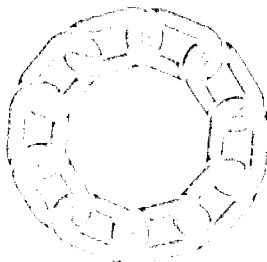




**Information Bulletin  
of the Steel Industry Safety and  
Health Commission**



**A publication of the Commission of the European Communities**

Prepared by the Directorate-General for Employment, Social Affairs and Education, in collaboration with the Directorate-General for the Information Market and Innovation.

**Notice**

Neither the Commission of the European Communities nor any person acting on its behalf may be held responsible for the use to which the information contained in this publication might be put.

© Commission of the European Communities

Reproduction of the contents of this booklet, in part or in whole, is permitted only with the prior permission of the Editor.

# Accidents

## 1. Operator's arm trapped between two rolls in the sheet finishing department

After establishing the origin of oil stains on sheet, an operative decided to remedy the problem with a rag soaked with solvent. When requested, another worker operated the lever of the pinch rolls which were to be cleaned.

In the process, the operative's hand was caught between the two rolls which were separated by a gap of 33 mm. The rollers (250 mm diameter) drew in the arm up to the shoulder level with the momentum of the machine.

### Recommendations for prevention:

1. The work force was to be reminded of the instructions that manual work must not be carried out on rotating rolls.
2. Establishment of a remote method of cleaning.

## 2. Fatal injury by release of oil under high pressure

One of the two hydraulic feed cylinders of the clay gun of a blast furnace was replaced. The new cylinder has the same volume as the old one, but its diameter is less, which makes the cylinder longer. When this cylinder was being tested, the end of the piston rod came further back than the rod in the old cylinder and pressed against the concrete. Since the rod was prevented from moving, the pressure caused the cylinder to move back. The connections ruptured and oil spurted out at high pressure (220-260 bar). One workman operating the machine was killed when he was hit in the face.

## 3. Severe burns in a hardening shop

In the hardening shop in a special steel works a rack of incandescent rings had to be transported from the annealing furnace to the oil quenching bath in an adjoining shop. To do this, the gantry crane near the furnace had to pick up the rack with the rings and place it on a trolley, to be transported into the adjoining shop. There the rack had to be lifted again by a gantry crane to be lowered in the quenching bath. When the operative came to lift the rack from the trolley with the crane, he could not fit the hook into the carrying eye of the rack with the normal guide pole. After a number of unsuccessful attempts he tried to do it by hand. As he reached over the incandescent rings, his clothing caught fire.

He was wearing heat-proof protective gloves and an apron, but not the frontal protective garment provided, which is made of aluminium-coated material. He had obviously underestimated the intensity of the radiated heat, which caused his clothing to catch fire. The prompt and careful action of a fellow worker saved him from still more serious burns than those he re-

ceived. The injured man was flown immediately to a special hospital.

After this accident the management will no longer tolerate any disobeying of the rule that heat protection clothing must be worn. In addition an easier way of fitting the crane hook into the carrying eye on the rack is being sought.

## 4. Coil handling machine

The accident occurred when the operative was fitting a coil on the mandrel of the decoiler. Using hand controls of the lockable type (which remain in the locked position unless cancelled), he actuated the fork of the coil carrier. After halting the fork by replacing the controls in the zero position, he stepped on to the telescopic pit cover plate between the two longitudinal coil support beams in order to check that the coil was properly centred for placing on the mandrel.

It was at this point that the coil carrier began to move in reverse. While getting out of the way of the coil support beams in order not to be trapped between the coil carrier and the coil positioned at the end of the beams, he placed his left foot on the bevelled edge of the pit on which the large coils are placed, and slipped.

His left foot and leg were trapped between the coil carrier and a longitudinal beam. A fellow worker who had witnessed what was happening promptly actuated the emergency stop, thus preventing the victim from being more seriously injured.

What probably happened was that when the victim had attempted to cancel the control (zero position), he went beyond the mark and thus actuated the carrier's reverse mechanism. As this latter mechanism is relayed through a time delay switch, the victim failed to notice the error and went on to check whether the coil was in the correct position.

### Preventive measures:

1. Installation of a mirror system in order to check that the coil is properly centred on the mandrel without the operative having to get on the machine.
2. Replacement of the lockable controls by hold-down controls.

## 5. Worker falls through glass roof during cleaning operation

At about 7.45 a.m. a worker from an outside company and his foreman went on to a roof to clean the glass panes, taking buckets and longhandled brushes with them.

There was no problem of movement or of safety on the flat part of the roof, which was surrounded by a railing.

The foreman instructed the worker to clean the panes with a brush in order to remove the blue solar protec-

tion coating which had been applied for the summer time.

While the foreman was fetching water, the worker climbed onto a sloping window (45°) which broke, whereupon he fell 17 m into the compressor shop.

Consequence of the accident: rupture of the spleen, bruised chest, fracture of the left elbow, concussion.

Note: the 19-year-old worker had been employed at the company for one month.

## 6. Moving a scrap wagon with an EOT crane — Foreman's head trapped between an electromagnet and the wagon's side

At 6.35 a.m., at the start of the shift, the crane foreman was given as one of his tasks the removal of pieces of scrap. He decided to proceed with this work immediately and formed a team consisting of a crane driver and a machine operator. The wagon he intended to use for the removal of the scrap was at the far end of the line and had to be moved into the EOT crane's area of operation. The crane foreman and machine operator detached the crane's lifting beam and attached an electro-magnet which had to be used afterwards for loading the scrap.

The foreman then fetched a 3 m long metal looped sling, passed it round one of the crane hooks and round the hook of the wagon. After instructing the crane driver to set the crane in motion, he followed the movement of the wagon. When the latter had arrived at a given location, the foreman probably thought it was time to detach the sling.

During this operation his head was struck by the electro-magnet and trapped between it and the side of the wagon.

The machine operator, who had gone to fetch a chock, saw him fall to the ground whilst the wagon continued to advance slowly. He managed to stop the wagon before it reached the foreman.

