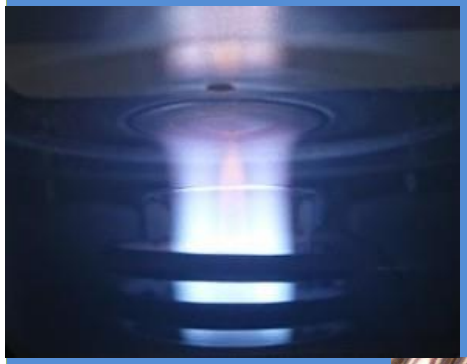
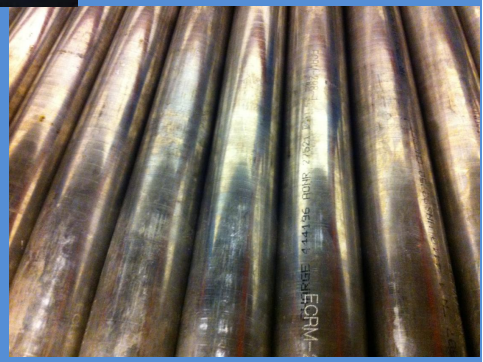
Certified Reference Materials 2023





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Introduction

The production of reference materials in the ECRM- and JK-series is directed by the Nordic CRM Working Group (NCRMWG), with representatives from the Nordic Steel and Iron industry. In 2023 the members are:

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In 1938, the production of certified reference materials (CRMs) in the JK-series was initiated in a close co-operation between Jernkontoret (The Swedish Steel Producers' Association) and Metallografiska Institutet (The Metallographic Institute), and four years later in 1942 seven steel CRMs became commercially available. It was also decided that every CRM produced should be given a prefix, namely JK, the abbreviation of Jernkontoret.

Since its foundation back in 1747, Jernkontoret (JK) has been owned jointly by the Swedish steel companies. Jernkontoret represents Sweden's steel industry on issues that relate to education, trade policy, research and development, standardisation, energy and environment as well as taxes and levies. Jernkontoret also manages the joint Nordic research in the steel industry. In addition, Jernkontoret draws up statistical information relating to the industry and carries on research into the history of mining and metallurgy.

Oy Narema Ab was founded in 2019, as a consultancy agency and chemical analys laboratory primarily supporting companies in the Nordic countries in the iron, steel and metal industries as well as mechanical industries. As of 1st of January 2020 the responsibility of the certification of Jernkontoret´s reference materials were transferred from Swerim AB to Oy Narema Ab. Certification analyses are carried out in accordance with principles in the ISO Guides 30-35 and ISO 17034. In 1998 the Nordic CRM Working Group became a member of EURONORM CRM Producers Group.

Further information can be found on: www.narema.fi

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Euronorm CRM (ECRM) and CRM in the JK Series

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1. LOW ALLOYED STEEL

JK 21 – chips, NW 150g

	C	Si	Mn	P	S	Cr	Ni	Mo	Co	V	Ti	Cu	$Al_{Acid\ Sol}$	$Al_{Non\text{-}acid\ Sol}$	Sn	Nb	N
JK 21	**0.1741**	**0.36**	**1.46**	**0.0148**	**0.011**	**0.024**	**0.035**	**0.004**	**0.008**	**0.002**	**0.0008**	**0.045**	**0.032**	**0.005**	**0.006**	**0.0175**	**0.008**

	As	Cd	Pb	Sb	Ta	W	Zn	Zr
JK 21	*100*	*1*	*10*	*10*	*10*	*6*	*7*	*10*

ECRM 196-2 – chips, NW 100g, discs 38 mm dia.

	C	Si	Mn	P	S	Cr	Mo	Ni	Al_{tot}	As	B	Co	Cu
ECRM 196-2	**0.0060**	**1.808**	**0.364**	**0.00369**	**0.00065**	**0.0282**	**0.0142**	**0.0401**	**0.2167**	**0.00033**	**0.00014**	**0.0138**	**0.0057**

	N	Sn	Ti	V	Ca	Mg	Zn
ECRM 196-2	**0.00178**	**0.00047**	**0.00253**	**0.00368**	**0.00071**	**0.00075**	**0.00019**

