

# International Institute of Welding

## Chairmen's Reports

### COMMISSION VIII—Hygiene and safety

The meetings of Commission VIII were held from 8 to 11 July 1971 in Stockholm, on the occasion of the Annual Assembly of the IIW, and were attended by 11 delegates, 4 experts and 4 observers, representing 12 countries.

Nine items were included in this year's agenda. Several of these items had been prepared before the Assembly by members of the Commission, either at unofficial meetings or by correspondence.

Thirty-eight documents were presented. Most of the time during the Assembly was devoted to studying and commenting on these documents. The most interesting of them are mentioned below.

#### 1. Report of Working Group A on revision of the IIW handbook on health and safety (VIII-434-71 "Annual report from Working Group A")

The work on the handbook has proceeded fairly quickly in co-operation with Mr. Northcott of the International Labour Organisation (ILO). An English draft has been prepared for four of the five sections.

The French delegation will revise the French text when a complete English draft has been prepared.

#### 2. Report of Working Group D on lighting and colour in welding workshops (VIII-456-71 "Annual report from Working Group D")

Very few results have been obtained during the year. The Working Group reported that, according to Japa-

nese experience, the lighting of welding workshops should exceed 150 lux for large welded joints and 400-500 lux for small joints.

#### 3. Report of Working Group E on Mechanical and Equipment Hazards in welding (VIII-437-71 "Annual report from Working Group E")

Document VIII-450-71 "Statistics of employment injuries in welding—Classification of accident, analysis and preventive measures" by Mr. Rames (Czechoslovakia) was recommended for publication (resolution 5). A long discussion took place on the priorities that this Working Group should give to technical projects for study. The Working Group is to draw up, at a meeting in autumn 1971, a proposition for a working programme, in accordance with the wishes expressed.

Mr. Grothe (Germany) was appointed Vice-Chairman of the Working Group. The Chairman, Mr. Rames, will be asked to continue the drafting of some new safety pamphlets for publication.

#### 4. Report of Working Group F on Fire Hazards in Welding (VIII-438-71 "Annual report from Working Group F")

Commission VIII decided to merge Working Groups E and F into one. Mr. Viramo (Finland) was elected to the new Working Group. Mr. Grothe is to convene the first meeting of Working Group E in Germany in the autumn of 1971.

The new Working Group was given the title "Accident prevention".

### 5. Report of Working Group B on ventilation (VIII-435-71 "Annual report from Working Group B")

In document VIII-451-71 "Welding fumes" by R. Frant (Netherlands), some of the results of the experimental work carried out by the Working Group were discussed. The Working Group met in The Hague in July to evaluate the investigations carried out during the last twelve months. In document VIII-457-71, are summarised different methods of ventilation in welding locations, both in large welding shops and in smaller, confined spaces. Through measuring, it is shown that very low exposure levels can be obtained by choosing adequate system solutions, i.e. a combination of local ventilation and general ventilation.

### 6. Report of Working Group C on Medical and Industrial Hygiene problems in welding (VIII-436-71 "Annual report from Working Group C")

After consideration by Working Group C, Commission VIII recommended the following documents for publication :

—VIII-440-71 "Report on a Danish investigation into the health and working environment of arc welders" by A. Fogh, J. Frost and J. Georg (resolution-1).

—VIII-441-71 "Problemes d'hygiene poses par le soudage avec des electrodes basiques/Hygienic aspects of welding with basic electrodes" by Working Group C (resolution 2)

—VIII-449-72 "Studies on toxic effects of manual electric arc welding" by S. Byczkoswki, M. Cempel, J. Gadowska, J. Krechniak, W. Senzok, K. Wrzesniowska and A. Bohdanowicz (poland) Resolution 4).

A number of other documents were also considered but were not recommended for publication.

—VIII-398-70 "The plasma jet : industrial hygiene aspects and a survey of current United States practices for employee protection" by N. L. Fannick and D. Corn (USA).

—VIII-400-70 "Recommended safe practices for plasma arc cutting" American Welding Society A. 63-69 (USA) and

—VIII-399-70 "An industrial hygiene study of flame cutting in a granite quarry" by W. A. Burgess and P. C. Reist (USA).