### Planned action:

1. Strict application of the rule forbidding the towing of wagons with EOT cranes.
2. More frequent checks on this point.
- 3 Study of a different method of scrap removal.

## 7. Worker trapped between belt and take-up pulley on a conveyor

After joining the team working on a belt conveyor chute, an employee began to help his colleagues to install wear-resistant elements whilst the conveyor was still in motion.

The final operation consisted in fixing the elements with bolts. In the process, the employee dropped a pipe spanner which fell down the chute onto the conveyor. The employee then approached the conveyor to recover the spanner. At that moment, he slipped onto the conveyor and was drawn under the nearby take-up pulley feet first.

In falling, he managed to operate the emergency stop cable, which was also pulled by another person at the scene, but nevertheless received serious injuries to his left thigh.

### Planned action:

1. Installation of a railing to separate the work platform from the outer baffle plates and the conveyor.
2. Intensified retraining of all the workforce:
  - (a) attitude training — no attempt should be made to recover a tool which falls onto a moving conveyor;
  - (b) complete familiarity with the installation — risks — use of slides for illustration;
  - (c) written and verbal instructions.
3. Listing of working areas and jobs likely to be exposed to the same danger (in-running nips).
4. Examination of the accessibility of emergency stop cables along conveyor installations.
5. Analysis of jobs requiring special safety monitoring by a worker when repairs have to be carried out during operation.

## 8. Hand caught in rolls

Following numerous incidents resulting in production problems, the shift foreman stopped rolling to check the guide rollers of stand 12. An operative went between stands 11 and 12 and passed his right arm from above between the guide rollers, to check that the rollers were not blocked for lack of lubrication.

The glove he was wearing became trapped by the rotating rolls and his right hand was drawn into the entry point.

On hearing the victim's cries, the rolling foreman nearby helped him to hold back his right arm until the rolls were stopped.

### Action taken:

The whole workforce was reminded of the instructions.

## 9. Forefinger severed by tool on shaping machine

A fitter was machining a workpiece on his shaping machine. A trainee was standing next to him. In order to measure the workpiece with slide calipers, the fitter stopped his machine and placed the calipers on the workpiece with the tool positioned at the end of the return stroke. Leaning over to read the result, the trainee caught the starting lever with his overall sleeve. The tool moved back and forth, severing the end of the fitter's left forefinger.

### Action taken:

1. Alteration of the controls.
2. Prohibition of machine operation by two persons.

## 10. Explosion during the emptying of a slag pot

Following difficulties with the operation of a blast furnace, which caused a blockage of the hearth, it was

decided to remove the molten products (slag, pig iron) in former steel shop ladles to the working area of an open hearth slag treatment company. Since the blast furnace had not been functioning properly for a long time, this operation had been performed several times in previous weeks.

The work sequence is as follows: the ladles are transferred to the working area and emptied by the slag treatment company. This job is done by a work team which consists of a crane driver, a loader operator and two handling staff.

A ladle is emptied in two operations: the rings at the end of the crane's chain sling are connected to the ladle's upper trunnions and the ladle is removed from its trolley and placed on the ground; the chains are then connected to the lower trunnions so that the ladle can be tipped when raised.

On the morning of 22 January, 12 ladles had been emptied without incident. In the afternoon, no ladles had been scheduled for emptying and the crane had been fitted with its electro-magnet to break up, with the aid of a crushing ball, the slag emptied that morning. However, since 6 ladles had been brought to the working area at about 2.30 p.m., the crane operator decided to empty them after covering the ground with a bed of hot slag, according to him.

When the first ladle was emptied, there was a violent explosion in which blocks of slag were blasted into the surrounding area, over distances of more than 20 m in some cases. The loader, which was some 15 m from the point where the ladles were emptied, was hit by hot material and a fire started. The loader operator in his cab suffered burns in the face and on his hands and he fractured his left wrist when jumping down from the loader in order to escape. The crane driver and the two sling handlers who were near the crane behind the row of trolleys and behind the ladle were not hit.

**Action to be taken:**

1. Ladles must be left standing for 8 hours before being emptied.
2. A layer of permeable dry slag, 30 to 40 cm thick, must be left on the ground to drain off rainwater.
3. The operation should be carried out in a more isolated area.

## 11. Clothing was set on fire as a result of an oxygen leak from a flexible pipe

A scarfer was scarfing slabs with the flexible oxygen pipe over his shoulder. The pipe was perforated 2 m from the lance. Oxygen escaped near the worker's shoulder, passing under the fireproof jacket and aluminium-asbestos shoulder pad and setting fire to his clothes.

**Action planned:**

1. Daily checks by the user, periodic checks by the shift foreman.
2. Use of stronger flexible pipes.
3. Instructions to the workforce on the dangers of oxygen.

## 12. Ore preparation/pellet plant

Sparks from a burning/welding torch fell onto a conveyor belt, in a pellet plant, and resulted in a fire which caused considerable damage to belting, motors and screens.

The outbreak occurred at the balling drum level of the plant, approximately 41 m above ground level. In this area moist iron ore concentrates, mixed with bentonite (a binding agent), are formed into a ball shape prior to drying and firing in the grate and kiln sections of the plant. The balling area contains five balling drums, each of which is normally lined with steel mesh on which iron ore builds up during the balling operation. To prevent the build-up becoming too thick, a cutter bar reciprocates along the length of the drum. This cutter bar contains metal knives which restrict the drum build-up to an acceptable level. The cutter bar however, is a high-maintenance item and experimentation on one of the drums had shown that it could be eliminated if the drum were lined with rubber instead of steel mesh. This conversion operation was being undertaken on the drum at which the incident occurred during a planned plant shut-down. Part of the conversion involved burning 'breathing holes', approximately 2 inches in diameter, in various positions of the drum shell. This operation was being undertaken immediately prior to the outbreak of the fire. After burning three rows of holes in the shell a boilermaker and his mate left the area for a meal break. Prior to leaving they turned off all gas supplies and checked for any signs of smouldering, etc. On their return, approximately 50 minutes later, smoke was seen to be coming from the plant. The alarm was raised, the fire brigade summoned and the outbreak brought under control within 45 minutes.