Carbon Steel

ECRM 197-1 – chips, NW 100g and disc**,** 38d x 25mm

	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	N	Al_{tot}	As	Co	Sn	Ti
ECRM 197-1	**0.219**	**0.275**	**0.792**	**0.0073**	**0.0232**	**0.451**	**0.402**	**0.148**	**0.152**	**0.0114**	**0,0313**	**0.0083**	**0.0135**	**0.0097**	**0.0005**

	V	Bi	Sb	Pb	$Al_{acid\ sol}$
ECRM 197-1	*50*	*0.1*	*18*	*3*	*0.027*

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1. LOW ALLOYED STEEL (continued)

Carbon Steel (continued)

JK 3B – chips, NW 150g

	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Co	Al_{tot}	Sn
JK 3B	**0.742**	**0.251**	**0.803**	**0.0101**	**0.0071**	**0.0529**	**0.0591**	**0.0051**	**0.0054**	**0.0175**	**0.0048**	**0.0036**	**0.0044**

	Pb	Ti	Sb	As	Ca	Zn	O	Mg	Ag	Bi	V
JK 3B	*2*	*20*	*7*	*20*	*5*	*3*	*180*	*1*	*0.2*	*1*	*20*

JK 20A – chips, NW 150g

	C	S	N	V	W	Pb
JK 20A	**1.263**	**0.0094**	**0.0027**	**0.161**	**1.75**	**0.160**

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2. HIGH ALLOYED STEEL

ECRM 270-1 – chips, NW 100g and disc, 38d x 25mm

	C	Si	Mn	P	S	Cr	Mo	Ni	Co	Cu	N	V	Ce	La
ECRM 270-1	**0.0742**	**1.517**	**0.540**	**0.0196**	**0.0007**	**20.88**	**0.2099**	**10.86**	**0.0685**	**0.1076**	**0.1417**	**0.0256**	**0.0487**	**0.0154**

	Al	As	Ba	Dy	Er	Eu	Ga	Gd	Ge	Hf	Ho	Ir	Lu	Mg	Nd	Os	Pr	Pt	Rb
ECRM 270-1	*23*	*34*	*1.8*	*0.013*	*0.0045*	*< 0.01*	*21*	*< 1.3*	*6*	*0.02*	*< 0.002*	*0.2*	*< 0.002*	*9*	*76*	*0.4*	*29.5*	*0.1*	*6*

	Re	Rh	Ru	Sb	Sc	Sm	Sn	Ta	Tb	Th	Ti	Tl	Tm	U	W	Y	Yb	Zn	Zr
ECRM 270-1	*0.4*	*0.2*	*2*	*7*	*< 0.02*	*< 0.1*	*35*	*0.1*	*< 0.045*	*0.002*	*19*	*0.006*	*< 0.002*	*0.01*	*244*	*< 0.18*	*< 0.003*	*7.4*	*2*

ECRM 379-1 – chips, NW 100g and disc, 38d x 25mm

	C	Si	Mn	P	S	Cr	Mo	Ni	B	Co	Cu	N	Sn	V	Ca	Sb
ECRM 379-1	**0.0121**	**0.393**	**1.804**	**0.0166**	**0.0006**	**26.79**	**3.290**	**30.83**	**0.00190**	**0.0390**	**0.984**	**0.0550**	**0.0021**	**0.0663**	**0.0033**	**0.00057**

	Al	As	Nb	O	Pb	Ti	Bi	Fe	Ag	Ce	Cs	Ga	Ir	Mg	Nd	Os
ECRM 379-1	*246*	*28*	*28*	*27*	*0.38*	*14*	*0.01*	*356 000*	*0.7*	*0.1*	*0.01*	*23*	*0.1*	*6*	*0.6*	*0.07*

	Pr	Pt	Rb	Re	Rh	Ru	Sm	Ta	W	Y	Zr
ECRM 379-1	*0.2*	*0.04*	*4.3*	*2.4*	*0.4*	*1.4*	*0.6*	*0.04*	*91*	*0.1*	*3.3*

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2. HIGH ALLOYED STEEL (continued)

Vanadium Steel

ECRM 274-1 – chips, NW 100g and disc**,** 38d x 25mm

	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	N	V	W
ECRM 274-1	**1.563**	**1.057**	**0.397**	**0.0148**	**0.0096**	**8.036**	**1.4551**	**0.077**	**0.0281**	**0.0769**	**4.010**	**0.0087**

