasaki Refractories Co.,Ltd., Yotai Refractories Co.,Ltd., Asahi Glass Co.,Ltd., Harima Ceramic Co.,Ltd., Shinagawa Refractories Co.,Ltd., Toshiba Ceramics Co.,Ltd., Toshiba Monofrax Co.,Ltd.

(2) Analytical techniques : JIS R 2212-5(Method for chemical analysis of refractory products — Part 5:Chrome-magnesia refractories)

(3) Analytical values : Each value is the average of two values obtained by two measurements on different days. These analysis values are shown converted into LOI (Loss on ignition) component free values from the February 22, 2008 v20080222 version on.

(4) Outlier tests were carried out by Grubbs test. The samples rejected by Grubbs tests were discussed in view of analytical techniques and it was determined whether the outliers should be adopted or not.

(5) Date of preparation : November, 1990

Prepared, and Values given and certified by

The Technical Association of Refractories, Japan
New Ginza Bldg., 3-13, Ginza 7-chome, Chuo-ku, Tokyo 104-0061, Japan
Telephone : 81-3-3572-0705　Fax : 81-3-3572-0175

Distributed by

SEISHIN TRADING CO., LTD.
1-4-4, Minatojima-Minamimachi, Chuo-ku, Kobe 650-0047, Japan
Telephone : 81-78-303-3810　Fax : 81-78-303-3822

The Technical Association of Refractories, Japan

Certified Reference Material Series for X-ray Fluorescence Analysis of Refractories

ＪＲＲＭ　５０３　(Chrome-Magnesia Refractory)

Results of Analyses

Unit : mass%

Constituent		SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	CaO	MgO	Cr_2O_3	Uncertified value			
										P_2O_5	V_2O_5	NiO	ZnO
Certified value		9.10$_6$	7.15$_5$	3.00$_9$	0.04$_7$	0.03$_8$	3.81$_9$	63.1$_9$	13.6$_1$	0.03$_2$	0.03$_7$	0.03$_6$	0.01$_3$
Laboratories	L_1	9.05$_9$	7.14$_1$	3.08$_2$	0.04$_3$	0.03$_8$	3.84$_5$	63.6$_6$	13.6$_1$	0.02$_9$	0.03$_7$	0.02$_5$	0.01$_5$
	L_2	9.12$_5$	7.15$_7$	2.98$_5$	0.04$_7$	—	3.78$_5$	63.0$_7$	13.5$_8$	—	—	—	—
	L_3	9.10$_7$	7.13$_3$	2.95$_2$	0.04$_8$	0.03$_6$	3.86$_7$	63.1$_2$	13.7$_0$	0.03$_5$	0.03$_4$	0.04$_1$	0.01$_4$
	L_4	9.07$_5$	7.19$_9$	3.02$_2$	0.04$_8$	—	3.82$_4$	63.3$_0$	13.6$_2$	—	—	—	—
	L_5	8.95$_3$	7.20$_3$	3.00$_1$	0.05$_0$	0.04$_2$	3.86$_4$	62.8$_3$	13.6$_0$	0.03$_4$	0.03$_6$	0.04$_2$	0.01$_2$
	L_6	9.07$_6$	7.21$_2$	3.03$_3$	0.04$_4$	0.03$_6$	3.82$_9$	63.2$_7$	13.4$_8$	—	—	—	—
	L_7	9.11$_2$	7.16$_5$	2.99$_7$	0.04$_5$	0.03$_9$	3.81$_8$	63.1$_4$	13.6$_9$	0.03$_1$	0.04$_2$	0.03$_5$	0.01$_0$
	L_8	9.24$_4$	7.08$_4$	3.03$_0$	0.04$_6$	0.04$_0$	3.79$_5$	63.2$_7$	13.5$_3$	—	—	—	—
	L_9	9.20$_3$	7.10$_4$	2.97$_8$	0.04$_8$	0.03$_7$	3.74$_7$	63.0$_1$	13.6$_9$	—	—	—	—
Average	$(\overline{\overline{X}})$	9.106$_0$	7.155$_3$	3.008$_9$	0.046$_6$	0.038$_3$	3.819$_3$	63.18$_6$	13.61$_1$	0.032$_3$	0.037$_3$	0.035$_8$	0.012$_8$
Standard deviation (Reproducibility)	$s_{\bar{x}}$	0.083$_5$	0.044$_7$	0.038$_3$	0.002$_3$	0.002$_2$	0.038$_5$	0.23$_6$	0.07$_6$	—	—	—	—
deviation (Reproducibility without laboratories)	$s_{I(T)}$ *1	0.046$_6$	0.039$_5$	0.009$_7$	0.002$_6$	0.001$_4$	0.031$_4$	0.17$_2$	0.07$_3$	—	—	—	—
Uncertainty C (95%) *2		0.06$_4$	0.03$_4$	0.03$_0$	0.00$_2$	0.00$_2$	0.03$_0$	0.1$_8$	0.0$_6$	—	—	—	—

(Note) ＊1 $s_{I(T)}$ is intermediate precision without a time condition.　　＊2 The half-width confidence interval C (95%) = $t_{\ell-1,0.05} \times s_{\bar{x}} / \sqrt{\ell}$　(ℓ = number of laboratories)

(1) List of laboratories ： Krosaki Corporation, Kyushu Refractories Co.,Ltd., Kawasaki Refractories Co.,Ltd., Yotai Refractories Co.,Ltd., Asahi Glass Co.,Ltd., Harima Ceramic Co.,Ltd., Shinagawa Refractories Co.,Ltd., Toshiba Ceramics Co.,Ltd., Toshiba Monofrax Co.,Ltd.

(2) Analytical techniques ： JIS R 2212-5(Method for chemical analysis of refractory products — Part 5:Chrome-magnesia refractories)

(3) Analytical values ：Each value is the average of two values obtained by two measurements on different days. These analysis values are shown converted into LOI (Loss on ignition) component free values from the February 22, 2008 v20080222 version on.

(4) Outlier tests were carried out by Grubbs test. The samples rejected by Grubbs tests were discussed in view of analytical techniques and it was determined whether the outliers should be adopted or not.