Prior to the burning/welding operation, as a precaution against an outbreak of fire, old belting, which partially covered the roller screen, and the remainder of the screen was covered with ore and scale from the drum. However, because of the drop involved, the specific position of each metal disc which had been burned out could not be observed and it was assumed that they would all drop onto the concrete wash-down floor below. The operation had been carried out successfully in this manner on another drum. In this instance, however, hot material which had been burned out had been able to ignite some flammable material situated at the end of the drum. A Panel of Inquiry, investigating the circumstances surrounding this incident, concluded that had someone returned to the area sooner the smouldering would have been evident so that the fire could have been extinguished fairly easily. In addition, during investigation, it was established that one of the dry risers used by the fire brigade had some leaking welded joints, although it is unlikely that this added to the time which it took to extinguish the fire.

**Recommendations/action:**

1. In this type of operation, the metal being burned out should be physically collected to ensure that it is cooled safely. A note to this effect was issued by the Plant Engineer immediately after the incident.
2. When carrying out any burning/welding jobs, the job should be checked immediately after completion

- and re-checked, after 30 minutes, to ensure that any possible smouldering is dealt with.
3. The dry riser to be repaired and all similar ones checked on the plant.
  4. All craftsmen and supervisors on the plant to be seen personally by the Plant Engineer and reminded of the hazards associated with burning/welding operations.
  5. Samples of the various rubbers and plastics used in the construction of the plant to be tested for their flammability and ease of ignition.
  6. Investigations to be carried out into the feasibility and practicability of utilizing fire-resistant belting where and when possible.

### 13. Ladle breakout in a steel plant

At around 10.30 p.m. at the weighing station approximately 200 tonnes of molten iron (at a temperature of 1365°C) was being charged into ladle No 6. During transfer (approximately 4 m) of the transfer car from the scales to the charging bay a hole appeared in the ladle underneath one of the trunnions, resulting in spillage of molten iron.

Only a very small quantity of spillage took place at this point. The shift foreman instructed the driver of overhead crane No 2 to move the ladle from the transfer car and position it in readiness for charging its contents into the converter which was still in the melt finishing phase prior to tapping. The ladle was then raised by overhead crane approximately 7 m (1.5 m above the shop floor) and the transfer car was moved as far as possible from the vertical of the ladle.

While the iron flowed into the underlying pit (an area considered suitable for its collection) the ladlemen tried to prevent an increase in spillage by hosing down the area affected. As they were doing so, another two leaks appeared near the first and this was followed by a full ladle breakout (a hole of roughly 30 cm in diameter) with a resulting increase in spillage of molten iron. A total of approximately 10 minutes had elapsed between the beginning of spillage and the breakout.

The molten iron entering the pit generated three violent explosions in quick succession caused by the reaction of the iron with the water which had collected in the pit after hosing down the ladle bottom.

The resulting injuries and damage to property were caused by several factors: explosions, fire and splashing of molten iron.

Five people were injured:

- (a) the crane driver of overhead crane No 2 (first and second degree burns to the face and hands);
- (b) the crane driver of another overhead crane walking on the access gangway to the crane cabins (first and second degree burns to the lower limbs);
- (c) The two ladlemen (bruises);

(d) The scales operative (slight bruising from a fall).

The two casualties suffering from burns were at the time wearing protective flameproof cotton suits and woollen underwear.

Main damage to plant and equipment:

- (a) damage to the roof of the shop and windows in the surrounding area (particularly those of the control cabin of overhead crane No 2);
- (b) fire damage to the main power lines to the overhead crane;
- (c) miscellaneous damage to the transfer car.

Approximately 20 hours were needed to repair the damage, after which normal operation was restored.

The ladle had been relined roughly three months before, using the materials normally used, and up until the time of the incident it has been used regularly over 350 melts.

An inquiry subsequently established that the infiltration of molten iron between the joints and between the working and safety lining had been caused by inadequate drying of the new lining. This prevents the refractory mortar from bonding and impairs its chemical and physical strength.

### 14. Explosion in slag yard

At around 9 a.m. a slag car from the steel works was being emptied in the slag yard when there was a violent explosion which shattered windows in the surrounding premises.

The cab windows of three private lorries parked nearby were broken.

There were only three slight casualties:

- (a) one worker pulled a muscle in his right leg while running away from the site of the explosion;
- (b) one worker inside the scales control cabin was struck on the forehead by a small piece of glass;
- (c) one technician inside the scales control cabin received dust in his eyes.

Prior to the explosion, the drainage pit of the unloading zone and the surrounding area had been cleaned by a specialized company. The sludge had been dumped on the nearby yard to be taken away by lorry. While waiting for the lorry, the driver of the firm's mechanical shovel incautiously tipped three skips of sludge on the brink of the slag pit (1.5 m deep) opposite the unloading area. The liquid slag being emptied into the basin from the ladles thus came into contact with the liquid sludge spilling over the edge and exploded, projecting mud and slag outwards.

The relevant code of practice had not been observed on this occasion, but was none the less strengthened, placing even greater emphasis on the risks involved in the handling of such materials.

# Training for new entrants and workers transferred to new duties

Although the recruitment of new workers to the steel industry is not common at the present time, the number of job transfers is on the increase, and workers are being asked more and more frequently to fulfill a multipurpose function; in other words, to carry out different jobs and activities depending on production conditions.

The consequence is a parallel increase in training requirements and companies are faced with a larger number of training activities which they need to make as effective as possible.

In order to provide more information on this aspect this bulletin contains the study, carried out by the Working Party on Safety Training of the Steel Industry Safety and Health Commission, entitled 'Safety training for new entrants and workers transferred to new duties' (adopted by the SISHC at its meeting of 9 July 1982) as well as information on training programmes and monitoring of their implementation in a French steel company.