	O	Al_{tot}	Co	As	B	Pb	Sb	Sn	Ti
ECRM 274-1	*26*	*25*	*230*	*13*	*5*	*0.64*	*2*	*10*	*11*

Duplex Stainless Steel

ECRM 298-2 – chips, NW 100g and disc**,** 38d x 25mm

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	N
ECRM 298-2	**0.0140**	**0.331**	**0.786**	**0.0210**	**0.0006**	**24.91**	**3.781**	**6.877**	**0.0148**	**0.0028**	**0.0024**	**0.0482**	**0.105**	**0.277**

	Nb	Sn	Ti	V	W	Sb
ECRM 298-2	**0.0011**	**0.0029**	**0.0023**	**0.0704**	**0.0094**	**0.0006**

	Ga	Re	Pb	Zn	Zr
ECRM 298-2	*40*	*3*	*<1*	*6*	*<1*

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2. HIGH ALLOYED STEEL (continued)

Chromium - nickel - molybdenum alloyed steel

JK 7B – chips, NW 150g

	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Al_{sol}	Al_{tot}	V
JK 7B	**0.342**	**0.267**	**0.697**	**0.0057**	**0.0064**	**1.34**	**1.34**	**0.182**	**0.0050**	**0.021**	**0.010**	**0.014**	**0.004**

Tool steel

JK 12A – chips, NW 150g

	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Co	V	W	Sn	Pb
JK 12A	**0.886**	**0.30**	**0.312**	**0.020**	**0.023**	**4.04**	**0.191**	**4.85**	**0.0259**	**0.062**	**0.189**	**1.94**	**6.42**	**0.007**	**0.0004**

ECRM 268-1 – chips, NW 150g and disc, 38d x 25mm

	C	Si	Mn	P	S	Cr	Mo	Ni	As	B	Co	Cu	N	Sn	V
ECRM 268-1	**1.134**	**0.373**	**0.293**	**0.0209**	**0.0154**	**4.578**	**3.208**	**0.1437**	**0.0062**	**0.0009**	**0.0290**	**0.1232**	**2.030**	**0.0078**	**8.478**

	W	Sb	*Nb*	*Ta*
ECRM 268-1	**3.707**	**0.0017**	*13*	*2*

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Austenitic Stainless Steel

JK 27B – chips, NW 150g and disc**,** 38d x 25mm

	C	Si	Mn	P	S	Cr	Mo	Ni	B	Co	Cu	N	Sn	V	W	Ca
JK 27B	**0.0089**	**0.401**	**1.510**	**0.0298**	**0.0207**	**17.36**	**2.510**	**12.56**	**0.00072**	**0.142**	**0.265**	**0.0630**	**0.0068**	**0.057**	**0.031**	**0.0022**

	Al	Pb	Ti	Zn	Ag	As	Ga	Re	Sb	Zr
JK 27B	*20*	*1*	*2*	*2*	*27*	*63*	*30*	*3*	*14*	*3*

3. SLAGS, INDUSTRIAL FLY ASHES and IRON ORES/POWDERS

Slags

ECRM 883-1 (blast furnace slag) - powder, NW 100g

In the following table, certified and non-certified concentrations are given in W/W %.

	Fe	Si	Ca	Mg	Al	Ti	Mn	P	S	Na	K	V
ECRM 883-1	**0.9820**	**16.67**	**21.32**	**8.86**	**6.55**	**1.3331**	**0.546**	**0.0033**	**1.0885**	**0.316**	**0.393**	**0.122**

	Cr	Ni	Mo	Ba	Sr	Zr
ECRM 883-1	**0.0130**	**0.00053**	**< 0.001**	**0.0436**	**0.0380**	**0.0276**

	As	B	Be	Bi	C	Cd	Ce	Co	Cs	Cu	F	Hf	Hg	Li
ECRM 883-1	*0.0001*	*0.0064*	*0.0006*	*0.000001*	*0.135*	*0.00002*	*0.014*	*0.00006*	*0.00003*	*0.0001*	*0.04*	*0.0008*	*0.000001*	*0.006*

	Nb	Pb	Rb	Sb	Sc	Se	Ta	Te	Th	U	W	Y	Zn
ECRM 883-1	*0.002*	*0.0001*	*0.001*	*0.000002*	*0.003*	*0.0004*	*0.0001*	*0.000003*	*0.008*	*0.001*	*0.00002*	*0.006*	*0.001*

