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BP 9

Agence de LENS
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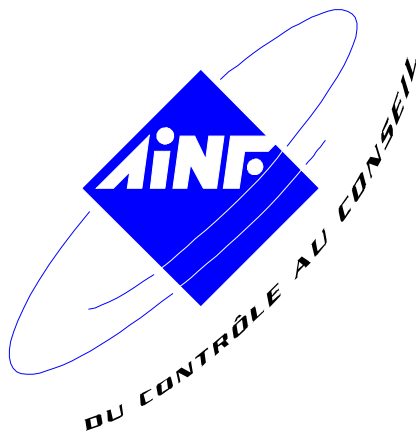
59590 RAISMES

A l'attention de Mr NOWAK

BORDEREAU D'ENVOI DE DOCUMENTS

N/Réf - UPR/JPG-RS/SB - n° 99191 le : 9 octobre 2003

Nombre d'exemplaires	Désignation
2	Compte-rendu relatif aux mesures en ambiance lors d'opération de soudage de rails pour déterminer les teneurs de polluants dans les fumées selon les creusets utilisés (version anglaise).



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Vérifications réglementaires

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- Installations et équipements ◆
- Appareils à pression ◆
 - Chaufferies ◆
- Chantiers - Bâtiment ◆
 - ERP-IGH ◆

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 - Energie ◆

Audit et management

- Qualité ◆
- Sécurité ◆
- Environnement ◆

Formation

- Dans les différents domaines d'intervention d'AINF ◆

Subject : environmental measures at the time of operation of welding of rails to determine the contents of pollutants in the fume according to crucibles' used.

Vérificateurs : Julien-Pierre GERONIMI et Reynald SAKOWICZ

Dates : 18 february et 10 april 2003

People met : Mrs DELCROIX et NOWAK

This report cancels and replaces our precede serding by

Lens, it 09 october 2003

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DO/IM-de002/C

Number of project : 99191
Number of task : 0001-A2A5
Number AGR : 20457140 – R6 - SB



I - OBJECT

Environmental measures, to determine the composition of the fume at the time of operations of welding of rail by aluminothermic reaction. tests of welding with three different supports.

Determination of the concentration of the following parameters:

- dust inhalables and collected maximum fraction (FMC), with two flows of slightly different taking away for the FMC (20 and 22 l/mn); in all, a inhalable measurement and two FMC by test of crucible
- - determination of the particulate concentration of following metals: Al, Cr, Fe, Mn, Ni, Zn. Seek on the filter charged with three measurements above
- - content Nox, CO, CO2 and Phenol

All these measurements proceeded in fixed station, except for phenol where we added a mobile station

The analysis of the samples was carried out by various laboratories: CARSO, CERECO and IMT.

II - METHODOLOGY

1) Course of measurements

To the room, all the doors were closed and the hood of stopped extraction; with a natural ventilation between each test, 5 minutes for renouveler the air with the external door .

The measuring points for dust inhalables and FMC as well as phenol are at approximately 0.5m crucible laterally and with 1m60 in height compared to the flagstone or the welding is carried out (see the photographs below).

The intake points for tubes DRAGÈR are at approximately 1m60 ground and has 1 m of the crucible.





2) Levy method

All these measures proceeded in fixed station, the levy support being laid out on a tripod to a huator of approximately 1m60 of the soil.

except for phenol for which we carried out a measurement on the welder during the totality of the operation and two stations fixed located at 1m of crucible.

A. phenols

Levy on tubes of silica gels and analysis by gas chromatography.

Use of an autonomous pump with compensation of pressure loss and flow controlled of type SKC 224

PCE of reference mark TH/MA 6341, 6342, 6343.

The flow is regulated to 2.30 L/min (+/- 5%).

The flow of the pump was regulated with a numerical flowmeter with soap bubble, of mark BIOBLOCK n° of series: 521225, checked by the CETIAT.

B. dust inhalables

The support of taking away is a closed cassette, of Millipore mark, with fibre filter of quartz, standard mark Whatman QMA and diameter 37 mm.

Use of an autonomous pump with compensation of pressure loss and flow controlled of type SKC 224 PCE of reference mark TH/MA 6475. The flow is regulated in 1.00 L/min (+/- 5%).