(5) Date of preparation：November, 1990

Prepared, and Values given and certified by

The Technical Association of Refractories, Japan
New Ginza Bldg., 3-13, Ginza 7-chome, Chuo-ku, Tokyo 104-0061, Japan
Telephone：81-3-3572-0705　Fax：81-3-3572-0175

Distributed by

SEISHIN TRADING CO., LTD.
1-4-4, Minatojima-Minamimachi, Chuo-ku, Kobe 650-0047, Japan
Telephone：81-78-303-3810　Fax：81-78-303-3822

The Technical Association of Refractories, Japan

Certified Reference Material Series for X-ray Fluorescence Analysis of Refractories

ＪＲＲＭ　５０４　(Chrome-Magnesia Refractory)

Results of Analyses

Unit : mass%

Constituent		SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	CaO	MgO	Cr_2O_3	Uncertified value			
										P_2O_5	V_2O_5	NiO	ZnO
Certified value		2.19$_2$	17.5$_8$	4.11$_7$	0.01$_4$	0.01$_1$	2.61$_1$	54.8$_8$	18.3$_7$	0.03$_4$	0.01$_6$	0.01$_5$	0.01$_1$
Laboratories	L_1	2.20$_7$	17.6$_2$	4.11$_9$	0.01$_1$	0.00$_8$	2.60$_4$	55.2$_5$	18.4$_0$	0.03$_0$	0.01$_5$	0.01$_0$	0.01$_3$
	L_2	2.25$_2$	17.4$_8$	4.13$_0$	0.01$_2$	—	2.62$_5$	55.0$_0$	18.3$_3$	—	—	—	—
	L_3	2.16$_8$	17.7$_3$	4.05$_6$	0.01$_7$	0.00$_8$	2.64$_5$	54.7$_4$	18.4$_9$	0.04$_2$	0.01$_6$	0.01$_5$	0.01$_0$
	L_4	2.20$_6$	17.5$_2$	4.12$_4$	0.01$_6$	—	2.61$_5$	55.0$_4$	18.3$_2$	—	—	—	—
	L_5	2.13$_3$	17.6$_5$	4.14$_5$	0.01$_8$	0.01$_4$	2.59$_4$	54.6$_2$	18.3$_9$	0.03$_0$	0.01$_4$	0.02$_8$	0.01$_4$
	L_6	2.13$_3$	17.4$_5$	4.14$_7$	0.01$_2$	0.01$_2$	2.68$_1$	54.8$_8$	18.3$_1$	—	—	—	—
	L_7	2.19$_4$	17.6$_0$	4.12$_8$	0.01$_1$	0.00$_9$	2.60$_7$	54.8$_5$	18.3$_5$	0.03$_2$	0.01$_9$	0.00$_8$	0.00$_8$
	L_8	2.21$_4$	17.7$_5$	4.13$_7$	0.01$_6$	0.01$_2$	2.60$_0$	54.7$_3$	18.4$_1$	—	—	—	—
	L_9	2.22$_0$	17.4$_5$	4.06$_9$	0.01$_2$	0.01$_5$	2.52$_7$	54.8$_0$	18.3$_6$	—	—	—	—
Average	$(\overline{\overline{X}})$	2.191$_9$	17.58$_3$	4.117$_2$	0.013$_9$	0.011$_1$	2.610$_9$	54.87$_9$	18.37$_3$	0.033$_5$	0.016$_0$	0.015$_3$	0.011$_3$
Standard deviation (Reproducibility)	$s_{\bar{x}}$	0.040$_4$	0.11$_2$	0.031$_8$	0.002$_7$	0.002$_7$	0.041$_8$	0.19$_4$	0.05$_6$	—	—	—	—
Standard deviation (Reproducibility without laboratories)	$s_{I(T)}$ *1	0.032$_8$	0.08$_4$	0.035$_2$	0.001$_3$	0.000$_6$	0.043$_3$	0.13$_3$	0.08$_8$	—	—	—	—
Uncertainty C (95%) *2		0.03$_1$	0.0$_9$	0.02$_4$	0.00$_2$	0.00$_3$	0.03$_2$	0.1$_5$	0.0$_4$	—	—	—	—

(Note) ＊1 $s_{I(T)}$ is intermediate precision without a time condition.　　＊2 The half-width confidence interval C (95%) = $t_{\ell-1,0.05} \times s_{\bar{x}} / \sqrt{\ell}$　(ℓ = number of laboratories)

(1) List of laboratories ： Krosaki Corporation, Kyushu Refractories Co.,Ltd., Kawasaki Refractories Co.,Ltd., Yotai Refractories Co.,Ltd., Asahi Glass Co.,Ltd., Harima Ceramic Co.,Ltd., Shinagawa Refractories Co.,Ltd., Toshiba Ceramics Co.,Ltd., Toshiba Monofrax Co.,Ltd.

(2) Analytical techniques ： JIS R 2212-5(Method for chemical analysis of refractory products — Part 5:Chrome-magnesia refractories)

(3) Analytical values ：Each value is the average of two values obtained by two measurements on different days. These analysis values are shown converted into LOI (Loss on ignition) component free values from the February 22, 2008 v20080222 version on.

(4) Outlier tests were carried out by Grubbs test. The samples rejected by Grubbs tests were discussed in view of analytical techniques and it was determined whether the outliers should be adopted or not.

(5) Date of preparation : November, 1990

Prepared, and Values given and certified by

The Technical Association of Refractories, Japan
New Ginza Bldg., 3-13, Ginza 7-chome, Chuo-ku, Tokyo 104-0061, Japan
Telephone : 81-3-3572-0705　Fax : 81-3-3572-0175

Distributed by

SEISHIN TRADING CO., LTD.
1-4-4, Minatojima-Minamimachi, Chuo-ku, Kobe 650-0047, Japan
Telephone : 81-78-303-3810　Fax : 81-78-303-3822

The Technical Association of Refractories, Japan

Certified Reference Material Series for X-ray Fluorescence Analysis of Refractories

ＪＲＲＭ　５０５　(Chrome-Magnesia Refractory)

