

**THE REDUCTION OF THE PROFESSIONAL EXPOSURE
RISK TO THE ACID VAPOURS RELEASED BY
THE PICKLING BATHS FROM
INDUSTRIA SARMEI CAMPIA TURZII**

1. Short presentation of *Industria Sarmei SA Campia Turzii*

Industria Sarmei SA Campia Turzii is a producer of steel, profiles, wires and wire products, and its over 80 years experience in this domain offers it an important place among the others producers of metallurgical products from our country and abroad.

At this moment *Industria Sarmei SA Campia Turzii* is a company with an integrated production flow. The process begins with the steel elaboration in the electrical arc furnaces (EBT + LF), continues with the rolling and the drawing, and the final result being the wire and wire products.

Due to an important investment during 1996 - 1998 "The modernisation of electrical steel-works" - which had led to the improvement of the products quality, to the substantial reduction of the costs and also to the pollution elimination by capturing and purging the exit gas - there had been important economical and ecological effects as well as the improvement of work conditions.

This major investment has joined the new orientation of the 90's, that regards the modernisation and the retechnologization of production capacities in order to reduce the costs, the substantial improvement of products quality, the protection of the employees as well as the local community, and generally the environment protection.

The System for the Quality Management of ISCT has been certified according to ISO 9002: 1994 by Lloyd's Register Quality Assurance, and the Tests Laboratory of the company was authorized in accordance with the international standard SR EN 45001 by The Romanian Association of Authorising (RENAR), the company being also authorized to deliver products designated to the nuclear power plants.

The company is in part certified in accordance with BS EN ISO 14001: 1996 by NQA (National Quality Assurance Limited) - UK, and the Environment Management System will be extended to the whole company by the end of this year.

And finally, we started to implement the Labour Health and Safety Management System.

These orientations and directions have been appropriated by the new owner of ISCT the important metallurgical group Mechel from Russia, that owns ISCT through its company Conares Trading - Switzerland starting with June 20th 2003.

2. The necessity and the opportunity of the investment

In order to eliminate the oxides from the wires that are to be manufactured (drawn) the technology foresees the use of some solutions of sulphuric acid or hydrochloric acid with a concentration around 12 - 18%.

Those vapours can spread into the working environment affecting the personnel health and capacity to work.

Throughout “The Programme for normalising the labour conditions”, during October - November 1999, with the support of The National Institute of Researching and Development for Work Protection Bucharest, The Staff of the Industrial Ventilating Laboratory lead by Mr. Eng. Dr. Victor Voicu, a first estimation of the costs for improvement of the ventilation in the main working places have been made.

Because of the limited financial possibilities, there was agreed by contract no. 7292/23.11.1999, concluded with The Institute mentioned above - the beginning of the work regarding the improvement of the ventilating at the Static Pickling from the Zincator workshop, and after that in case that the technical solutions prove to be efficient and when some financial resources are available - this would be extended in the sectors of other workshop.

The theme of the paper **“The projection and the performing of the installation for capturing the hydrochloric acid vapours from a group of 5 static pickling baths in hydrochloric acid”** had 3 stages, respectively the analysis of the existent situation (the technological process, the existent ventilator, noise analysis and those of the pollution agents concentrations), the establishment of the technical solutions, the elaboration of the survey, the elaboration of the project itself, of the labour security measures for the utilisation of the hydrochloric acid and the supplementary measures for the bay equipment in order to improve labour conditions.

The third stage referred to : the physical achievement of the installation, the assembly, the regulation and the putting into operation at the designed parameters, the elaboration of the exploitation and maintenance of the installation, the estimation of the functioning parameters from the ventilating installation and of pollution agents' concentrations in the working area so that they could be integrated into the General Norms of Labour Protection.

Practically two interdependent elements have led to the necessity of projecting and performing a new ventilating installation : the advanced physical and moral wear and tear of the old installation, including basic deficiencies of the initial technical solution and as a consequence the increase of 9 - 10 times of the M.A.C. in acid vapours concentration that were spread into the working space as well as in the neighbourhoods, affecting the health of the workers, the structure of the building as well as the environment (see Annex no. 1).

Due to measurements of noise and pollution agents concentration, effected in normal working conditions, to the survey made and to the observations at site (it had to be taken in consideration the methods and the procedures of work used) the technical solution presented in **the project of performing V 456 - 00** has been elaborated.

Basically, the technical solution was foreseeing the casing of those five pickling baths and neutralisation bath and putting it into depressure with the help of 2 ventilators.

But the casing shouldn't hinder the natural lighting, the normal activity of the workers, the access of the crane and of the mototruck during the introduction and exit of the wire coil from the baths etc.

During the night the lighting of the zone inside the case is assured by 2 neons, tight and anticorrosive protected, as well as the components of the installation and of the hall structure.

The elements of the case had been performed from LAMINOL (a material compound from polyesterical resins reinforced with glass fibre - produced in our country).

Of course, there were other technical problems for which the designer had to find solutions of practical realization such as the draughts circulation the power and the capacity of the ventilator, the debit, the best hight of the chimnies etc.