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JK S10 and JK S 11 – powder, NW 100g

		F	CaF_2	Ca_{tot}	CaO	SiO_2	Al_2O_3	FeO	MnO	MgO	TiO_2	V_2O_5	C	P	P_2O_5	Cr_2O_3	S
JK S 10	*ESR-slag-low Al*	**34.4**	**70.7**	**50.8**	**20.3**	**7.8**	**0.54**	**0.10**	**0.03**	**0.30**	**0.05**	*< 100*	**0.022**	**0.002**	…	…	…
JK S 11	*AOD-slag*	**7.9**	…	…	**60.0**	**26.8**	**2.85**	**0.2**	**0.12**	**4.7**	**0.95**	*< 100*	…	…	*< 50*	**0.17**	**0.30**

Industrial fly ashes

ECRM 882-1 – powder, NW 100g

In the following table, certified and non-certified concentrations are given in W/W %.

	Fe	Ca	Al	Na	K	Zn	Pb	Cd	Cr	Ni	Cu	V	As	Bi	Sb	Hg
ECRM 882-1	**22.20**	**10.11**	**0.375**	**0.697**	**0.960**	**28.49**	**1.324**	**0.0183**	**0.490**	**0.0263**	**0.218**	**0.0090**	**0.0054**	**0.0026**	**0.0116**	**0.000075**

	Sn	Si	Mn	Mg	Cl	C	S	F
ECRM 882-1	*0.02*	*1.05*	*2*	*0.48*	*2.35*	*1.0*	*0.5*	*0.07*

JK 43 and JK 45 – powder, NW 15g

JK 44 – powder, NW 25g

In the following table, certified and non-certified concentrations are given in W/W %.

	Zn	Pb	Cd	Hg	Fe	Cr	Ni	Ca	Na	K	Al	V	Cu
JK 43	**4.96**	**0.21**	**0.0023**	**0.00039**	*20*	*8*	*2*	*12*	*0.5*	*0.3*	*0.2*	*0.02*	*0.2*
JK 44	**27.3**	**2,74**	**0.0469**	**0.00028**	*27*	*0.2*	*0.02*	*5*	*1*	*1.3*	*0.2*	*0.02*	*0.2*
JK 45	**1.53**	**0.11**	**0.0047**	**0.000025**	*40*	*0.3*	*0.05*	*7*	*7*	*0.4*	*0.1*	*0.1*	*0.01*

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Iron ores

ECRM 688-1 (magnetite) – powder, NW 100g

	Fe	**Si**	**Ca**	**Mg**	**Al**	**Ti**	**Mn**	**P**	**Ni**	**Na**	**K**	**Co**	**Cu**	**V**	**Pb**	**Zn**
ECRM 688-1	**61.38**	**3.383**	**1.449**	**1.061**	**0.679**	**0.408**	**0.0457**	**0.337**	**0.0136**	**0.333**	**0.180**	**0.0096**	**0.0023**	**0.135**	**0.00025**	**0.0015**

	As	**B**	**Be**	**Ce**	**Cr**	**Ga**	**Gd**	**Hf**	**Hg**	**Ho**	**La**	**Lu**	**Nb**	**Nd**	**Pr**	**Rb**	**S**	**Sb**	**Sc**	**Se**	**Sm**	**Sn**	**Sr**
ECRM 688-1	*11*	*5*	*1*	*55*	*21.7*	*36*	*3.5*	*0.4*	*0.5*	*0.7*	*26*	*0.3*	*1.6*	*26*	*7*	*9*	*468*	*0.1*	*7*	*0.7*	*4.6*	*3.3*	*19*

	Ta	**Tb**	**Th**	**Tm**	**U**	**Y**	**Yb**	**Zr**
ECRM 688-1	*0.1*	*0.6*	*14*	*0.3*	*2*	*19*	*2*	*15*

ECRM 689-1 – powder, NW 100g

	Fe	**Ca**	**Mg**	**Al**	**Ti**	**Mn**	**P**	**Na**	**K**	**V**	**Ni**	**Zn**	**Co**	**Cu**
ECRM 689-1	**57.05**	**1.183**	**0.980**	**1.185**	**0.3264**	**0.1196**	**0.0706**	**0.638**	**0.462**	**0.1020**	**0.0195**	**0.0042**	**0.0103**	**0.0068**