In its resolution 6, the Commission proposed the transmission of these three documents for information to Commission I "Gas welding. Brazing and cutting." (resolution 7). These two resolutions were adopted by the Governing Council at its meeting of 12 June 1971.

The Chairman of Working Group C, Dr. M. L. Granjon (France) proposed the following programme for Working Group C, to which Commission VIII, after discussion, agreed :

- (i) preparation of a general paper on occupational hygiene ;
- (ii) scientific study of the methods of determination of the threshold limit value (TLV) for welding fumes and the examination of the probable lowering of the present TLV of 20 mg/m<sup>3</sup> for welding fumes from non-basic electrodes (doc. VIII-441-71) ;
- (iii) a study on the toxic breakdown of products of paints and primers during welding ;
- (iv) a monograph on the formation of phosgene during welding processes ;
- (v) problems of hygiene and safety arising from new welding processes, e.g. electron beam, MIG and laser welding.

### 7. Health and Safety problems under study

#### 7.1. Analytical progress

—VIII-432-71 "Gas chromatographic determination of chlorinated acetyl chlorides and phosgene present in air at very low concentrations" by J. A. Dahlberg and I. B. Kihlman (Sweden).

In this document is reported a gas chromatographic method which has been developed for the determination of mono-, di- and trichloroacetyl chloride and low concentration levels in air. The acyl chloride vapour in a small air sample (about 1 litre) is absorbed in 2-propanol and the ether then formed is determined gas chromatographically with electron capture detection. By this method di- and trichloro derivatives at concentrations lower than 1 ppm may be measured. For monochloro acetyl chloride the sensitivity is somewhat less. It has also been shown that phosgene may be determined down to 10<sup>-3</sup> ppm in air using gas chromatography and electron capture detection.

## 7.2. Plasma arc and plasma jets

—VIII-433-71 "Health and safety aspects of plasma cutting" by R. A. Cresswell (UK).

This document, transmitted by Commission I, summarises the general position and is intended to act as an outline on which to build up a more detailed document if required. Because of the very high temperature of plasma arcs and plasma jets, light radiation is intense and eye protection and shielding of skin from the effects of ultra-violet light is important. There are potential dangers from toxic gases produced by the effects of strong ultra-violet light on the ambient atmosphere. The main dangers arise from ozone and from oxides of nitrogen. Generally speaking, the fumes given off are similar to those produced during MIG or TIG welding and, provided normal conditions of ventilation obtain, do not rise above the maximum allowable concentration. With argon/hydrogen gas, cutting torches can give noise levels in the region of 70 to 80 dB. Nitrogen and nitrogen/hydrogen mixtures give a higher noise level up to 100/120 dB.

## 7.3. Fume dose determinations

Doc. VIII-440-71 already mentioned (see point 6) presents, probably for the first time, the recording of exposure by means of a personal air sampler. The apparatus used consists of a battery-driven pump which is attached to the welder's belt. This method of measuring exposure to welding fumes is a great improvement on previous methods of measuring welding fumes, where the welders often felt that the tests were carried out at a time when the welding fumes were less dense than normal, a feeling that might cast doubts on the reliability of the results. The studies were carried out in two shipyards, one boiler factory and one tank factory. The sites studied in the report were divided into three groups: I-Sites in the open air; II-Sites in large welding shops with little or no mechanical ventilation; III-Sites in confined spaces with mechanical ventilation (less than 50 cbm).

## 7.4. Basic electrodes

In doc. VIII-441-71, prepared by Working Group C (see point 6), the hygienic aspects of welding with basic electrodes are evaluated. It is stated that the characteristic effects on health connected with the use of basic electrodes are mainly those arising from the concentrations of fluorine compounds in the fumes.