The flow of the pump was regulated with a numerical flowmeter with soap bubble, of mark BIOBLOCK n° of series: 521225, checked by the CETIAT.

C. Collected maximum fraction (CMF)

Collected maximum fraction: Mass fraction of the particles of the aerosol collected by an apparatus of sampling as not very selective as possible.

The support of taking away is an opened cassette, of Millipore mark, with fibre filter of quartz, standard mark Whatman QMA and diameter 37 mm.

Use of two autonomous pressure loss compensation pump of the type Técora TCR and Biobloc of reference mark TH/MY 6472 for each test.

Flows are regulated with 20 L/min (for the Técora) and with 22 L/min for the Biobloc.

D. Nox, CO, CO2 contents

Using a DRAGËR pump model 21-31 levies on the following tubes reactive DRAGËR:

Nitrous vapors 2/a, measurement bracket 2 with 100ppm, used on scale 2 with 50ppm.

Carbon monoxide 5/c, measurement bracket 5 to 150 ppm, used on scale 5 to 150 ppm.

Carbon dioxide 0.1%, measurement bracket 0.1 to 6%, used on scale 0.1 to 1.2%



3 - Lawful and normative references

For these tests, we tried to bring us closer for the taking away methods Ci below concerning the environmental measures of work

According to:

A the texts

- fair labor standards act R232-5 article with R232-5-14
- decrees of October the 8, and 9 1987 and 24 December 1993 relating to the control of the installations
- decree of June 8 1990 relating to the contents limit in acceptable dangerous substances in the atmosphere of work under grounds
- circulars of the Ministry of Labour of December 1, 1983, 9mai 1985, May 14, 1985

B Methods described by the INRS in the notes

"Metals and Metalloids"
"Phenol and Cresols"
"ponderal concentration on filter"

C Standards

- NF X on 43-258. October 1991, Air of the workplaces. Sampling and analysis of gaseous pollutants on silica gel. Levy by pumping.
- NF X on 43-261. August 1988, Air of the workplaces. Fixed-post levy and measuring of total particulate pollution.
- NF X on 43-275. July 1992, Proportioning by spectroscopy of atomic absorption (flame) of present elements in the aerosol particles.
- T 01-040 - ISO on 6955, December 1982, analysis Methods by spectroscopy. Flame emission, atomic absorption and atomic fluorescence. Bilingual vocabulary.
- T on 01-041. October 1975, Spectrometry of atomic absorption. Introduction to its employment.

D Toxicological Cards

- FT 1 chromium trioxyde
- FT 15 Phenols
- FT 47 carbon monoxide
- FT 68 nickel and made up mineral
- FT 75 Zinc and made up
- FT 133 nitric oxyde - nitrogen peroxide

III - RESULTS

3 tests were carried out:

1st test with disposable and odorous crucible filtering with mould.

2nd test with disposable and odorous crucible filtering without mould.

3rd test with nondisposable and odorous normal crucible without mould.

These three tests proceeded normally.

A PHENOL

	Nonfilter CJ in welding		Filter CJ in welding	
	mass on the tube in µg	concentration (mg/m3)	mass on the tube in µg/m3	concentration (mg/m3)
1m of the crucible side office	< 8	< 1	< 8	< 1
1m of the crucible side carry	< 8	< 1	< 8	< 1
operator (M,DEDISE)	< 8	< 0,4	< 8	< 0,4

These values show that the phenol was not detected

B. Nox-CO-CO2

	concentration in CO (en ppm)	concentration in CO2 (en ppm)	concentration in NOx (en %)
test 1	15 à 20	< 100	0,1*
test 2	15 à 20	< 100	0,1*
test 3	20 à 25	< 100	0,1*

* not detected

C. POUSSIÈRES

X* nondeterminable, the mass collected is lower than the threshold of detection of the balance.