	Si	***S***	***F***	***Cr***	***C***	***Sn***	***Cl***	***GoI***
ECRM 689-1	*5*	*0.06*	*0.07*	*0.003*	*0.25*	*0.0003*	*0.015*	*1.5*

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Iron ores

JK 29A and JK 42A (magnetite) – powder, NW 100g

	Fe	SiO_2	CaO	MgO	Al_2O_3	TiO_2	MnO	P	S	Na_2O	K_2O	V_2O_5	Cr	Ni	Zn	Co	Cu
JK 29A	**71.36**	**0.33**	**0.082**	**0.223**	**0.232**	**0.292**	**0.0632**	**0.0059**	**0.0059**	**0.015**	**0.0087**	**0.266**	**0.0057**	**0.0167**	**0.0016**	**0.0106**	**0.0007**
JK 42A	**70.66**	**0.800**	**0.199**	**0.382**	**0.278**	**0.385**	**0.0506**	**0.0247**	**0.0082**	**0.043**	**0.0157**	**0.251**	**0.0010**	**0.0129**	**0.0015**	**0.0105**	**0.0007**

	F	Pb	As	Sn	Cl	Ba	Gol	Zr	Ag	Au	B	Be	Bi	Cd	Ce	Cs	Ga	Ge	Hf	Hg	I
JK 29A	*40*	*< 10*	*< 3*	*2*	*30*	*3*	*3.2%*	*2*	*< 0.1*	*< 0.1*	*0.4*	*0.1*	*< 0.1*	*< 0.1*	*0.7*	*< 0.1*	*41*	*0.7*	*0.1*	*< 0.1*	*< 0.1*
JK 42A	*117*	*< 10*	*< 3*	*3*	*100*	*4*	*3.3%*	*4*	*< 0.1*	*< 0.1*	*1*	*0.2*	*< 0.1*	*< 0.1*	*9*	*< 0.1*	*37*	*0.8*	*0.1*	*< 0.1*	*< 0.1*

	Ir	La	Li	Mo	Nb	Rb	Sb	Sc	Se	Ta	Th	Tl	U	W	Y	Re	Os
JK 29A	*< 0.1*	*3*	*1.4*	*0.8*	*0.3*	*0.3*	*< 0.1*	*1.3*	*< 0.2*	*0.1*	*6*	*< 0.1*	*1.1*	*0.2*	*1.0*	*< 0.1*	*< 0.1*
JK 42A	*< 0.1*	*5*	*1*	*0.3*	*0.8*	*0.6*	*< 0.1*	*2*	*< 0.2*	*0.1*	*11*	*< 0.1*	*2*	*0.1*	*2*	*< 0.1*	*< 0.1*

JK 52 and JK 53 - powder, NW 100g

	Fe	Fe(II)	SiO_2	CaO	MgO	Al_2O_3	TiO_2	MnO	Na_2O	K_2O	V_2O_5	Cr	Ni	Zn	Co	Cu
JK 52	**66.76**	**1.06**	**2.58**	**0.464**	**0.510**	**0.399**	**0.284**	**0.0485**	**0.0406**	**0.0321**	**0.252**	**0.0137**	**0.0172**	**0.0021**	**0.0095**	**0.0009**
JK 53	**67.82**	*<0.3%*	**0.795**	**0.933**	**0.691**	**0.165**	**0.164**	**0.0609**	**0.0406**	**0.0315**	**0.188**	**0.0039**	**0.0178**	**0.0021**	**0.0074**	*<0.04%*

	P	S	Cl	Ag	As	B	Ba	Be	Bi	Cd	Ce	Cs	Dy	Er	Eu	F	Ga	Hf	Hg	Ho	La
JK 52	*<0.01%*	*27*	*24*	*<0.01*	*0.05*	*<0.5*	*12*	*0.2*	*0.01*	*<0.02*	*7*	*0.08*	*0.3*	*0.2*	*0.1*	*1*	*33*	*0.7*	*<0.02*	*0.1*	*4*
JK 53	**0.0245**	*28*	*23*	*<0.01*	*0.06*	*<0.5*	*11*	*0.4*	*0.05*	*<0.02*	*13*	*0.03*	*0.8*	*0.6*	*0.2*	*3*	*20*	*0.8*	*<0.02*	*0.2*	*7*