Results of Analyses

Unit : mass%

Constituent		SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	CaO	MgO	Cr_2O_3	Uncertified value			
										P_2O_5	V_2O_5	NiO	ZnO
Certified value		1.82₄	7.77₅	17.7₇	0.11₈	0.10₉	0.49₃	50.1₈	21.7₅	0.02₃	0.07₅	0.07₈	0.02₁
Laboratories	L_1	1.86₁	7.69₆	17.7₁	0.11₆	0.10₈	0.48₉	50.4₈	21.7₂	0.02₅	0.07₅	0.07₆	0.02₉
	L_2	1.87₃	7.77₅	17.7₉	0.12₀	—	0.48₈	49.9₉	21.7₁	—	—	—	—
	L_3	1.83₆	7.75₅	17.6₉	0.11₉	0.10₆	0.50₄	50.2₈	21.8₂	0.02₅	0.07₀	0.07₄	0.01₉
	L_4	1.81₈	7.79₂	17.7₁	0.12₀	—	0.48₄	50.2₃	21.6₆	—	—	—	—
	L_5	1.74₄	7.79₅	17.9₂	0.11₈	0.12₈	0.49₁	49.7₉	21.8₀	0.02₁	0.07₆	0.08₈	0.02₁
	L_6	1.74₄	7.83₁	17.8₈	0.11₄	0.10₂	0.51₀	49.8₅	21.7₇	—	—	—	—
	L_7	1.81₅	7.71₃	17.8₁	0.11₆	0.10₅	0.48₈	50.2₅	21.7₂	0.02₂	0.08₀	0.07₆	0.01₄
	L_8	1.85₂	7.78₄	17.6₉	0.12₂	0.10₆	0.50₁	50.4₅	21.8₀	—	—	—	—
	L_9	1.87₆	7.83₁	17.7₇	0.11₆	0.10₆	0.48₀	50.3₂	21.7₇	—	—	—	—
Average	$(\bar{\bar{X}})$	1.824₃	7.774₇	17.77₄	0.117₉	0.108₇	0.492₈	50.18₂	21.75₂	0.023₃	0.075₃	0.078₅	0.020₈
Standard deviation (Reproducibility)	$s_{\bar{x}}$	0.050₄	0.046₄	0.08₃	0.002₇	0.008₇	0.009₄	0.25₁	0.04₆	—	—	—	—
(Reproducibility without laboratories)	$s_{I(T)}$ *1	0.021₁	0.030₄	0.05₉	0.003₁	0.002₃	0.014₄	0.14₂	0.09₁	—	—	—	—
Uncertainty C (95%) *2		0.03₉	0.03₆	0.0₆	0.00₂	0.00₈	0.00₇	0.1₉	0.0₄	—	—	—	—

(Note) ＊1 $s_{I(T)}$ is intermediate precision without a time condition.　　＊2 The half-width confidence interval C (95%) = $t_{\ell-1,0.05} \times s_{\bar{x}} / \sqrt{\ell}$　(ℓ = number of laboratories)

(1) List of laboratories ： Krosaki Corporation, Kyushu Refractories Co.,Ltd., Kawasaki Refractories Co.,Ltd., Yotai Refractories Co.,Ltd., Asahi Glass Co.,Ltd., Harima Ceramic Co.,Ltd., Shinagawa Refractories Co.,Ltd., Toshiba Ceramics Co.,Ltd., Toshiba Monofrax Co.,Ltd.

(2) Analytical techniques ： JIS R 2212-5(Method for chemical analysis of refractory products — Part 5:Chrome-magnesia refractories)

(3) Analytical values ：Each value is the average of two values obtained by two measurements on different days. These analysis values are shown converted into LOI (Loss on ignition) component free values from the February 22, 2008 v20080222 version on.

(4) Outlier tests were carried out by Grubbs test. The samples rejected by Grubbs tests were discussed in view of analytical techniques and it was determined whether the outliers should be adopted or not.

(5) Date of preparation : November, 1990

Prepared, and Values given and certified by

The Technical Association of Refractories, Japan
New Ginza Bldg., 3-13, Ginza 7-chome, Chuo-ku, Tokyo 104-0061, Japan
Telephone : 81-3-3572-0705　Fax : 81-3-3572-0175

Distributed by

SEISHIN TRADING CO., LTD.
1-4-4, Minatojima-Minamimachi, Chuo-ku, Kobe 650-0047, Japan
Telephone : 81-78-303-3810　Fax : 81-78-303-3822

The Technical Association of Refractories, Japan

Certified Reference Material Series for X-ray Fluorescence Analysis of Refractories

ＪＲＲＭ　５０６　(Chrome-Magnesia Refractory)

Results of Analyses

Unit : mass%

Constituent		SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	CaO	MgO	Cr_2O_3	Uncertified value			
										P_2O_5	V_2O_5	NiO	ZnO
Certified value		2.16$_7$	14.7$_0$	7.49$_5$	0.13$_4$	0.07$_2$	0.46$_0$	46.6$_9$	28.2$_1$	0.01$_8$	0.08$_6$	0.09$_4$	0.01$_0$
Laboratories	L_1	2.19$_5$	14.6$_1$	7.51$_1$	0.13$_4$	0.07$_2$	0.45$_6$	46.9$_4$	28.2$_0$	0.02$_2$	0.08$_7$	0.09$_6$	0.01$_6$
	L_2	2.19$_8$	14.8$_7$	7.49$_4$	0.13$_8$	—	0.46$_0$	46.8$_1$	28.1$_0$	—	—	—	—
	L_3	2.16$_3$	14.8$_3$	7.48$_3$	0.13$_7$	0.07$_0$	0.45$_7$	46.5$_6$	28.2$_9$	0.02$_1$	0.07$_9$	0.08$_6$	0.01$_1$
	L_4	2.15$_5$	14.4$_9$	7.47$_4$	0.13$_1$	—	0.45$_2$	46.9$_5$	28.1$_8$	—	—	—	—
	L_5	2.07$_2$	14.7$_2$	7.49$_1$	0.13$_4$	0.08$_0$	0.45$_6$	46.3$_2$	28.1$_4$	0.00$_8$	0.08$_6$	0.10$_4$	0.00$_8$
	L_6	2.15$_7$	14.5$_7$	7.44$_0$	0.12$_8$	0.07$_1$	0.49$_3$	46.4$_1$	28.1$_5$	—	—	—	—
	L_7	2.15$_5$	14.6$_5$	7.49$_4$	0.13$_2$	0.07$_0$	0.45$_0$	46.6$_3$	28.2$_6$	0.01$_9$	0.09$_1$	0.09$_1$	0.00$_5$
	L_8	2.19$_8$	14.7$_7$	7.55$_9$	0.13$_8$	0.07$_0$	0.46$_8$	46.8$_3$	28.3$_1$	—	—	—	—
	L_9	2.20$_7$	14.8$_2$	7.50$_8$	0.13$_2$	0.07$_0$	0.44$_5$	46.7$_3$	28.2$_8$	—	—	—	—
Average	$(\overline{\overline{X}})$	2.166$_7$	14.70$_3$	7.494$_9$	0.133$_8$	0.071$_9$	0.459$_7$	46.68$_7$	28.21$_2$	0.017$_5$	0.085$_8$	0.094$_3$	0.010$_0$
Standard deviation (Reproducibility)	$s_{\bar{x}}$	0.041$_6$	0.13$_0$	0.031$_2$	0.003$_2$	0.003$_6$	0.014$_2$	0.22$_8$	0.07$_4$	—	—	—	—
Standard deviation (Reproducibility without laboratories)	$s_{I(T)}$ * 1	0.020$_7$	0.09$_6$	0.022$_5$	0.004$_8$	0.001$_8$	0.014$_6$	0.09$_4$	0.08$_9$	—	—	—	—
Uncertainty C (95%) * 2		0.03$_2$	0.1$_0$	0.02$_4$	0.00$_2$	0.00$_3$	0.01$_1$	0.1$_8$	0.0$_6$	—	—	—	—