## 1. Safety training for new entrants and workers transferred to new duties

Technological development is leading to more frequent changes in duties and working conditions for the individual worker. Moreover, the steel industry is undergoing a process of restructuring involving personnel transfers on a considerable scale. Systematic instruction makes a substantial contribution towards ensuring that the workers concerned rapidly become familiar with their new work without being exposed to a particularly high degree of risk.

Training on the job proposed in this document also permits better induction for operational purposes and, if a sufficiently broad approach is adopted, may provide a wider range of job opportunities for the workforce.

The Steel Industry Safety and Health Commission reiterates the provisions of the tenth principle issued in 1977:

'Alongside the technical and organizational aspects of accident prevention, training in safety matters at all levels of management and for all workers employed is of the highest importance. With this aim in view, the trend must be towards safety training becoming an integral part of vocational training, but in so far as it may not be possible to achieve this, the firm's programme should include additional training in this field.'

The objective of this document is to provide information on methods of training to interested parties which the Steel Industry Safety and Health Commission deems most suitable.

The persons to whom the proposals of this document relate are new entrants and workers transferred to a new job involving a major change in duties and working conditions.

### Training methods

#### Basic instructions

After completion of the recruitment or transfer formalities and *before* employment on the new job, all workers must receive basic safety instructions.

Such instruction may cover:

- the structure of the plant;
- relevant safety legislation;
- safety organization in the plant;
- personal protection equipment;
- safe practices;
- key risk areas specific to the plant.

See Annex 1 for an example of a suggested programme for basic safety instruction taken from a Community plant.

Where immigrant workers are employed it is important that sufficient attention is given to language barriers and that any written material distributed or audio-visual aids should also recognize this problem.

Where workers are transferred within the same undertaking, it may under certain circumstances be possible to dispense with certain sections of the basic instruction.

#### Instruction on the job

On-the-job instruction must be carried out taking into account both operation and safety aspects. In particular, immediate superiors must ensure that new workers or transferees receive proper instruction on the job.

During instruction on the job it is desirable to assign a 'supervising workman' for day-to-day supervision of the new entrant or transferee until he is competent. This person's function is to assist the newcomer in adjusting to the new working conditions and environment.

Supervising workmen must possess a detailed knowledge of the hazards associated with the job, precautions against these hazards, safe working practice and appropriate behaviour in emergencies.

In order to ensure that it is successful, instruction should be carried out step by step as follows:

#### Step 1: *Introduction*

- (a) Establish rapport.
- (b) State nature of work.
- (c) Determine prior suitable knowledge or experience.
- (d) Arouse interest.

#### Step 2: *Demonstration*

- (a) What is done?
- (b) How is it done?
- (c) Why is it done in this manner?
- (d) Aspects of particular importance?

#### Step 3: *Practice*

- (a) First attempts by the new worker to carry out the work.
- (b) Emphasis on the aspects of importance while the work is in progress.
- (c) Repetition as necessary.

**Step 4: Conclusion of Instruction**

- (a) Allow newcomer to practice work on his own.
- (b) Check whether everything has been fully understood.
- (c) Designate persons whom the new worker may consult.

See Annex 2 for an example of an on-the-job instruction programme for loading operations in a sheet rolling mill.

It is desirable that such instruction programmes should be drawn up by specially trained staff in collaboration with the supervisors, industrial safety officers, and training officers concerned.

To guarantee the quality of training, instructors must be trained accordingly.

The manner in which the worker carries out his new job must be continually checked throughout the in-

duction period. Care must be taken to ensure that he does not pay less attention to safe working practices as his proficiency increases.

**Training record**

In order to ensure that all necessary measures for the induction of new entrants and transferees and their instruction in safety matters are duly carried out, it is recommended that a training record card be drawn up. It should be used to record the following steps in the instruction process:

- (i) confirmation that the worker has undergone basic instruction;
- (ii) written material issued during basic instruction;
- (iii) confirmation that the worker has undergone instruction on the job;
- (iv) supervising workman for the induction period, if applicable;
- (v) personal protection equipment issued.



<b>A suggested programme for basic safety instruction taken from a Community plant</b>	
<b>1. Description of the works</b> 1.1. Works area 1.2. Structure of undertaking and workforce 1.3. Products 1.4. Special facilities for the workforce (recreation rooms, washrooms, canteen, etc.)	<i>Minutes</i> 15
<b>2. Legal basis of industrial health and safety</b> 2.1. <i>Health and safety regulations</i> Legal requirements, structure, legal consequences of non-compliance, duties of the employers and employees, arrangements for consultation 2.2. <i>Other statutory provisions</i> Functions of the trade unions, industrial accidents, commuting accidents, occupational diseases, notification requirements, accident situation investigations, trade association doctors, reporting arrangements 2.3. <i>Workers' representatives</i> Functions of the workers' representatives in ensuring industrial health and safety 2.4. <i>Safe working procedures</i> Operating instructions, rules of behaviour	40
<b>3. Safety organization in the undertaking</b> 3.1. Functions of the safety officers, safety representatives and safety committees 3.2. Outline of health and safety policy 3.3. Health and safety programmes	20
<b>4. Personal protection equipment</b> 4.1. Purpose and value of items of protective equipment 4.2. Requirements with regard to the acquisition, provision and wearing of such equipment 4.3. List of protective equipment	30
<b>5. Safe practices</b> 5.1. Operational hazards and accident causes broken down by industrial safety field 5.2. Unsafe acts 5.3. Unsafe conditions 5.4. Safety instructions from superiors 5.5. Assistance to safety representatives 5.6. Safety-minded behaviour 5.7. Arrangements for supervising workmen 5.8. Complaints procedure	60
<b>6. Key factors with regard to load handling</b> 6.1. Lifting machinery, loads and lifting tackle	20
<b>7. Road and rail safety</b> 7.1. Stationary and moving traffic, warning and information signs, roads and tracks, level crossings	15
<b>8. Video tapes/slides/films</b> (German, Turkish, Spanish, Portuguese, Italian, Serbo-Croat, Greek) 8.1. 'Safety at our works' 8.2. 'Safe working for a better life' } priority 8.3. 'The invisible danger' 8.4. 'Safe lifting for a longer life' } as required 8.5. 'The incalculable danger'	40
<b>Total</b>	240
<b>9. Issue of safety literature</b>	