From where following concentrations:

	test 1	test 2	test 3
mass dust inhalables (in mg)	X*	X*	X*
FMC mass (in mg) with flow of 22 L/min	1,03	1,85	3,85
FMC mass (in mg) with flow of 20 L/min	1,02	1,84	3

	test 1	test 2	test 3
dust concentration inhalables (in mg/m ³)	X*	X*	X*
FMC concentration (in mg/m ³) with a flow of 22 L/min	8,1	14,7	27,8
FMC concentration (in mg/m ³) with a flow of 20 L/min	11,1	16,4	25,4

X* nondeterminable, the mass collected is lower than the threshold of detection of the balance

D. PARTICULATE METAUX

Filters retained for total dust (FMC) et dust inhalables of the test number 3

The analyses were carried out only on this test, but for tests 1 and 2, the masses of dust collected are insufficient to carry out the proportioning of metals.

dust	concentration of the following compounds in mg/m ³					
	aluminium	chrome	fer	manganèse	nickel	zinc
inhalables	X*	X*	1,88	2,2	X*	2,2
total, pump tecora (20l/min)	0,2	0,03	5,58	4,84	X*	2,19
total, pump bioblock (22l/min)	0,43	0,029	5,44	4,68	X*	2,08

X * the analysis did not show the trace of this element.



IV CONCLUSION

Recall:

3 tests were carried out with various filter hats:

1st test with disposable and odorous crucible filtering with mould.

2nd test with disposable and odorous crucible filtering without mould.

3rd test with non disposable and odorous normal crucible without mould.

VME : Limit value of exhibition average intended to protect the workers of the effects in the long term, measured or considered on the duration of a post 8-a.m.. The VME can be exceeded over short periods, subject to not exceeding the VLE, when it exists.

VLE: Value limits exposure corresponding to the phase of work which can be most polluting

As an indication, values recommended by the regulation:

- nickel : VME = 1 mg/m³
- Manganèse : VME = 1 mg/m³
- Chrome (métal) : VME = 0,5 mg/m³
- Aluminium : VME = 5 mg/m³
- Fer : VME = 5 mg/m³
- Zinc : VME = 5 mg/m³
- poussières inhalables : VME = 10 mg/m³
- FMC : VME = 10 mg/m³
- Phénol : VME = 19 mg/m³
- Nox : VME = 5 ppm
- Monoxydes de carbone : VME = 50 ppm où 55 mg/m³

A -Nox-CO-CO2

The three made up ones were detected for each test but the concentrations measurements are weak. The tubes were placed at one meter of the release of smoke. The values determined according to the type of welding are équivalentes.

B. PHENOL

We carried out three measurements of phenol, 2 in fixed station and a measurement in mobile station on the welder, the analyses did not reveal any presence of phenol.



C.DUST

1) inhalables

For the dust measurement we have to respect the methods of taking away for the exposures of the workers for measurements in fixed station.

Taking into account the aluminothermic reaction time very runs by operation, the mass of dust collected is negligible, to see null. However, visually, we notice a colouring of the filters, we thus undertook the analysis for the research of particulate metals for the test n°3, filter where colouring was marked.

2) collected maximum fraction

The values determined with the two pumps with two different flows are close. All the concentrations are significant and for the test n°3, they are high.

D. PARTICULATE METAUX

The values are given only as an indication taking into account low taken volumes which generates an important uncertainty concerning the weighing and the analysis. The concentrations out of iron, manganese and zinc are significant particularly for the two filters of the collected maximum fraction. Three other particulate metals are detected with very weak concentrations (aluminium and chromium) where not detected (nickel) for the filters of the FMC and not detected for the filter of dust inhalables. We point out that the analyzed filters correspond to the taking away of the test n°3 i.e. to an operation of welding in a nondisposable and odorous normal crucible without mould (the filters charged in dust)..



APPENDICES

Sheets of Results
sampling of analyses of the laboratory

**FICHE N°1**

Workshop: workshop of the aluminothermic weldings of rails of railroad

Required pollutant:

NO_x, CO, CO₂
Total dust

Fixed station.

Site of the intake point: located at nearest to the release of smoke creates by the welding.