## 7.5. Nitrous fumes

In doc. VIII-444-71 "The industrial hazard from nitrous fumes with special reference to welding, cutting and heating of steels" by R. Morley and S. Silk (UK), which was recommended for publication (resolution 3), the chemistry and toxicology of "nitrous fumes" are discussed. Attention is drawn to the fact that the inhalation of "nitrous fume" may predispose those concerned to subsequent pneumonia and one case is described. Details of "Nitrous fume" cases in Britain in the past ten years are given and correlated with a recent environmental survey carried out in shipyards and repair yards along the North-East coast of England. This showed that "nitrous fume" is produced in welding and particularly in cutting and burning, where it is present even when the flame is not in contact with the metal.

## 7.6. Protective coating agents

In doc. VIII-446-71 "Some health hazards encountered in the use of metal preservative coating agents" by D.S. Ross (UK), it is reported that during the last three and a half years hazards have been encountered from the application of protective coating agents to fabricated metal structures. Such hazards have occurred in engineering work. The coating agents are applied, sometimes on the specific request of a client, to protect metal during manufacturing processes. Only rarely is any information available on the composition of these coatings. The coatings reported are oil, red oxide primers, bituminous compounds and primers on vinyl basis.

## 7.7. Toxicity

Doc. VIII-449-71 already mentioned (see point 6) deals with the continuation of experimental researches on the harmful effects of manual electric arc welding. They were carried out on experimental animals in conditions of prolonged exposure and after a single administration of the dust by way of intratracheal insufflation. The harmful effects of fumes of basic-coated and rutile-coated electrodes, as well as those of their single chief components were investigated. The animals used were mostly male Wistar rats, but dogs and rabbits were also employed in order to elucidate the problem of excretion. Tests consisting of long-term exposure to dust produced during the melting of basic-coated electrodes and rutile coated electrodes were carried out for several weeks in a specially constructed experimental chamber.

## 7.8. Shades of filter lenses

Doc. VIII-439-71 "Comments on doc. VIII-365-67 "Special transmissive requirements for welding filters" by the Japanese delegation.

In this document transmittances and tolerance in transmittance of various shades of filter lenses are presented according to Japanese standards.

### 7.9. *Accidents*

In doc. VIII-450-71, already mentioned (see point 3), the general practice, which should be followed in accordance with the ILO resolution concerning statistics of employment injuries is summarised. The procedure for reaching the first aim—prevention of accidents and injuries—is divided into :

- accident investigation
- accident classification
- accident reporting for statistics
- statistical analysis
- prevention of accidents and injuries.

It is emphasised that the statistics of welding accidents are a part of national statistics of employment injuries. Therefore to improve the statistics of welding accidents means to improve the whole system of statistics of employment injuries in each country, in accordance with ILO recommendations. This implies that the whole system of accident investigation classification, reporting and accident statistics analysis should be carried out by the methods mentioned.

## 8. *National Activities*

### 8.1. *United Kingdom*

Mr. Silk presented an interim report on the work of the British Occupational Society's Working Party on the toxicity testing of covered electrodes. The UK delegation hopes to present a final report on the work to Commission VIII next year.

Mr. Silk also reported on a study carried out in aluminium refineries, where MIG welding of aluminium was used. High concentrations of ozone were found behind and in front of a hand helmet supplied with fresh air. The helmet was designed to produce a venturi effect and the manufacturers of the helmet are now correcting the fault.

### 8.2. *USA*

Mr. Evans reported on the Battelle studies and he stated that the results were as yet inconclusive. It is unlikely that an agency will be carrying out an environmental study in shipyards.

Work is proceeding, as in the UK, on the toxicity testings of covered electrodes, but the main emphasis is on ventilation studies.

### 8.3. *Germany*

Dr. Buckup reported that the studies on welders' lungs have been completed. A report will be available by the end of the year.

Mr. Grother indicated that the investigations are being carried out on the quantity and quality of radiation from newer processes, such as CO<sub>2</sub> and plasma. Studies are also being carried out of the reliability of present recommendations in German standards for lense shades for these newer processes.

### 8.5. *Finland*

Mr. Virtame reported on the various studies being carried out at the Institute of Occupational Health in Helsinki, concerning, for example, welding in confined spaces, noise from certain welding processes and the welding of coated metal surfaces.