## On-the-job instruction programme for loading operations in a sheet rolling mill

Step 2 of the training process	Example: Transport of sheet packs by chain sling for loading onto wagons	
What is done?	How is it done?	Why is it done in this manner?
<p>1. Prepare wagons on low-level track or at the ramp for loading of the sheet packs.</p> <p>2. Inspect the sheet packs to be loaded (Sheets are bound together with steel bands to form packs).</p> <p>3. Select suitable chain sling according to the weight of the sheet packs.</p> <p>4. Examine chain sling for visible defects.</p> <p>5. Select suitable crane and inform crane operator.</p> <p>6. Pass chain sling over crane hook.</p> <p>7. Position crane and sling over sheet pack.</p> <p>8. Sling the sheet pack, lift and transport it to the wagon.</p> <p>9. Lower the sheet pack onto the wagon.</p> <p>10. Detach the chain sling from the sheet pack and resume crane operations.</p>	<p>Inspect wagon, clear loading surface, remove old tension wires, wedges and nails. Where necessary, remove or fold down wagon stanchions or sides. Lay out suitable supporting blocks and wedges for subsequent use.</p> <p>Visit stockyard and check conditions for later lifting and transport of the sheet packs.</p> <p>The weights of the sheet packs are indicated on the top sheet. Chain slings fitted with hooks must be selected on the basis of these weights (consult the load table on the chain stand). Given the height and width of the sheet packs, the chain lengths or the angle included between the legs of the sling must be taken into account in relation to the load.</p> <p>Visual examination of the chain sling or deformation. (Lifting tackle is periodically inspected by experts.)</p> <p>The crane capacity is that indicated on the crane bridge. The crane operator must comply with the instructions of the slinger. The prescribed hand signals must be used.</p> <p>Grip the bottom part of the ring of the chain sling with both hands and pass it over the crane hook. Use hand guards.</p> <p>Use clear signals to direct the positioning of the crane over the centre of the sheet pack.</p> <p>Lower the crane hook and <i>sling sufficiently</i> to allow both hooks to be inserted centrally under the load (two men working simultaneously). Press the hook against the sheet pack with the open palm of the hand, simultaneously having the sling pulled tight. Step back from the load and only then give the signal to lift or move off. Ensure that there is adequate clear space, supervise crane travel.</p> <p>Direct the crane from the ramp so that the sheet pack can be positioned directly above the point at which it is to be deposited on the loading surface of the wagon. Lower the sheet packs to within about 50 cm of the loading surface and wait until the crane is stationary. Only then <i>mount the wagon</i>, push wooden blocks under the sheet pack and lower the load onto them.</p> <p>Lower the chain sling sufficiently to allow the hooks to be detached from the load. Reverse hooks and give signal to raise the sling, which is suspended loosely from the crane hook. Give signal for crane departure.</p>	<p>The loading surface must be completely free of obstacles. There must be no risk of stumbling or crushing during movement on the loading surface or loading of sheet packs. Projecting wire ends may also cause injury.</p> <p>The crane must be able to reach the sheet packs in a suitable (central) position. Potential crushing hazards must be noted or eliminated.</p> <p>The requisite safe working load for the sling depends on the weight of the sheet pack. The load-carrying capacity of the sling decreases as the angle between the legs increases.</p> <p>Faulty slings may cause fall of load.</p> <p>Cranes must not be subjected to loads in excess of their safe working load. Clear signals must be given to avoid errors which may have serious consequences.</p> <p>The hands must not be placed between the crane and the ring. Danger — risk of crushing.</p> <p>The crane or sling must be able to apply a perfectly vertical lifting action to the sheet pack in order to avoid dangerous swinging of the load.</p> <p>The load must be equally distributed over both hooks as otherwise it may slip. The hooks must project as far as possible below the pack. The hands must not be placed between the hook and pack as they may otherwise be crushed. Dangerous swinging may occur when the load is raised. Persons must not be exposed to danger from suspended loads.</p> <p>On the wagon there is a risk of falling and of being crushed by the load as it approaches. Lowering over short distances involves minimal risk.</p> <p>The sling must hang loose so that there is no danger of crushing the hands. Once detached, the sling must not catch in the load as is raised.</p>

## 2. Recruitment, introduction and training in a French plant

In France, employers are statutorily required to organize suitable practical safety training for paid workers they recruit, workers who have been transferred, workers having changed work station or technical process, interim staff and, at the request of the industrial medical officer, workers resuming duties following an interval of at least 21 days.

This training should relate to the following three main points:

- (i) risks arising from works traffic,
- (ii) inherent risks of the work station,
- (iii) steps to be taken in the event of an accident.

In order to make the introduction easier and more personal, to integrate recruits into the industrial environment and give them knowledge they will need to perform their tasks, a survey has been carried out of existing training schemes, an induction procedure prepared and programmes drawn up.

**Attached are:**

- (i) the action programmes for recruitment and introduction (Table I);
- (ii) the training programme for the induction period, applicable to all new recruits and partly to workers who change workplace (Table II);
- (iii) the safety training programme for the new recruit;
- (iv) the list of additional training schemes relating to specific duties to be carried out;
- (v) an example of an individual training record sheet (front and back).

Table I

### Introduction

Department Involved	Action	New recruit	Worker transferred from another department	Change within a department	Change of work station within the team
Before the decision to employ or to change of work station					
Personnel Department	Administrative formalities Medical examination Psychotechnical examination Introduction to the head of department	Yes Yes Yes Yes	No Yes If necessary Yes	No Desirable If necessary No	No If necessary If necessary No
Introduction day					
Department where the subject will carry out his duties	Reception by the head of department and the shop manager	Yes	Yes	No	No
	Quick tour of the workplace	Yes	Yes	No	No
	Role of the department within the works	Yes	Yes	No	No
	Role of the team within the department	Yes	Yes	No	No
	Establishment plan of the team	Yes	Yes	No	No
	Work timetable	Yes	Yes	No	No
	Place to which he is to report on his first day of work (routes followed by plant and trains in the works)	Yes	Yes	No	No
	Information on the issuing of working and safety clothing and equipment (shoe sizes, etc.)	Yes	No	No	No
	Escorting of the subject back to the recruitment office	Yes	No	No	No
	Training Department	Identity card — bus services Works regulations Pension scheme, health insurance Wages, etc.	Yes	No	No

Table II

## Induction period

3 weeks from 6 a.m. to 2 p.m.