(Note) * 1 $s_{I(T)}$ is intermediate precision without a time condition.　　* 2 The half-width confidence interval C (95%) = $t_{\ell-1,0.05} \times s_{\bar{x}} / \sqrt{\ell}$　(ℓ = number of laboratories)

(1) List of laboratories : Krosaki Corporation, Kyushu Refractories Co.,Ltd., Kawasaki Refractories Co.,Ltd., Yotai Refractories Co.,Ltd., Asahi Glass Co.,Ltd., Harima Ceramic Co.,Ltd., Shinagawa Refractories Co.,Ltd., Toshiba Ceramics Co.,Ltd., Toshiba Monofrax Co.,Ltd.

(2) Analytical techniques : JIS R 2212-5(Method for chemical analysis of refractory products — Part 5:Chrome-magnesia refractories)

(3) Analytical values : Each value is the average of two values obtained by two measurements on different days. These analysis values are shown converted into LOI (Loss on ignition) component free values from the February 22, 2008 v20080222 version on.

(4) Outlier tests were carried out by Grubbs test. The samples rejected by Grubbs tests were discussed in view of analytical techniques and it was determined whether the outliers should be adopted or not.

(5) Date of preparation : November, 1990

Prepared, and Values given and certified by

The Technical Association of Refractories, Japan
New Ginza Bldg., 3-13, Ginza 7-chome, Chuo-ku, Tokyo 104-0061, Japan
Telephone : 81-3-3572-0705　Fax : 81-3-3572-0175

Distributed by

SEISHIN TRADING CO., LTD.
1-4-4, Minatojima-Minamimachi, Chuo-ku, Kobe 650-0047, Japan
Telephone : 81-78-303-3810　Fax : 81-78-303-3822

The Technical Association of Refractories, Japan

Certified Reference Material Series for X-ray Fluorescence Analysis of Refractories

ＪＲＲＭ　５０７　(Chrome-Magnesia Refractory)

Results of Analyses

Unit : mass%

Constituent		SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	CaO	MgO	Cr_2O_3	Uncertified value			
										P_2O_5	V_2O_5	NiO	ZnO
Certified value		5.69$_2$	24.9$_9$	12.9$_6$	0.16$_6$	0.11$_5$	1.61$_3$	22.3$_4$	31.9$_9$	0.01$_0$	0.13$_0$	0.20$_4$	0.03$_7$
Laboratories	L_1	5.69$_1$	25.0$_5$	12.9$_4$	0.15$_8$	0.11$_6$	1.58$_2$	22.3$_4$	32.1$_5$	0.00$_8$	0.13$_8$	0.20$_4$	0.01$_9$
	L_2	5.70$_9$	25.0$_0$	13.0$_3$	0.16$_8$	—	1.66$_7$	22.2$_4$	31.8$_1$	—	—	—	—
	L_3	5.73$_3$	24.8$_6$	12.9$_5$	0.16$_8$	0.11$_4$	1.60$_8$	22.5$_3$	31.7$_6$	0.01$_4$	0.11$_4$	0.19$_0$	0.03$_8$
	L_4	5.64$_5$	25.0$_3$	12.9$_2$	0.16$_4$	—	1.58$_7$	22.3$_6$	32.3$_1$	—	—	—	—
	L_5	5.65$_7$	25.0$_1$	12.9$_3$	0.16$_3$	0.11$_3$	1.61$_9$	22.3$_6$	31.9$_9$	—	0.13$_3$	0.19$_9$	0.04$_9$
	L_6	5.66$_1$	24.9$_8$	12.9$_4$	0.16$_0$	0.11$_4$	1.59$_5$	22.2$_3$	32.0$_3$	—	—	—	—
	L_7	5.71$_5$	24.8$_6$	12.9$_7$	0.16$_8$	0.11$_9$	1.61$_4$	22.3$_3$	31.8$_7$	0.00$_7$	0.13$_6$	0.22$_4$	0.04$_2$
	L_8	5.71$_4$	25.1$_1$	13.0$_1$	0.17$_5$	0.11$_5$	1.62$_2$	22.3$_8$	31.9$_9$	—	—	—	—
	L_9	5.70$_0$	24.9$_9$	12.9$_9$	0.17$_1$	0.11$_6$	1.62$_4$	22.2$_8$	32.0$_2$	—	—	—	—
Average	$(\overline{\overline{X}})$	5.691$_7$	24.98$_8$	12.96$_4$	0.166$_1$	0.115$_3$	1.613$_1$	22.33$_9$	31.99$_2$	0.009$_7$	0.130$_3$	0.204$_3$	0.037$_0$
Standard deviation (Reproducibility)	$s_{\bar{x}}$	0.030$_3$	0.07$_8$	0.03$_7$	0.005$_4$	0.002$_0$	0.025$_3$	0.09$_0$	0.17$_0$	—	—	—	—
Standard deviation (Reproducibility without laboratories)	$s_{I(T)}$ * 1	0.039$_1$	0.10$_3$	0.06$_7$	0.002$_5$	0.002$_3$	0.020$_9$	0.08$_2$	0.06$_2$	—	—	—	—
Uncertainty C (95%)	*2	0.02$_3$	0.0$_6$	0.0$_3$	0.00$_4$	0.00$_2$	0.01$_9$	0.0$_7$	0.1$_3$	—	—	—	—

(Note) * 1 $s_{I(T)}$ is intermediate precision without a time condition.　　* 2 The half-width confidence interval C (95%) = $t_{\ell-1,0.05} \times s_{\bar{x}} / \sqrt{\ell}$　(ℓ = number of laboratories)

(1) List of laboratories : Krosaki Corporation, Kyushu Refractories Co.,Ltd., Kawasaki Refractories Co.,Ltd., Yotai Refractories Co.,Ltd., Asahi Glass Co.,Ltd., Harima Ceramic Co.,Ltd., Shinagawa Refractories Co.,Ltd., Toshiba Ceramics Co.,Ltd., Toshiba Monofrax Co.,Ltd.