	Li	Lu	Nb	Nd	Pb	Pd	Pr	Pt	Rb	Re	Ru	Sb	Sc	Se	Sm	Sn	Sr	Ta	Tb	Te	Th
JK 52	*2*	*0.05*	*0.8*	*3*	*0.9*	*<0.02*	*0.8*	*<0.01*	*1*	*<0.01*	*<0.01*	*0.1*	*1*	*<0.5*	*0.6*	*2*	*5*	*0.3*	*0.05*	*<0.02*	*6*
JK 53	*2*	*0.07*	*1*	*6*	*0.7*	*<0.02*	*1*	*<0.01*	*1*	*<0.01*	*<0.01*	*0.1*	*2*	*<0.5*	*0.7*	*1*	*9*	*0.4*	*0.1*	*<0.01*	*7*

	Tl	Tm	U	W	Y	Yb	Zr	LOI
JK 52	*<0.01*	*0.03*	*0.9*	*2*	*3*	*0.3*	*43*	*220*
JK 53	*<0.01*	*0.05*	*0.9*	*2*	*6*	*0.3*	*37*	*220*

Iron powder

JK 47A– powder, NW 35g

In the following tables, certified and non-certified concentrations are given in W/W %.

	O	N	C	*S*
JK 47A	**0.69**	**0.0062**	**0.370**	*0.0090*

JK 55 – powder, NW 100g

	Fe_{tot}	Fe_M	SiO_2	*CaO*	*MgO*	Al_2O_3	TiO_2	*MnO*	*P*	K_2O	V_2O_5	*GOI*
JK 55	*92.47*	*84.15*	*1.0*	*1.2*	*0.86*	*0.21*	*0.17*	*0.084*	*0.036*	*0.032*	*0.27*	*36*

Jernkontoret NAREMA

Certified concentrations are given in bold text and in W/W %. Non-certified elements, i.e. elements only given as supplemental information, are normally given in italics and in µg/g, if not stated otherwise. The number of values for the supplemental concentrations varies from 1 to 13 individual determinations. Please, order the certificate from crm@narema.fi for detailed information.

4. STEEL WITH SPECIAL ELEMENT SPECIFICATION

High alloyed steel

JK 25 (cerium) – chips, NW 150g

	Ce	Cr	La	Mn	Mo	Nd	Ni	Pr
JK 25	**0.096**	*22.3*	*0.015*	*1.7*	*0.1*	*0.015*	*11.3*	*0.006*

JK 36, JK 54 (carbon, sulphur, nitrogen and oxygen) – JK 36-chips, NW 150g and JK 54-punched discs 100 pieces á 1.1g.

	C	S	N	O	*H*
JK 36	**0.0125**	**0.0126**	**0.0337**		
JK 54	**0.0535**	**0.0007**	**0.0229**	**0.0046**	*0.00023*

JK 31, JK 32 and JK 34 (oxygen) – rods, 10 x 400-500mm

In the following table, certified and non-certified concentrations are given in W/W %.

	O	C	Si	Mn	Cr	Ni	Al_{sol}	Al_{tot}
JK 31	**0.0015**	*1.03*	*0.32*	*0.36*	…	…	*0.020*	*0.021*
JK 32	**0.0028**	*1.02*	*0.32*	*0.30*	*1.38*	…	*0.008*	*0.011*
JK 34	**0.0068**	*0.13*	*0.31*	*1.40*	…	…	*0.047*	*0.051*

Certified concentrations are given in bold text and in W/W %. Non-certified elements, i.e. elements only given as supplemental information, are normally given in italics and in µg/g, if not stated otherwise. The number of values for the supplemental concentrations varies from 1 to 13 individual determinations. Please, order the certificate from crm@narema.fi for detailed information.

5. FERRO ALLOYS

Ferrosilicon

JK 39 – powder, NW 50g

	C	Si	Mn	P	Fe	Ti	Cu	Al_{tot}	Ca
JK 39	**0.105**	**75.9**	**0.165**	**0.018**	**21.6**	**0.116**	**0.013**	**1.45**	**0.24**

	B	Mg	Cr	Ni	Co	V	As	Zn
JK 39	*700*	*100*	*100*	*80*	*20*	*70*	*30*	*10*

6. FLOURSPARS

JK D – powder, NW 100g

In the following table, certified and non-certified concentrations are given in W/W %.