3. The efficiency of the project

The installation was accepted on **6.06.2002**, the measurements of the pollution agents, in the work environment established initially and subsequent, have proved a maximum efficiency regarding the pollution agents capturation permitting the achievement and the maintenance of a chloride acid vapours concentration in to the working space under the maximum allowable concentration, in accordance with the following table:

No. crt.	The data analysis	Document	Emitent	The result of the analysis in mg/m³ air
1.	a) May 2002	Analysis Bulletin - <u>installation non-operating</u>	I.N.C.D.P.M.B Bucharest	65
	b) May 2002	- <u>installation operating</u>	I.N.C.D.P.M. Bucharest	2,4
2.	July 2002	Analysis Bulletin no. 199 - 206	Toxicological Laboratory ISCT	2,3
3.	April 2003	Analysis Bulletin no. 88 - 91/2003	Toxicological Laboratory ISCT	2,7
4.	October 2003	Analysis Bulletin no. 250	Toxicological Laboratory ISCT	2,5

At least two aspects are significant.

First of all, from a technical point of view, the results of the measurements point out a complete success, and second of all we have to underline that there is an important psychological impact, at least from two aspects.

We are talking about shaking two prejudgments.

On one hand the distrust for the efficiency foreseen in the technical solution and in its completion, and on the other hand the workers fear that they might lose some supplementary rights as a result of the efficiency of such an installation.

4. The impact over the environment

The technical and constructive characteristics of the installation ensures not only the capture of the hydrochloric acid vapours from the working space but also an evacuation that protects the environment, the hydrochloric acid vapours concentration released in the atmosphere through the chimney is 1,7 mg/m³ instead of 30 that is 15 times lower than the maximum allowable concentration in accordance with Ord. 462/93 al MAPM (Annex no. 2).

CONCLUSION

After 1 year and 5 months from the putting into operation of the ventilating installation at the static pickling with hydrochloric acid, the general state of health, the working capacity of the workers reflected through the increase of the activity efficiency, and finally the state of satisfaction expressed by the personnel, that cannot be equaled but by the green of the fruit trees that have grown into an area that not long time ago was desolated, reflects the success and justifies the investment that had been made.

It is a matter of company policy to include among the priorities the investments that regards the people's health and the environment, in fact the investments in the future !

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**ANALYSIS REGARDING THE HYDROHYDROCHLORIC ACID VAPOURS CONCENTRATION
DEPENDING ON THE TEHNOLOGICAL PROCESS AT THE ZINCATOR SECTION STATIC PICKLING SECTOR
- I.N.C.D.P.M. - BUCHAREST**

No. crt.	Place of tests	HCL Vapours concentrations HCL mg/m ³			Medium concentration mg/m ³	Observations
		2	3	4		
0	1	2	3	4	5	6
		Test 1	Test 2	Test 3		
1.	Above bath B1	50	52	53	51,66	Without immersed wire in HCL solution Ventilating installation off
2.	Above bath B1	61	59	59	59,66	Immersed wire in HCL solution Ventilating installation off
3.	Above bath B1	53	54	52	53	Immersed wire in HCL solution Ventilating installation on
4.	Above bath B2	57	58	57	57,33	Immersed wire in HCL solution Ventilating installation off
5.	Above bath B3	54	55	56	55	Immersed wire in HCL solution Ventilating installation off
6.	Above bath B4	62	63	63	62,66	Immersed wire in HCL solution Ventilating installation off
7.	Above bath B4	55	54	53	54	Immersed wire in HCL solution

0	1	2	3	4	5	6
						Ventilating installation on
8.	Labour environment	40	42	41	41	Without immersed wire in HCL solution Ventilating installation off
9.	Labour environment	45	45	46	46,33	Immersed wire in HCL solution Ventilating installation off
10.	Labour environment	38	40	41	39,66	Immersed wire in HCL solution Ventilating installation on
11.	Labour environment	42	44	45	43,66	During the pulling of the wire from HCL solution Ventilating installation on

The hydrohydrochloric acid solution concentrations from the static pickling bath during the analysis :

- 80,3 g/l in bath B1
- 65,7 g/l in bath B2
- 58,4 g/l in bath B3
- 87,6 g/l in bath B4

The maximum allowed concentration of the HCl in the labour environment in accordance with the General Norms of Labour Protection is 5 mg/m³.

SC MINESA - RESEARCH AND DESIGN MINING INSTITUTE SA

ANALYSIS BULLETIN

Material name	Analysis data	Environment temperature	No. of the tests
AIR TEST	29 September 2003	22°C	P1; P2

**THE ANALYSIS OF THE HCL VAPOURS EMISSION IN ATMOSPHERE
THROUGHOUT THE PICKLING BASKETS**

**SC INDUSTRIA SARMEI SA
CAMPIA TURZII, jud. CLUJ**

STATIC PICKLING ZINCATOR

No. crt.	Place of the tests	Performed operation	Concentration of HCl vapours analysis	Maximum allowed concentration cf. ORD. 462/93 MAPPM mg/m ³	Observation
1.	P1 - Chimney tub exit upsetting centrifugal ventilator	exit in atmosphere	1,7	30,0	Installation on - static pickling
2.	P2 - Chimney tub exit upsetting centrifugal ventilator	exit in atmosphere	absence	30,0	- Installation idle running (no load) - Preparation pickling bath

$Q_{NOMINAL} = 10.000 \text{ m}^3/\text{h}$

ϕ chimney = 0,6 m

H chimney = 10 m

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