Actions carried out by the department in which the subject will carry out his duties, unless stated otherwise

Action	New recruit		Worker transferred from another department		Change within a department		Change of work station within the team	
	6 a.m. - 8 a.m.	Yes	6 a.m. - 8 a.m.	Yes	6 a.m. - 8 a.m.	Yes		
<p>In the company of the shift foreman:<sup>1</sup> explanation of access to social facilities (changing rooms, canteens, etc.), Issue of equipment, explanation of the shop layout, return to foreman's office</p> <p>In the company of the safety foreman:            Guided tour of the premises            Specific risks of the department, of the site (molten material, overhead cranes, gases, etc.); procedure to be followed in the event of explosion or fire. Emergency exits            Rules governing the movement of plant and vehicles at the workplace            Issue, where appropriate, of special safety equipment and explanation of its use</p> <p>Introduction by shift foreman of the new recruit to his workmates and to the chargehand. Comments on the work station            Issuing of code of conduct and safety regulations</p> <p>Under the guidance of the shift chargehand and team leader, practical demonstration of the duties to be carried out            Application of the safety rules specific to the work station. <i>Modus operandi</i>.            Explanation of the functioning of protective and emergency equipment            Teaming up with an experienced worker</p> <p>During the first 15 days: follow-up by a three-day period of general training and safety training, organized by the safety and training departments (see below)            During this period, use may be made of existing training schemes relating to safety (overhead crane drivers, sling operators, truck drivers, transport training)</p> <p>At the second end of the second week, interview with the shop manager and safety foreman who must ascertain that the instructions have been understood and provide any additional information required</p>	First day of work	6 a.m. - 8 a.m.	Yes	6 a.m. - 8 a.m.	Yes	6 a.m. - 8 a.m.	Yes	No
		8 a.m. - 11 a.m.	Yes	8 a.m. - 11 a.m.	Yes	8 a.m. - 11 a.m.	Yes (only for the new sector)	
		11 a.m. - 2 p.m.	Yes	11 a.m. - 2 p.m.	Yes	11 a.m. - 2 p.m.	Yes	
	Second day	Second day	Yes	Yes	Second day	Yes	Yes	Yes
			Yes	Yes	Yes	Yes	Yes	
	Third day until end of 6 a.m./2 p.m. shift period	Third day until end of 6 a.m./2 p.m. shift period	Yes	Yes	Third day until end of 6 a.m./2 p.m. shift period	No	No	No
			Yes	Yes	Yes	If necessary	Yes	
	Third day until end of 6 a.m./2 p.m. period	Third day until end of 6 a.m./2 p.m. period	Yes	Yes	Third day until end of 6 a.m./2 p.m. period	Yes	Yes	Yes
			Yes	Yes	Yes	Yes	Yes	
	Second day until the end of 6 a.m./2 p.m. period	First day of work	Yes	(to be done at the beginning of the shift)	Yes	Yes	Yes	Yes

<sup>1</sup> Or by the chargehand or the qualified person in charge.

## Three-day period of general training and safety training of the new recruit

### Objective

To include in the new recruit's induction a course designed to make him safety conscious and to teach him the basic principles of safety.

### Organization

Every new recruit is given, within a week of his arrival, a general course designed to make him safety conscious. This course lasts 20 hours spread over three days.

There are two such courses per month.

### Programme

<b>First day</b>	Safety awareness: 4 hours
8 - 9 a.m.	In the safety department, familiarization with the works (using slides), explanation of the role of the different departments.
9 - 10.30 a.m.	Explanation and comments on the various hazards encountered in the works: gas, electricity, internal traffic, materials handling.
10.30 - 11 a.m.	Illustrations by means of slides. Procedure to be followed in the event of an accident or intoxication at the workplace.
11 a.m. - 12 noon	Guided tour of the workplace.

<b>Second and third days:</b>	Slinging and manual materials handling: 16 hours (timetable 6 a.m. - 2 p.m.)
-------------------------------	--

#### Second day: 8 hours

<b>Theory:</b>	<b>Practical:</b>
Slinging equipment	Visit to an overhead crane teaching bay
Rules for using slinging equipment	Demonstration exercises
Slinging techniques	Simple slinging operations using various loads
Examination of an overhead crane (dummy)	Supervised slinging
Lifting, moving, placing loads	
Safety instructions	

#### Third day: 8 hours

<b>Theory:</b>	<b>Practical:</b>
Basic principles for load lifting	Practical manual handling exercises (case, sack, drum, oxygen cylinder)
Film and slides	

### Administrative organization

The list of new recruits is sent by the recruitment office to the training department weekly.

The training department draws up a training schedule and summons the workers concerned via the safety foreman.

### Comments

This period of making recruits safety conscious and teaching them the basic safety principles is supplemented by safety instruction relevant to the work station they will occupy. The programme is prepared and monitored by the safety foreman and checked by the shop manager and the shift foreman.