(2) Analytical techniques : JIS R 2212-5(Method for chemical analysis of refractory products — Part 5:Chrome-magnesia refractories)

(3) Analytical values : Each value is the average of two values obtained by two measurements on different days. These analysis values are shown converted into LOI (Loss on ignition) component free values from the February 22, 2008 v20080222 version on.

(4) Outlier tests were carried out by Grubbs test. The samples rejected by Grubbs tests were discussed in view of analytical techniques and it was determined whether the outliers should be adopted or not.

(5) Date of preparation : November, 1990

Prepared, and Values given and certified by

The Technical Association of Refractories, Japan
New Ginza Bldg., 3-13, Ginza 7-chome, Chuo-ku, Tokyo 104-0061, Japan
Telephone : 81-3-3572-0705　Fax : 81-3-3572-0175

Distributed by

SEISHIN TRADING CO., LTD.
1-4-4, Minatojima-Minamimachi, Chuo-ku, Kobe 650-0047, Japan
Telephone : 81-78-303-3810　Fax : 81-78-303-3822

The Technical Association of Refractories, Japan

Certified Reference Material Series for X-ray Fluorescence Analysis of Refractories

ＪＲＲＭ　５０８　(Chrome-Magnesia Refractory)

Results of Analyses

Unit : mass%

Constituent		SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	CaO	MgO	Cr_2O_3	Uncertified value			
										P_2O_5	V_2O_5	NiO	ZnO
Certified value		3.08$_2$	3.98$_3$	22.7$_1$	0.01$_4$	0.00$_6$	1.03$_1$	30.8$_8$	38.2$_0$	0.01$_6$	0.00$_8$	0.01$_0$	0.00$_5$
Laboratories	L_1	3.14$_7$	3.97$_5$	22.7$_2$	0.01$_3$	0.00$_6$	1.01$_9$	31.0$_1$	38.1$_8$	0.01$_8$	0.00$_5$	0.00$_8$	—
	L_2	3.13$_7$	3.98$_3$	22.7$_1$	0.01$_4$	—	1.03$_0$	30.9$_5$	38.0$_7$	—	—	—	—
	L_3	3.08$_2$	3.94$_5$	22.7$_0$	0.01$_8$	0.00$_6$	1.03$_5$	30.7$_8$	38.1$_1$	0.01$_4$	0.00$_9$	0.01$_3$	0.00$_4$
	L_4	2.93$_2$	4.03$_2$	22.8$_1$	0.02$_2$	—	1.02$_2$	30.8$_3$	38.4$_5$	—	—	—	—
	L_5	3.05$_8$	3.98$_6$	22.6$_3$	0.01$_7$	0.00$_4$	1.03$_9$	30.9$_0$	38.2$_8$	—	0.00$_4$	0.00$_6$	0.00$_6$
	L_6	3.07$_9$	3.98$_6$	22.6$_5$	0.01$_1$	0.00$_6$	1.03$_3$	30.8$_0$	38.0$_8$	—	—	—	—
	L_7	3.14$_1$	3.95$_9$	22.7$_5$	0.00$_8$	0.00$_7$	1.04$_4$	30.8$_7$	38.1$_0$	0.01$_6$	0.01$_2$	0.01$_2$	0.00$_6$
	L_8	3.11$_1$	4.00$_2$	22.6$_3$	0.01$_0$	0.00$_8$	0.98$_7$	30.9$_9$	38.2$_3$	—	—	—	—
	L_9	3.05$_5$	3.97$_8$	22.7$_9$	0.01$_6$	0.00$_6$	1.07$_3$	30.7$_6$	38.3$_2$	—	—	—	—
Average	$(\overline{\overline{X}})$	3.082$_4$	3.982$_9$	22.71$_0$	0.014$_3$	0.006$_1$	1.031$_3$	30.87$_7$	38.20$_2$	0.016$_0$	0.007$_5$	0.009$_8$	0.005$_3$
Standard deviation (Reproducibility)	$s_{\bar{x}}$	0.066$_4$	0.024$_7$	0.06$_8$	0.004$_2$	0.001$_1$	0.022$_7$	0.09$_0$	0.12$_9$	—	—	—	—
deviation (Reproducibility without laboratories)	$s_{I(T)}$ * 1	0.038$_1$	0.022$_5$	0.05$_5$	0.001$_2$	0.000$_8$	0.015$_6$	0.09$_8$	0.04$_9$	—	—	—	—
Uncertainty C (95%) *2		0.05$_1$	0.01$_9$	0.0$_5$	0.00$_3$	0.00$_1$	0.01$_7$	0.0$_7$	0.1$_0$	—	—	—	—

(Note) * 1 $s_{I(T)}$ is intermediate precision without a time condition.　　* 2 The half-width confidence interval C (95%) = $t_{\ell-1,0.05} \times s_{\bar{x}} / \sqrt{\ell}$　(ℓ = number of laboratories)

(1) List of laboratories : Krosaki Corporation, Kyushu Refractories Co.,Ltd., Kawasaki Refractories Co.,Ltd., Yotai Refractories Co.,Ltd., Asahi Glass Co.,Ltd., Harima Ceramic Co.,Ltd., Shinagawa Refractories Co.,Ltd., Toshiba Ceramics Co.,Ltd., Toshiba Monofrax Co.,Ltd.

(2) Analytical techniques : JIS R 2212-5(Method for chemical analysis of refractory products — Part 5:Chrome-magnesia refractories)

(3) Analytical values : Each value is the average of two values obtained by two measurements on different days. These analysis values are shown converted into LOI (Loss on ignition) component free values from the February 22, 2008 v20080222 version on.

(4) Outlier tests were carried out by Grubbs test. The samples rejected by Grubbs tests were discussed in view of analytical techniques and it was determined whether the outliers should be adopted or not.