	F	CaF_2	SiO_2	P	S	Al_2O_3	Fe_2O_3	Pb
JK D	**47.24**	**97.07**	***1.5***	**0.035**	**0.004**	**0.04**	**0.20**	*<0.001*

Certified concentrations are given in bold text and in W/W %. Non-certified elements, i.e. elements only given as supplemental information, are normally given in italics and in µg/g, if not stated otherwise. The number of values for the supplemental concentrations varies from 1 to 13 individual determinations. Please, order the certificate from crm@narema.fi for detailed information.

7. SETTING UP STANDARDS

Ceramics

CE 650A (high oxygen) – disc, 25d x 8mm

In the following table are the concentrations given in W/W %.

	O	Al	C_{tot}	Ti	Fe	W
CE 650A	*30*	*34*	*6*	*21*	*2.1*	*0.8*

Steel plate with a layer of electroless nickel (NiP alloy)

JK SUS NiP-1

This setting up standard is intended for calibration of depth profile measurements mainly by GD-OES. The layer has been applied on both sides of the steel plate.
In the following table are the concentrations given in W/W %.

	P	Pb	Ni
JK SUS NiP-1	*5.8 ± 0.2*	*0.26 ± 0.02*	*balance*

The layer thickness is given in µm

	Layer thickness
JK SUS NiP-1	*8.7 ± 0.5*

Zinc discs

JK SUS Zn-1, JK SUS Zn-2, JK SUS Zn-5 (zinc discs with impurities) - disc 40x40 mm, height 10mm

In the following table are the concentrations given in µg/g.

O	Ag	Al	Bi	Cd	Cr	Cu	Fe	Ga	In	Mn	Ni	Pb	Sb	Sn	Tl
JK SUS Zn-1	2	2024	0.2	14	55	14	273	*0.4*	…	*6*	*43*	*21*	*0.1*	*0.3*	*8*
JK SUS Zn-2	2	1394	56	75	63	19	314	*0.4*	…	*7*	*43*	*77*	*34*	*61*	*5*
JK SUS Zn-5	*2*	*1992*	136	63	81	15	318	*19*	*29*	*9*	*47*	*108*	*24*	*99*	*3*

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Umwelt- & Betriebsanalytik, voestalpine Stahl GmbH, Linz
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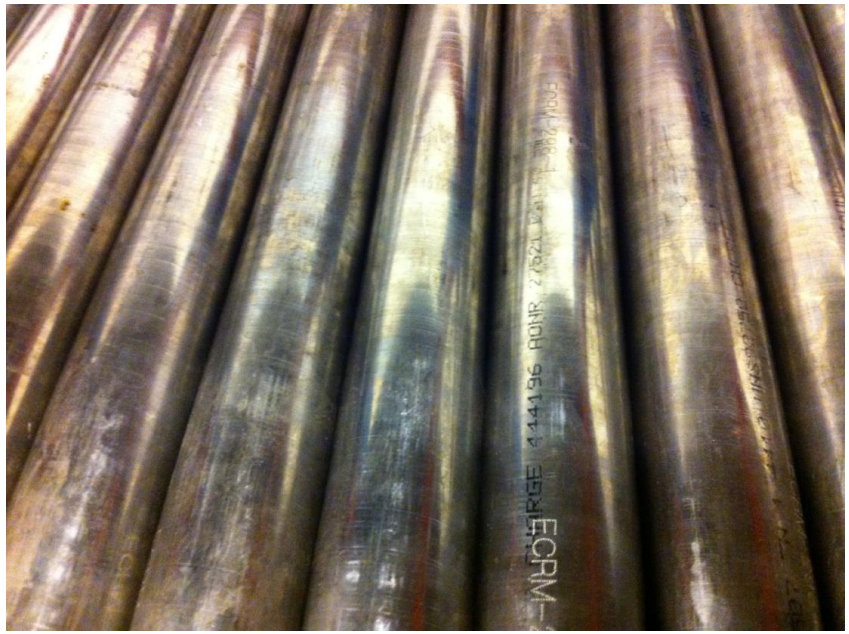

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