## List of additional training schemes relating to the specific duties to be carried out

### Training for posts for which safety training schemes exist

	<i>Duration</i>	<i>Body responsible</i>	<i>Qualification Issued</i>
Overhead crane drivers	40 hours	Training department	Permit
Special crane drivers (for those already holding a standard permit)	20 hours	Training department	Certificate
Manually ground-controlled cranes	24 hours	Training department	Certificate of ability to operate
Truck drivers (standard type)	40 hours	Training department	Permit
Heavy truck drivers (for those already holding a standard permit)	24 hours	Training department	Certificate
Tractor loaders	40 hours	Training department	Permit
Wagon pushers	32 hours	Training department	Certificate of ability to operate
Shunters	120 hours	Transport department	
Pilot shunters	24 hours	Transport department	Proficiency test
Head pilots	40 hours	Transport department	Proficiency test
Pointsmen, wagon tipper operators, checkers	8 hours + one month practical training	Transport department	Proficiency test
Electric pointsmen	48 hours + practical training	Transport department	Proficiency test
Loco drivers	200 hours	Transport department	Permit
Crane drivers	80 hours	Transport department	Permit
HGV drivers	1 month	Transport department	Official driving licence
Slinging and manual materials handling	24 hours	Transport department	Proficiency test

### Other training schemes

Oxyacetylene cutters	24 - 40 hours	Training department	Proficiency test
Welding	40 hours	Training department	Proficiency test
Furnace controlmen	24 hours	Melting and training departments	Proficiency test
Blooming operatives	20 hours	Rolling and training departments	Proficiency test
Billet yard operatives	40 hours	Rolling and training departments	Proficiency test

### Safety training

First aid	20 hours	Safety department	Certificate
Fire prevention and fire fighting	4 hours	Safety department	
Arduous tasks and postures	40 hours	Training department	Certificate
B safety courses	32 hours	External training institute	



# Reader's letter

## Hooks — an effective means of preventing hand injuries in crane handling operations

Forge workers have been using yard-long hooks for generations to handle large, hot ingots and forgings because of the intense heat they radiate. Whether workpieces are in the furnaces or under the presses, there is simply no other way of handling them — they are kept on a long 'leash'.

With this way of working, it is hardly possible for the fingers or hands to get between the sling and the load. Why then are these hooks not also used in cold processes? This would surely be the logical consequence. It is indeed done at times, when loads have to be moved to or from racks high up out of arm's reach. It is therefore even more illogical to use the hands for loads within reach in view of the well-known severe hazards; in addition, very short hooks could be employed as no heat is radiated.

At TEW, we began five years ago to equip the workers responsible for slinging with these carrier hooks, which are approximately 400 mm long. The number of hand and finger injuries has declined radically since.

It would be wrong to assume that all types of work could be carried out with this hook. It has three basic uses:

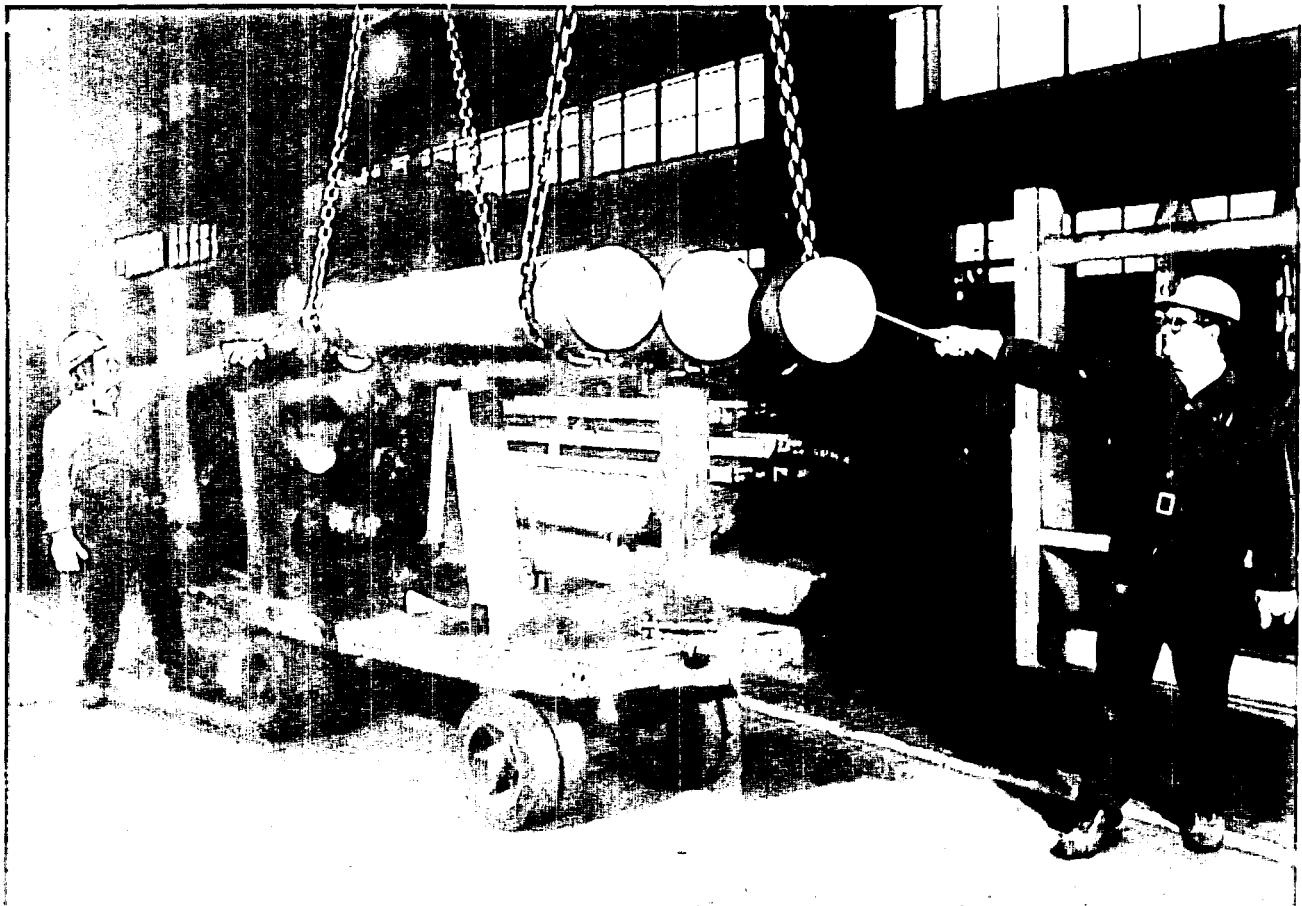
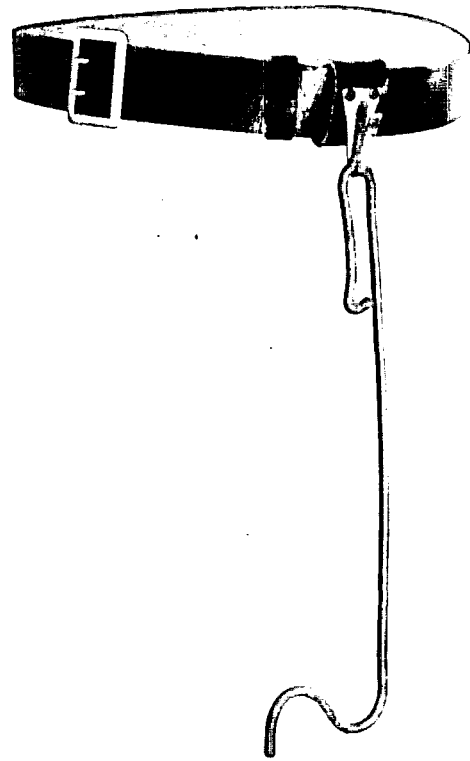
- (i) to tension the slinging gear before lifting;
- (ii) to correct a load hanging on the crane (particularly bundles of rounds);
- (iii) to remove the slinging gear when the load has been set down.