Réf. Support : DY36, DY35, QO3-10
Réf. Pump : TH/MA 6342, 6345, 6472, Técora TCR
Date : 18/02/03
Hour beginning : 10h56
Hour end : 11h01
Duration : 5 minutes
Taken volume :
for TH/MA 6345 : 5.05 litres
for TH/MA 6472 : 127 litres
for Técora TCR : 92 litres

Pollutant	Mass collected (mg)	Concentration (mg /m ³)
FMC with TH/MA 6472	1.03	8.1
FMC Técora TCR	1.02	11.1
Inhalables with TH/MA 6345	X*	X*

X* nondeterminable, the mass collected is lower than the threshold of detection of the balance.
FMC : collected maximum fraction

Pollutant	Concentration (mg /m ³)
Nox	< 5 ppm
CO	10 à 15 ppm
CO ₂	0.1 %

Observations :

N°1 test, test with disposable and odorous crucible filtering with mould.
4 min of pre-heating, 1 min of casting, 3-4 min of cooling

**FICHE N°2**

Workshop: workshop of the aluminothermic weldings of rails of railroad

Required pollutant :

NO_x, CO, CO₂
total Dust

Fixed station.

Site of the intake point: located at nearest to the release of smoke creates by the welding.

Réf. Support : DY34, DY32, QO3-11
Réf. Pompe : TH/MA 6345, 6472, Técora TCR
Date : 18/02/03
Hour beginning : 10h20
Hour end : 10h25
Duration : 5 minutes
TakenVolume :
for TH/MA 6345 : 5.05 litres
for TH/MA 6472 : 126 litres
for Técora TCR : 112 litres

Pollutant(s)	Mass collected (mg)	Concentration (mg /m ³)
FMC with TH/MA 6472	1.85	14.7
FMC Técora TCR	1.84	16.4
Inhalables with TH/MA 6345	X*	X*

X* nondeterminable, the mass collected is lower than the threshold of detection of the balance.
FMC : collected maximum fraction

Pollutant	Concentration (mg /m ³)
Nox	< 5 ppm
CO	15 à 20 ppm
CO ₂	0.1 %

Observations :

N°2 test, test with disposable and odorous crucible filtering without mould.

4 min of pre-heating, 1 min of casting, 3-4 min of cooling

**FICHE N°3**

Workshop: workshop of the aluminothermic weldings of rails of railroad

Required pollutant:

NO_x, CO, CO₂
Dust total

Fixed station.

Site of the intake point: located at nearest to the release of smoke creates by the welding.

Réf. Support : DY30, DY29, QO3-13
Réf. Pompe : TH/MA6345, 6472, Técora TCR
Date : 18/02/03
Hour beginning : 10h36
Hour end : 10h41
Duration : 5 minutes
Taken Volume :
for TH/MA 6345 : 5.05 litres
for TH/MA 6472 : 139 litres
for Técora TCR : 118 litres

Pollutant	Mass collected (µg)	Concentration (mg /m ³)
FMC with TH/MA 6472	3.85	27.8
FMC Técora TCR	3.0	25.4
Inhalables with TH/MA 6345	X*	X*

X* nondeterminable, the mass collected is lower than the threshold of detection of the balance.
FMC : collected maximum fraction

Pollutant	Concentration (mg /m ³)
Nox	< 5 ppm
CO	20 à 25 ppm
CO ₂	0.1 %

Observations :

3rd test with crucible not filtering disposable and odorous out of basin.
4 min of pre-heating, 1 min of casting, 3-4 min of cooling

**FICHE N°4**

Workshop: workshop of the aluminothermic weldings of rails of railroad

Required pollutant: Phenol

Fixed station. Site of the intake point: located at one crucible measures, and a measurement on the operator.

Réf. Support : op1,bur1, por1, op2, bur2, por2

Réf. Pompe : TH/MA 6341, 6342

Date : 10/04/03

Volume prélevé :

pour TH/MA 6341 : 8 litres

pour TH/MA 6342 : 8 litres

pour TH/MA 6343 : 18 litres

	Nonfilter CJ in welding		Filter CJ in welding	
	mass on the tube in μg	concentration (mg/m^3)	mass on the tube in $\mu\text{g}/\text{m}^3$	concentration (mg/m^3)
1m of the crucible side office	< 8	< 1	< 8	< 1
1m of the crucible side carry	< 8	< 1	< 8	< 1
Soudeur	< 8	< 0,4	< 8	< 0,4

These values show that the phenol was not detected, we thus registered the minimum threshold of detection.