### 8.5. *Sweden*

The Chairman stated that work in Sweden at present is concentrated on ergonomic problems, on ventilation during welding by high speed local exhaust ventilation and on the threshold limit values and health problems of welders exposed to the combined effect of welding fumes, exhaust gases and ionizing radiation.

## 9. *Other Business*

The following was agreed as the agenda for the 1972 Assembly :

- 1) Report of Working Group A on revision of the handbook on health and safety.
- 2) Report of Working Group B on ventilation.
- 3) Report of Working Group C on medical and industrial hygiene problems in welding
- 4) Report of Working Group E on accident prevention.
- 5) Report of Working Group D on lighting and colour in welding workshops.
- 6) Health and safety problems under study.
- 7) National activities on health and safety in welding.
- 8) Other business.

## COMMISSION I—Gas welding, Brazing and Cutting

### 1. GENERAL MATTERS

1.1. During the Stockholm Annual Assembly, Commission I held 4 meetings in which about 30 delegates, experts and observers representing 16 countries took part.

During these meetings, the Commission examined the work of the various Sub-Commissions which, since the Lausanne Assembly, in July 1970, had met as indicated below :

- Sub-Commission A “Brazing and surfacing”  
25 March 1971 in Rotterdam (Netherlands)
- Sub-Commission B “Thermal Cutting”  
24-25 November 1970 in Paris (France)  
19 April 1971 in Brussels (Belgium)
- Sub-Commission C “Hot spraying. Metal Spraying”  
19 September 1970 in Paris (France)  
16-17 March 1971 in London (United Kingdom)
- Sub-Commission H “Gas welding and cutting equipment”  
16-17 November 1970 in Hamburg (Germany)

1.2. At the beginning of the first meeting, the Commission observed one minute's silence after the President had paid tribute to the memory of Mr. K.T. Pedersen, Danish delegate, a member of the Commission for many years, a past Chairman of Sub-Commission IC, who died on 24 December 1970.

### 1.3. Liaison with ISO/TC 44 “Welding”

#### 1.3.1. Plenary Committee

At the meeting of the Plenary Committee of ISO/TC 44 “Welding” held in Paris from 6 to 9 July 1970, the Chairman of Commission I took part in the work as an IIW observer on all questions with a bearing on the terms of reference of his Commission.

Among the matters dealt with, those of interest to Commission I were the subject of the following documents (ref. ISO/TC 44) :

- doc. 441 “Regulators for gas cylinders used in welding, cutting and related processes”
- doc. 453 “Regulators for gas cylinders used in welding, cutting and related processes ; part II testing”
- doc. 436 “Hoses for gas welding and related processes”.

After certain editorial amendments, these draft recommendations prepared by Sub-Committee 8 “Gas welding equipment” of ISO/TC 44 were unanimously adopted. It was also decided that documents 441 and 453 should be combined as one single paper.

With regard to future work, Sub-Committee 8 was invited to prepare a draft recommendation, giving details of test techniques for pressure reducing valves.

#### 1.3.2. Sub-Committee 8 “Gas welding equipment”

At the recent meeting of ISO/TC 44/SC 8 held in Berlin from 2 to 4 June 1971, Mr. Lonngren, member of Commission I, represented the IIW as an observer. The report prepared by him on this meeting appeared as doc. 1-478-71.

The following points were studied :

—*Manual welding and cutting blowpipes*  
A document was prepared by an “ad hoc” Group with the aim of defining conditions to be fulfilled by manual blowpipes in their use and from the safety point of view. It should be noted that this document quotes a certain number of definitions drafted by Commission I.

—*Connections for flexible hoses*  
Proposals prepared by an “ad hoc” Group were approved by Sub-Committee 8 which decided to submit them to the members of ISO/TC 44 in accordance with the speeded-up procedure.

—*Pressure gauges*  
Since problems related to pressure gauges were not taken into account by any of the Committees of ISO, it was decided, with the agreement of the General Secretariat of that body, that this question would henceforth appear on the programme of Sub-Committee 8.

—*Testing procedure for pressure reducing valves*  
Discussion took place on types of test to be used to determine maximum flow.