(5) Date of preparation : November, 1990

Prepared, and Values given and certified by

The Technical Association of Refractories, Japan
New Ginza Bldg., 3-13, Ginza 7-chome, Chuo-ku, Tokyo 104-0061, Japan
Telephone : 81-3-3572-0705　Fax : 81-3-3572-0175

Distributed by

SEISHIN TRADING CO., LTD.
1-4-4, Minatojima-Minamimachi, Chuo-ku, Kobe 650-0047, Japan
Telephone : 81-78-303-3810　Fax : 81-78-303-3822

The Technical Association of Refractories, Japan

Certified Reference Material Series for X-ray Fluorescence Analysis of Refractories

ＪＲＲＭ　５０９　(Chrome-Magnesia Refractory)

Results of Analyses

Unit : mass%

Constituent		SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	CaO	MgO	Cr_2O_3	Uncertified value			
										P_2O_5	V_2O_5	NiO	ZnO
Certified value		1.96$_7$	20.3$_1$	10.1$_6$	1.20$_5$	0.08$_2$	2.87$_1$	20.4$_7$	42.6$_3$	0.01$_3$	0.11$_8$	0.04$_4$	0.03$_7$
Laboratories	L_1	1.95$_1$	20.4$_3$	10.1$_7$	1.19$_5$	0.08$_4$	2.84$_4$	20.6$_6$	42.7$_7$	0.01$_2$	0.12$_0$	0.04$_6$	0.04$_2$
	L_2	1.97$_5$	20.3$_4$	10.1$_1$	1.21$_3$	—	2.87$_4$	20.5$_8$	42.6$_1$	—	—	—	—
	L_3	1.96$_1$	20.1$_5$	10.1$_2$	1.19$_0$	0.08$_4$	2.84$_2$	20.4$_5$	42.5$_6$	0.01$_8$	0.10$_6$	0.04$_1$	0.03$_6$
	L_4	1.90$_2$	20.1$_4$	10.2$_1$	1.15$_0$	—	2.83$_5$	20.3$_5$	42.8$_5$	—	—	—	—
	L_5	1.94$_1$	20.4$_4$	10.1$_0$	1.19$_1$	0.08$_2$	2.82$_8$	20.4$_6$	42.5$_8$	—	0.12$_1$	0.04$_1$	0.03$_8$
	L_6	1.98$_0$	20.3$_5$	10.1$_5$	1.16$_3$	0.07$_8$	2.90$_7$	20.4$_5$	42.6$_4$	—	—	—	—
	L_7	1.98$_7$	20.3$_3$	10.1$_9$	1.23$_9$	0.08$_6$	2.85$_5$	20.3$_7$	42.5$_0$	0.01$_0$	0.12$_4$	0.04$_9$	0.03$_3$
	L_8	1.99$_3$	20.4$_3$	10.2$_1$	1.27$_6$	0.08$_5$	2.93$_6$	20.5$_3$	42.5$_2$	—	—	—	—
	L_9	2.00$_9$	20.1$_4$	10.2$_1$	1.22$_5$	0.07$_4$	2.92$_0$	20.4$_0$	42.6$_6$	—	—	—	—
Average	$(\overline{\overline{x}})$	1.966$_6$	20.30$_6$	10.16$_3$	1.204$_7$	0.081$_9$	2.871$_2$	20.47$_2$	42.63$_2$	0.013$_3$	0.117$_8$	0.044$_3$	0.037$_3$
Standard deviation (Reproducibility)	$s_{\bar{x}}$	0.032$_1$	0.12$_4$	0.04$_5$	0.038$_4$	0.004$_3$	0.045$_0$	0.09$_9$	0.11$_6$	—	—	—	—
deviation (Reproducibility without laboratories)	$s_{I(T)}$ *1	0.014$_7$	0.08$_1$	0.06$_5$	0.046$_0$	0.002$_8$	0.033$_8$	0.07$_5$	0.08$_8$	—	—	—	—
Uncertainty C (95%) *2		0.02$_5$	0.1$_0$	0.0$_3$	0.03$_0$	0.00$_4$	0.03$_5$	0.0$_8$	0.0$_9$	—	—	—	—

(Note) ＊1 $s_{I(T)}$ is intermediate precision without a time condition.　　＊2 The half-width confidence interval C (95%) = $t_{\ell-1,0.05} \times s_{\bar{x}} / \sqrt{\ell}$　(ℓ = number of laboratories)

(1) List of laboratories ： Krosaki Corporation, Kyushu Refractories Co.,Ltd., Kawasaki Refractories Co.,Ltd., Yotai Refractories Co.,Ltd., Asahi Glass Co.,Ltd., Harima Ceramic Co.,Ltd., Shinagawa Refractories Co.,Ltd., Toshiba Ceramics Co.,Ltd., Toshiba Monofrax Co.,Ltd.

(2) Analytical techniques ： JIS R 2212-5(Method for chemical analysis of refractory products — Part 5:Chrome-magnesia refractories)

(3) Analytical values ：Each value is the average of two values obtained by two measurements on different days. These analysis values are shown converted into LOI (Loss on ignition) component free values from the February 22, 2008 v20080222 version on.

(4) Outlier tests were carried out by Grubbs test. The samples rejected by Grubbs tests were discussed in view of analytical techniques and it was determined whether the outliers should be adopted or not.

(5) Date of preparation：November, 1990

Prepared, and Values given and certified by

The Technical Association of Refractories, Japan
New Ginza Bldg., 3-13, Ginza 7-chome, Chuo-ku, Tokyo 104-0061, Japan
Telephone：81-3-3572-0705　Fax：81-3-3572-0175

Distributed by

SEISHIN TRADING CO., LTD.
1-4-4, Minatojima-Minamimachi, Chuo-ku, Kobe 650-0047, Japan
Telephone：81-78-303-3810　Fax：81-78-303-3822

The Technical Association of Refractories, Japan

Certified Reference Material Series for X-ray Fluorescence Analysis of Refractories

ＪＲＲＭ　５１０　(Chrome-Magnesia Refractory)