**FICHE N°5**

Workshop: workshop of the aluminothermic weldings of rails of railroad

Pollutant sought : dust total with concentration in Al, Cr, Ni, Fe, Mn, Zn

Fixed station.

Site of the intake point: located at nearest to the release of smoke creates by the welding.

Réf. Support : DY30, DY29, QO3-13
 Réf. Pompe : TH/MA 6345, 6472, Técora TCR
 Date : 18/02/03
 Hour beginningt : 10h36
 Hour end : 10h41
 Duration : 5 minutes
 Taken Volume : for TH/MA 6345 : 5.05 litres
 for TH/MA 6472 : 139 litres
 for Técora TCR : 118 litres

Pollutant	FMC with TH/MA 6472 Mass collected (μg)	FMC Técora TCR Mass collected (μg)	Inhalables with TH/MA 6345 Mass collected (μg)	white (μg)
Al	104	69	13	45
Cr	4.0	3.6	< 1	< 1
Ni	< 1	< 1	< 1	< 1
Mn	650	571	11	< 1
Zn	289	259	11	< 1
Fe	762	664	15	5.6

FMC : collected maximum fraction

From where following concentrations:

Pollutant(s)	FMC with TH/MA 6472 Concentration ($\mu\text{g}/\text{m}^3$)	FMC Técora TCR Concentration ($\mu\text{g}/\text{m}^3$)	Inhalables with TH/MA 6345 Concentration ($\mu\text{g}/\text{m}^3$)
Al	0.43	0.20	X*
Cr	0.029	0.03	X*
Ni	X*	X*	X*
Mn	4.68	4.84	2.2
Zn	2.08	2.19	2.2
Fe	5.44	5.58	1.88

X * nondeterminable, the compound was not detected.

Observations :**3rd test with crucible not filtering disposable and odorous out of basin.**

4 min of pre-heating, 1 min of casting, 3-4 min of cooling

INSTITUT DE SANTE AU TRAVAIL DU NORD DE LA FRANCE
Association Loi 1901 - Président : Professeur D. FURON
Laboratoire de Toxicologie Professionnelle

le 18 avril 2003

Réf. Commande : 030414004

Votre référence : .

Référence Client : A.I.N.F3

Demandeur : Monsieur SAKOWICZ

Date d'arrivée au laboratoire : 14/04/03

A.I.N.F. SA - SECLIN

Monsieur SAKOWICZ

BP 259

Rue Marcel DASSAULT

59472 SECLIN Cédex

Echantillon: 030414004-01

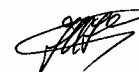
Tube op1

Milieu: Atmosphère

Phénol (sur tube)

< 8 µg sur tube

Norme: VME : 19 mg/m3 soit 5 ppm



Directeur du Laboratoire :
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Monsieur SAKOWICZ

BP 259

Rue Marcel DASSAULT

59472 SECLIN Cédex

Echantillon: 030414004-02

Tube por 1

Milieu: Atmosphère

Phénol (sur tube)

< 8 µg sur tube

Norme: VME : 19 mg/m³ soit 5 ppm



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Date d'arrivée au laboratoire : 14/04/03

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BP 259

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59472 SECLIN Cédex

Echantillon: 030414004-03

Tube bur 1

Milieu: Atmosphère

Phénol (sur tube)

< 8 µg sur tube

Norme: VME : 19 mg/m3 soit 5 ppm



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59472 SECLIN Cédex

Echantillon: 030414004-04

Tube OP 2

Milieu: Atmosphère

Phénol (sur tube)

< 8 µg sur tube

Norme: VME : 19 mg/m3 soit 5 ppm



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Rue Marcel DASSAULT

59472 SECLIN Cédex

Echantillon: 030414004-05

Tube por 2

Milieu: Atmosphère

Phénol (sur tube)

< 8 µg sur tube

Norme: VME : 19 mg/m3 soit 5 ppm



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Monsieur SAKOWICZ

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Rue Marcel DASSAULT

59472 SECLIN Cédex

Echantillon: 030414004-06

Tube bur 2

Milieu: Atmosphère

Phénol (sur tube) _

< 8 µg sur tube

Norme: VME : 19 mg/m3 soit 5 ppm



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END OF REPORT/RATIO