### 2. SUB-COMMISSION A “BRAZING AND SURFACING”

Chairman : Mr. B. Blanchet (France)

The progress report of this Sub-Commission appears in document 1-441-71.

## 2.1. Symbolisation of filler metals for brazing

In accordance with the decision taken at the Lausanne annual Assembly by Commission I which had decided to re-examine the document submitted to it and which expressed the wish that the symbolisation of filler metals should be based on that at present in use in the United States, the Sub-Commission re-examined the draft which it had presented. However, considering, after a full examination, that the arrangements in question did not constitute a code but a simple list of products with references and that this list could vary with time, the Sub-Commission returned to its initial proposal, modifying it slightly to achieve a symbolisation which would be shorter and more easy to remember.

The new proposal, doc. I-442-71 (ex doc. I-A-245-71) "Projet de code de symbolisation des metaux d'apport de brasage tendre et de brasage fort/Tentative code of symbols for filler metals for brazing and soldering", was studied and finally adopted by the Commission which recommended it for publication (resolution No. 1) and for transmission to ISO (resolution No. 2).

The code thus defined, which takes into account recommendations made by ISO/TC 44 at its Plenary Meeting in July 1966, is based on the use of a certain number of groups of symbols. The first is represented by the letter B for brazing ; the second is constituted by the chemical symbols corresponding to the metals forming the alloy, classified in decreasing order of weight of contents if the contents are above 0.2% ; however, only the first 4 chemical symbols are taken into account, the first being followed by an indication of its percentage in weight. The last group indicated the solidus-liquidus fusion interval of the alloy under consideration.

Resolution 2 was adopted by the Governing Council with the rider that this document was to be transmitted to Sub-Committee 3 "Filler materials and electrodes" of ISO TC 44.

## 2.2. Study of welded assemblies

### 2.2.1. Brittleness of assemblies

The Sub-Commission continued its study of this important question with the aim of defining a type of test piece which would enable the brittleness of a brazed joint to be defined. Research work is at present in progress on the subject in several countries and the Sub-Commission received reports dealing with the

influence of impurities in filler metals on the brittleness of the joint. Further information is awaited.

### 2.2.2. Testing methods for joints

In view of the objections made by ISO/TC 44/SC 3 on the subject of document IIS/IIW-307-68 (ex doc. 1-346-67) entitled "Testing methods for brazing filler metals", the Sub-Commission undertook to draft a new document, dealing with both brazing and soldering.

## 2.3. Enquiry into the development of brazing in the various countries

In order to obtain information on the position occupied by brazing within the range of joining processes, a questionnaire prepared by the Sub-Commission was sent to all delegations to obtain data on the quantities of filler metals used annually. Since most of the manufacturers of these products consider that the information requested is confidential, it has been impossible to prepare a report on the subject.

In these circumstances the Sub-Commission decided to remove this question from its agenda.

The Commission noted this decision, while regretting that it had not been possible to carry out this enquiry.

## 2.4. Surfacing

In accordance with the decision taken the previous year, national delegations were consulted with a view to their proposing experts to take part in studies on surfacing.

A certain number of specialists were thus appointed and this will enable the Chairman of the Sub-Commission to set up the corresponding Working Group.

## 3. SUB-COMMISSION B "THERMAL CUTTING"

Chairman : Mr. E. Sellier (Belgium)

The progress report of the Sub-Commission is contained in document I-443-71.

### 3.1. Oxygen Cutting

#### 3.1.1. Accuracy in automatic oxygen cutting

The Commission considered document I-444-71 "Accuracy in oxygen machine cutting". The first part

of this document had been redrafted to take into account observations made when it was studied during the Lausanne Annual Assembly.

Drafting has continued and national delegations have been invited to send their written comments to speed up the final editing of this important document.

### 3.1.2. *Research in the field of oxygen cutting*

At the request of the Commission, the Sub-Commission decided to include in its programme the study of a document entitled "Recent investigations into the oxygen cutting of shipbuilding steel plate" presented at the Public Session of the Stockholm Annual Assembly.