Results of Analyses

Unit : mass%

Constituent		SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	CaO	MgO	Cr_2O_3	Uncertified value			
										P_2O_5	V_2O_5	NiO	ZnO
Certified value		4.90$_2$	12.1$_8$	14.9$_5$	0.13$_3$	0.17$_6$	0.29$_0$	16.8$_2$	50.2$_5$	0.01$_6$	0.11$_1$	0.19$_3$	0.04$_1$
Laboratories	L_1	4.90$_3$	12.2$_5$	14.9$_9$	0.12$_9$	0.18$_0$	0.28$_4$	17.0$_1$	50.3$_6$	0.01$_1$	0.11$_3$	0.19$_2$	0.03$_7$
	L_2	4.91$_8$	12.1$_9$	14.9$_4$	0.13$_8$	—	0.28$_7$	16.9$_1$	50.0$_9$	—	—	—	—
	L_3	4.87$_1$	12.0$_3$	14.8$_4$	0.13$_8$	0.17$_7$	0.27$_7$	16.6$_6$	50.2$_5$	0.02$_8$	0.09$_8$	0.17$_8$	0.03$_8$
	L_4	4.86$_1$	12.1$_3$	14.9$_5$	0.12$_9$	—	0.30$_8$	16.7$_9$	50.3$_9$	—	—	—	—
	L_5	4.88$_6$	12.2$_0$	14.9$_1$	0.13$_1$	0.18$_0$	0.30$_3$	16.9$_7$	50.3$_5$	—	0.11$_5$	0.18$_7$	0.04$_6$
	L_6	4.91$_0$	12.2$_1$	14.9$_2$	0.13$_3$	0.17$_5$	0.30$_3$	16.8$_5$	50.2$_7$	—	—	—	—
	L_7	4.94$_9$	12.1$_7$	15.0$_1$	0.13$_2$	0.18$_0$	0.28$_5$	16.9$_0$	50.1$_3$	0.01$_0$	0.11$_8$	0.21$_4$	0.04$_4$
	L_8	4.97$_9$	12.2$_8$	15.0$_5$	0.13$_6$	0.17$_7$	0.28$_1$	16.5$_8$	50.1$_5$	—	—	—	—
	L_9	4.83$_7$	12.1$_2$	14.9$_7$	0.13$_5$	0.16$_3$	0.27$_9$	16.6$_9$	50.2$_5$	—	—	—	—
Average	$(\overline{\overline{X}})$	4.901$_6$	12.17$_6$	14.95$_3$	0.133$_4$	0.176$_0$	0.289$_7$	16.81$_8$	50.24$_9$	0.016$_3$	0.111$_0$	0.192$_8$	0.041$_3$
Standard deviation (Reproducibility)	$s_{\bar{x}}$	0.043$_8$	0.07$_3$	0.06$_1$	0.003$_5$	0.006$_2$	0.011$_8$	0.14$_0$	0.10$_2$	—	—	—	—
Standard deviation (Reproducibility without laboratories)	$s_{I(T)}$ * 1	0.032$_2$	0.04$_0$	0.06$_4$	0.002$_8$	0.002$_2$	0.010$_6$	0.07$_6$	0.07$_1$	—	—	—	—
Uncertainty C (95%) *2		0.03$_4$	0.0$_6$	0.0$_5$	0.00$_3$	0.00$_6$	0.00$_9$	0.1$_1$	0.0$_8$	—	—	—	—

(Note) * 1 $s_{I(T)}$ is intermediate precision without a time condition.　　* 2 The half-width confidence interval C (95%) = $t_{\ell-1,0.05} \times s_{\bar{x}} / \sqrt{\ell}$　(ℓ = number of laboratories)

(1) List of laboratories : Krosaki Corporation, Kyushu Refractories Co.,Ltd., Kawasaki Refractories Co.,Ltd., Yotai Refractories Co.,Ltd., Asahi Glass Co.,Ltd., Harima Ceramic Co.,Ltd., Shinagawa Refractories Co.,Ltd., Toshiba Ceramics Co.,Ltd., Toshiba Monofrax Co.,Ltd.

(2) Analytical techniques : JIS R 2212-5(Method for chemical analysis of refractory products — Part 5:Chrome-magnesia refractories)

(3) Analytical values : Each value is the average of two values obtained by two measurements on different days. These analysis values are shown converted into LOI (Loss on ignition) component free values from the February 22, 2008 v20080222 version on.

(4) Outlier tests were carried out by Grubbs test. The samples rejected by Grubbs tests were discussed in view of analytical techniques and it was determined whether the outliers should be adopted or not.

(5) Date of preparation : November, 1990

Prepared, and Values given and certified by

The Technical Association of Refractories, Japan
New Ginza Bldg., 3-13, Ginza 7-chome, Chuo-ku, Tokyo 104-0061, Japan
Telephone : 81-3-3572-0705　Fax : 81-3-3572-0175

Distributed by

SEISHIN TRADING CO., LTD.
1-4-4, Minatojima-Minamimachi, Chuo-ku, Kobe 650-0047, Japan
Telephone : 81-78-303-3810　Fax : 81-78-303-3822

The Technical Association of Refractories, Japan

Certified Reference Material Series for X-ray Fluorescence Analysis of Refractories

ＪＲＲＭ　５１１　(Chrome-Magnesia Refractory)

Results of Analyses

Unit : mass%

Constituent		SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	CaO	MgO	Cr_2O_3	Uncertified value			
										P_2O_5	V_2O_5	NiO	ZnO
Certified value		2.89$_5$	6.65$_2$	27.0$_9$	0.10$_5$	0.12$_6$	0.07$_1$	10.5$_7$	52.2$_6$	0.00$_4$	0.05$_4$	0.10$_8$	0.05$_2$
Laboratories	L$_1$	2.89$_9$	6.75$_9$	27.1$_2$	0.10$_6$	0.13$_1$	0.07$_0$	10.6$_8$	52.1$_7$	0.00$_6$	0.05$_2$	0.10$_7$	0.05$_5$
	L$_2$	2.91$_4$	6.72$_3$	27.1$_7$	0.10$_9$	—	0.06$_4$	10.5$_4$	52.1$_4$	—	—	—	—
	L$_3$	2.83$_6$	6.53$_7$	26.8$_1$	0.10$_9$	0.12$_7$	0.06$_2$	10.5$_3$	52.1$_3$	<0.00$_1$	0.05$_0$	0.10$_0$	0.04$_8$
	L$_4$	2.93$_4$	6.51$_6$	27.2$_1$	0.08$_8$	—	0.09$_4$	10.5$_2$	52.4$_6$	—	—	—	—
	L$_5$	2.85$_0$	6.62$_4$	27.0$_5$	0.10$_5$	0.12$_9$	0.07$_0$	10.5$_5$	52.2$_3$	—	—	—	—
	L$_6$	2.90$_6$	6.65$_6$	27.1$_5$	0.09$_4$	0.12$_7$	0.07$_2$	10.5$_4$	52.1$_1$	—	—	—	—
	L$_7$	2.91$_6$	6.66$_2$	27.0$_9$	0.10$_5$	0.12$_9$	0.07$_4$	10.5$_9$	52.2$_7$	0.00$_2$	0.05$_9$	0.11$_6$	0.05$_4$
	L$_8$	2.94$_7$	6.71$_6$	27.0$_8$	0.11$_0$	0.12$_9$	0.05$_8$	10.5$_9$	52.4$_2$	—	—	—	—
	L$_9$	2.85$_5$	6.67$_4$	27.1$_0$	0.11$_5$	0.11$_1$	0.07$_2$	10.5$_5$	52.4$_2$	—	—	—	—
Average	$(\overline{\overline{X}})$	2.895$_2$	6.651$_9$	27.08$_7$	0.104$_6$	0.126$_1$	0.070$_7$	10.56$_6$	52.26$_1$	0.00$_4$	0.053$_7$	0.107$_7$	0.052$_3$
Standard deviation (Reproducibility)	$s_{\overline{x}}$	0.039$_0$	0.082$_6$	0.11$_7$	0.008$_8$	0.006$_6$	0.010$_4$	0.04$_7$	0.13$_3$	—	—	—	—
deviation (Reproducibility without laboratories)	$s_{I(T)}$ *1	0.026$_2$	0.022$_6$	0.11$_4$	0.002$_5$	0.003$_0$	0.005$_4$	0.06$_7$	0.04$_1$	—	—	—	—
Uncertainty C (95%) *2		0.03$_0$	0.06$_3$	0.0$_9$	0.00$_7$	0.00$_6$	0.00$_8$	0.0$_4$	0.1$_0$	—	—	—	—

(Note) ＊1 $s_{I(T)}$ is intermediate precision without a time condition.　　＊2 The half-width confidence interval C (95%) = $t_{\ell-1,0.05} \times s_{\overline{x}} / \sqrt{\ell}$　(ℓ = number of laboratories)

(1) List of laboratories ： Krosaki Corporation, Kyushu Refractories Co.,Ltd., Kawasaki Refractories Co.,Ltd., Yotai Refractories Co.,Ltd., Asahi Glass Co.,Ltd., Harima Ceramic Co.,Ltd., Shinagawa Refractories Co.,Ltd., Toshiba Ceramics Co.,Ltd., Toshiba Monofrax Co.,Ltd.

(2) Analytical techniques ： JIS R 2212-5(Method for chemical analysis of refractory products — Part 5:Chrome-magnesia refractories)

(3) Analytical values ：Each value is the average of two values obtained by two measurements on different days. These analysis values are shown converted into LOI (Loss on ignition) component free values from the February 22, 2008 v20080222 version on.

(4) Outlier tests were carried out by Grubbs test. The samples rejected by Grubbs tests were discussed in view of analytical techniques and it was determined whether the outliers should be adopted or not.

(5) Date of preparation : November, 1990

Prepared, and Values given and certified by

The Technical Association of Refractories, Japan
New Ginza Bldg., 3-13, Ginza 7-chome, Chuo-ku, Tokyo 104-0061, Japan
Telephone : 81-3-3572-0705　Fax : 81-3-3572-0175

Distributed by

SEISHIN TRADING CO., LTD.
1-4-4, Minatojima-Minamimachi, Chuo-ku, Kobe 650-0047, Japan
Telephone : 81-78-303-3810　Fax : 81-78-303-3822

The Technical Association of Refractories, Japan

Certified Reference Material Series for X-ray Fluorescence Analysis of Refractories

ＪＲＲＭ　５１２　(Chrome-Magnesia Refractory)

Results of Analyses

Unit : mass%

Constituent		SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	CaO	MgO	Cr_2O_3	Uncertified value			
										P_2O_5	V_2O_5	NiO	ZnO
Certified value		10.57	29.26	26.02	0.047	0.025	4.063	24.82	4.990	0.019	0.012	0.018	0.013
Laboratories	L_1	10.69	29.33	26.24	0.043	0.024	4.063	24.86	4.976	0.020	0.011	0.019	0.009
	L_2	10.61	29.25	26.13	0.053	—	4.073	24.77	5.038	—	—	—	—
	L_3	10.62	29.11	25.82	0.044	0.023	4.040	24.74	4.922	0.018	0.012	0.018	0.012
	L_4	10.33	29.35	26.02	0.042	—	4.042	24.96	4.966	—	—	—	—
	L_5	10.69	29.31	26.05	0.045	0.022	4.048	24.77	4.998	—	0.009	0.015	0.018
	L_6	10.60	29.18	26.16	0.046	0.030	4.071	24.81	4.976	—	—	—	—
	L_7	10.67	29.27	25.86	0.050	0.026	4.043	24.80	5.014	0.019	0.014	0.022	0.014
	L_8	10.48	29.41	25.92	0.048	0.025	4.102	24.85	5.025	—	—	—	—
	L_9	10.47	29.14	25.97	0.048	0.024	4.082	24.82	4.996	—	—	—	—
Average	$(\overline{\overline{X}})$	10.573	29.261	26.019	0.0466	0.0249	4.0627	24.820	4.9901	0.0190	0.0115	0.0185	0.0133
Standard deviation (Reproducibility)	$s_{\bar{x}}$	0.121	0.098	0.140	0.0036	0.0026	0.0216	0.064	0.0353	—	—	—	—
(Reproducibility without laboratories)	$s_{I(T)}$ *1	0.064	0.090	0.127	0.0015	0.0010	0.0379	0.106	0.0361	—	—	—	—
Uncertainty C (95%) *2		0.09	0.08	0.11	0.003	0.002	0.017	0.05	0.027	—	—	—	—

(Note) ＊1 $s_{I(T)}$ is intermediate precision without a time condition.　　＊2 The half-width confidence interval C (95%) = $t_{\ell-1,0.05} \times s_{\bar{x}} / \sqrt{\ell}$　(ℓ = number of laboratories)

(1) List of laboratories ： Krosaki Corporation, Kyushu Refractories Co.,Ltd., Kawasaki Refractories Co.,Ltd., Yotai Refractories Co.,Ltd., Asahi Glass Co.,Ltd., Harima Ceramic Co.,Ltd., Shinagawa Refractories Co.,Ltd., Toshiba Ceramics Co.,Ltd., Toshiba Monofrax Co.,Ltd.

(2) Analytical techniques ： JIS R 2212-5(Method for chemical analysis of refractory products — Part 5:Chrome-magnesia refractories)

(3) Analytical values ：Each value is the average of two values obtained by two measurements on different days. These analysis values are shown converted into LOI (Loss on ignition) component free values from the February 22, 2008 v20080222 version on.

(4) Outlier tests were carried out by Grubbs test. The samples rejected by Grubbs tests were discussed in view of analytical techniques and it was determined whether the outliers should be adopted or not.

(5) Date of preparation：November, 1990

Prepared, and Values given and certified by

The Technical Association of Refractories, Japan
New Ginza Bldg., 3-13, Ginza 7-chome, Chuo-ku, Tokyo 104-0061, Japan
Telephone：81-3-3572-0705　Fax：81-3-3572-0175

Distributed by

SEISHIN TRADING CO., LTD.
1-4-4, Minatojima-Minamimachi, Chuo-ku, Kobe 650-0047, Japan
Telephone：81-78-303-3810　Fax：81-78-303-3822