## 3.2. Plasma cutting

### 3.2.1. *Service life of electrodes and nozzles in plasma cutting torches*

The Commission noted that answers to the enquiry carried out by the Sub-Commission which are the subject of document I-447-71 "The life of electrodes and nozzles in plasma cutting torches. Answers to questionnaire I-434-70". The information collected shows a considerable range of values and it was felt that the document was of little practical use. Nevertheless, the conclusions show that in many cases consumption of nozzles and electrodes is a considerable factor in cost price. Therefore from this point of view it is desirable to pay particular attention to the skill of personnel and to the use and maintenance of equipment.

### 3.2.2. *Documents studied*

The Sub-Commission considered two documents transmitted by the Japanese delegation which were :

- doc. I-448-71 "Water shield Hitachi plasma jet cutting system"
- doc. I-449-71 "Characteristics of plasma flame in metal cutting apparatus of the transferred type plasma jet system" by T. Ito (Japan)

The first deals with the advantages of plasma cutting with water shield protection. Results given mention very good cutting quality under economic conditions which were most satisfactory.

The second document gives information on measurements of plasma temperature for various currents at carefully chosen points. In addition, the speed of

the gas flow has also been determined as a function both of current and of the diameter of the nozzle orifice.

### 3.2.3. *Developments in plasma cutting*

The Commission noted with great interest document I-468-71 "Developments in arc plasma cutting" prepared by Dr. R. A. Cresswell (United Kingdom) and presented by the Sub-Commission. This paper is a survey of methods proposed to improve the quality of cuts and to render the process more efficient. The Commission recommended its publication (resolution No. 4) subject to several minor amendments.

### 3.2.4. *Definitions of terms used in plasma cutting*

Commission VI "Terminology" having presented various observations on the definition of plasma cutting prepared by the Sub-Commission and adopted by the Commission at its meeting in Lausanne, a new proposal was drawn up which appears in document I-467-71.

This new proposal was examined jointly with another dealing with the terms "plasma" and plasma arc" (document I-445-71).

After certain modifications of form, the Commission having adopted these definitions decided to re-group them into one single document with the reference I-477-71 and recommended its transmission to Commission IV "Special welding processes" and VI (for consideration) (resolution 3 adopted by the Governing Council).

## 3.3. Laser Cutting

The Sub-Commission noted with interest, document I-446-71 "Le coupage du verre et de la ceramique aux lasers a CO<sub>2</sub>, gazeux/Cutting of glass and ceramics using CO<sub>2</sub> gas lasers" which had been transmitted to it by Commission IV for information. This paper deals with the advantages of the method of cutting by piercing holes along a line to give rise to a break in that direction. Comparisons were made with results obtained by traditional cutting methods.

A second document (doc. I-469-71) entitled "Lasers for cutting and piercing" by J. E. Harry (United Kingdom) was also submitted to the Commission. It consists of a list of material which can be cut by laser, giving cost prices which take into account thickness, power used, cutting speed, etc. This document was recommended for publication (resolution 5).

#### 4. SUB-COMMISSION C "HOT SPRAYING. METAL SPRAYING"

Chairman : Mr. A. Hedde (France)

The annual progress report of the Sub-Commission is contained in document I-450-71.

##### 4.1. Comparative tests on sprayed coatings

The Commission noted the results of comparative tests carried out by several members of the Sub-Commission concerning the adhesive strength and hardness of arc sprayed steel coatings. The reference of the paper in question is I-451-71 and it is entitled "Comparison test results on arc sprayed coating".

This document contains a survey of results of tests obtained by three laboratories which carried out tests on tensile tearing and hardness measurements on sprayed coatings carried out on identical conditions. These tests show the difficulties of obtaining comparable data even with similar test pieces.

The Commission noted this information, it being stated that further tests were in progress with a view to achieving a draft international standard for these tests.

##### 4.2. Inspection of sprayed coatings

Another survey document, the result of an enquiry made by the Sub-Commission, was presented to the Commission. The reference is I-452-71 and the title "Methodes de mesure et de controle des revetements metallises utilises dans les differents pays membres/ Methods of measurement and inspection of sprayed coatings used in the various member countries".

This report, which includes answers from 13 countries, has proved that a considerable effort had already been made regarding the testing and inspection of sprayed coatings, but that the problems raised have not yet been satisfactorily solved.

##### 4.3. Study of document submitted

The Commission considered document I-466-71 "Observations presentees par les membres de la Commission I sur le document IC-370-70—Metallisation au pistolet a flamme avec alimentation par fil/Observations submitted by members of Commission I on document IC-370-70—Metal spraying with a flame spray gun with wire feed".

Generally speaking, the opinions expressed were that the subject is dealt with in a manner which would be useful for those readers who have to learn about the process and the Commission therefore requested that the text should be revised with the aim of preparing a document suitable for teaching.

##### 4.4. Participation in the work of a Sub-Commission

At the request of the Chairman of the Sub-Commission, the Chairman of the Commission emphasised to national delegations that they should show more marked interest in work with a bearing on hot spraying in order to ensure that those experts belonging to the Sub-Commission could count on greater co-operation for the advancement of the studies in progress.

#### 5. SUB-COMMISSION D "METHODS AND PROCEDURES FOR GAS WELDING AND HEATING"

Chairman : Dr. P. Steidl (Germany)

The annual report of this Sub-Commission appears in document I-463-71. In the absence of Dr. Steidl, this report was presented by his compatriot Dr. Teske.

##### 5.1. Applications of automatic gas welding

Following the circulation of a questionnaire on the applications of automatic gas welding in member countries of the IIW, the answers received were collected by the Sub-Commission in document I-454-71.

The Commission having taken note of this document, invited national delegations to use the data contained in it to initiate in each country a campaign for the promotion of the use of automatic gas welding.

##### 5.2. Various applications of flame

In order to determine the relative importance of the different applications of flame other than in welding, oxygen cutting and hot spraying, a questionnaire was circulated to all members of Commission I. The answers received are the subject of document I-455-71.

The aim of this enquiry was to discover if Commission I should include on its agenda the study of allied processes such as flame cleaning, flame forming, stress relieving, pre-heating, etc. In the light of the information collected, it would appear that answers to the questions asked are on the whole favourable. The



need for exchange of information on these subjects is obvious and the Sub-Commission has been asked to put this point on its working programme.

Consequently, it was prepared to modify the title of the Sub-Commission as follows : "Methods and procedures for gas welding and heating". This proposal was the subject of resolution 6 which was noted by the Governing Council.

## **6. SUB-COMMISSION H "GAS WELDING AND CUTTING EQUIPMENT"**

Chairman : Dr. K. Teske (Germany)

The progress report of this Sub-Commission is the subject of document I-456-71.

### **6.1. Test conditions for manual welding and cutting blowpipes**

The Sub-Commission has drawn up a questionnaire (document I-457-71) with the aim of collecting information on the conditions laid down in the various countries for the testing of manual welding and cutting blowpipes. This document was adopted by the Commission which decided to circulate it to all member societies of the IIW.

### **6.2. Safety devices in gas welding and cutting installations.**

In order to determine the different types of safety apparatus used with gas welding and cutting equipment, the Sub-Commission has prepared an enquiry. The questionnaire is the subject of document I-458-71 which was adopted by the Commission after some comments on details had been made. As with the previous enquiry, it will be circulated to all member societies of the IIW.

### **6.3. Measurements of pressure in gas welding and oxygen cutting blowpipes**

In order to determine the conditions under which pressure measurements should be carried out when testing gas welding and cutting blowpipes, the Sub-Commission has prepared document I-459-71 "Pressure measurements at gas welding and cutting blowpipes".

After discussion, the Commission adopted the proposals made in this document which it has recommended for publication (resolution No. 7).

### **6.4. Normal service conditions for manual welding and oxygen cutting blowpipes**

As a result of a proposal made last year, and which gave rise to a certain number of comments, the Sub-Commission has prepared a new version which is the subject of document I-460-71.

During consideration of the new text, amendments were made to it and the Sub-Commission was requested to add a paragraph explaining the aim of the proposals made.

### **6.5. List of external and internal agents which could lead to the deterioration of flexible hoses**

The draft already considered during the Lausanne Annual Assembly was modified as the Commission had requested. The new text appears in document I-461-71. It was adopted by the Commission which decided to recommend its transmission to Sub-Committee 8 of ISO/TC 44, in reply to the question asked by that Sub-Committee to the IIW on this subject (resolution 8 adopted by the Governing Council).

### **6.6. Definition of gas consumption and mixing proportions**

Also with the aim of precisely defining the conditions to be fulfilled during testing of gas welding and cutting blowpipes, the Sub-Commission has prepared a document (I-462-71) describing what should be understood by gas consumption and mixing proportions. After discussion, the document was adopted by the Commission which recommended it for publication together with document I-459-71 (resolution 7).

### **6.7. Use of copper and copper alloys in blowpipes and pressure reducing valves**

After studying the answers (Doc. I-432-70) resulting from the circulation of an enquiry questionnaire (doc. I-407-69) on the maximum permitted copper content in alloys used in the construction of pressure reducing valve and blowpipe components coming into contact with acetylene, the Sub-Commission prepared an answer to the question asked on this subject by ISO/TC 44/SC 8.

In the text of this reply, adopted by Commission I, it is recommended that the maximum copper content be fixed at 70%. The corresponding document (doc. I-463-71) was recommended for transmission to ISO/TC 44/SC -8 (resolution 9 adopted by Governing Council).

## 7. OTHER BUSINESS

In accordance with the proposals made by him at the Lausanne meeting, Mr. Ghosh (India) had prepared a note on the SI unit system in which he pointed out the evolution in this field and the advantages of the system, illustrating these with several examples of applications (doc. 1-472-71).

## 8. FUTURE WORKING PROGRAMME

### —Sub-Commission IA “Brazing and surfacing”

#### 1. *Brazing*

- 1.1. Determination of the brittleness of a brazed assembly.
- 1.2. Determination of the corrosion behaviour of brazed assemblies.
- 1.3. Testing methods for brazed and soldered assemblies.
- 1.4. Enquiry into non-destructive testing methods for brazed assemblies.

#### 2. *Surfacing*

Setting up of a Working Group.

### —Sub-Commission IB “Thermal Cutting”

1. Accuracy in automatic oxygen cutting.
2. Present position with regard to the use of the plasma cutting process (enquiry).
3. Titanium cutting.
4. Consideration of several documents, and particularly : “Recent reserach into the oxygen cutting of steel plates for ship-building” by J. E. Chadbound, A. H. Taylor and F. S. Wylie (United Kingdom).

“Shape of the oxygen cutting jet” by M. Rentsch (Germany).

5. Preparation of an oxygen cutting manual.

### —Sub-Commission IC “Hot spraying. Metal spraying”

1. Properties of sprayed coatings : adhesion problems statistical study of the significance of parameters governing spraying-corrosion resistance.

2. Study on the spraying of plastics.
3. Machine properties of sprayed coatings.
4. Standardisation.
5. New applications.

### —Sub-Commission ID “Methods and procedures for gas welding and heating”

1. Applications of automatic gas welding.
2. Study of allied processes using flame.
3. Handbook on pressure welding of tubes and piping.
4. Possibility of increasing the temperature of the oxyacetylene flame by electric ionisation.
5. Gas welding with excess of oxygen.
6. Determination of the relative advantages of single and multi-pass welding.
7. Recommendations for gas pressure welding.
8. Preparation of a document on methods of welding pipelines.

### —Sub-Commission IH “Gas welding and cutting equipment”

1. Welding and cutting blowpipes : definition of a scale of power and establishment of technical specifications.
2. Pressure reducing valves : definition of types, compilation of terminology and technical specifications.
3. Safety devices : definition of types, compilation of terminology and technical specifications.
4. Completion of rules for the satisfactory use of welding equipment.
5. Study of the external and internal agents which could lead to the deterioration of flexible hoses.
6. Maximum permitted copper and silver content of filler metals used in the brazing of pressure reducing valve components and blowpipes coming into contact with acetylene.