So that he has his hands free for other jobs, the slinger carries the hook on his belt at the back of his body, and is thus virtually unhindered. The hook is thus always ready for the operations described above.

In order to make carrying the hooks even more comfortable, we made them from the titanium manufactured at TEW, using round rod 6 - 7 mm thick. The hook then weighs about as much as an ordinary bar of chocolate.

Anyone who knows about the numerous losses of fingers which occur amongst slinging personnel and is aware of the hand injuries which these men suffer in transport operations should definitely try out the hook. It will certainly prove worthwhile.

Krefeld, 14 March 1983



# Bibliography

## 1. Publications in the series 'Safety and health at work'

The three documents described below, prepared by the Steel Industry Safety and Health Commission, have just been published in Dutch, English, French, German and Italian. They may be obtained from the Office for Official Publications of the European Communities, 5 rue du Commerce, L-2985 Luxembourg.

### 1.1. EUR 7831 — Pollution and noise in steelworks electric arc furnaces

1982 - 47 pp., 11 fig. — 14.8 x 21.0 cm

Price (excluding VAT) in Luxembourg: ECU 3.32 — BFR 150 — IRL 2.30 — UKL 1.90 — USD 3.50

This document, drawn up by the Working Party on Health - *Electric Furnaces* of the Steel Industry Safety and Health Commission, contains information and recommendations on pollutant emissions and noise in electric steelworks. The first part deals with pollution and, after having defined the scope of the study, examines the physical and toxicological properties of the various particulate and gaseous pollutants, and puts forward some general recommendations for preventing or restricting atmospheric pollution in electric steelworks (natural ventilation, fume collection, clean-

ing of premises, wearing of personal protective apparatus) and also makes some specific recommendations to be applied at various stages of manufacture or maintenance.

The second part is devoted to noise and, more specifically, to the noise emitted by an arc furnace in operation. This also puts forward some recommendations aimed at restricting worker exposure to excessively high noise levels.

### 1.2. EUR 7893 — I — Cooperation of workers and their representatives in accident prevention within the enterprise

II — *The training of workers' safety representatives in safety and health matters*

1982 — 27 pp. — 14.8 x 21.0 cm

Price (excluding VAT) in Luxembourg: ECU 3.34 — BFR 150 — IRL 2.30 — UKL 1.90 — USD 3.50

This booklet has been prepared by the Working Party on the Organization of Accident Prevention and the Working Party on Safety Training. The first part contains a study of all accident prevention activities which, in the view of the Steel Industry Safety and Health Commission, should be carried out in undertakings in collaboration with workers and their representatives, and recommends ways of making this collaboration effective. The second part deals with the health and safety training of workers' representatives, recommends that undertakings and workers' organizations should jointly establish a training programme, and suggests what a minimal programme of this type might contain.

### 1.3. EUR 7935 — Pollution in rolling mills

1982 — 37 pp. — 14.8 x 21.0 cm

Price (excluding VAT) in Luxembourg: ECU 3.30 — BFR 150 — IRL 2.30 — UKL 1.90 — USD 3.30

This document drawn up by the Working Party on Health - Rolling Mills and adopted by the Steel Industry Safety and Health Commission of which it is part, contains an assessment of the pollution hazards present or likely to occur in steel rolling mills and recommends preventive measures. The following topics are examined successively: acids, fumes given off by molten metals, fuels and products of combustion, metallic dust, effluent and miscellaneous products. The final chapter is entitled 'General observations' and deals with the problems which these various hazards raise in common. The following are to be found as annexes: a specimen warning label for non-approved products, a specimen first aid medical sheet, a recommendation for the drafting of a catalogue of toxic substances, a list of chemical and physical pollutants, a glossary.

## 2. Study reports

### 2.1. EUR 8556 — Pilot survey on the significance of industrial accident statistics in the iron and steel industry

1981 — 32 pp. — Available in Dutch, English, French, German and Italian

This study was carried out by the Secretary of the Steel Industry Safety and Health Commission. A summary is given below.

When analysing the results of the annual surveys of industrial accidents carried out by the Statistical Office of the European Communities for the whole Community iron and steel industry, the Steel Industry Safety and Health Commission has for many years been aware of discrepancies in the national statistics, although they are based on precise definitions and similar methods of calculation.

An initial study undertaken with the assistance of 16 works in three Community countries and covering accidents which had occurred over a 10-year period demonstrated that the frequency rate for accidents involving at least one day of absence from work (lost-time accidents) was largely determined by accidents involving absence from work for less than three weeks, while quite different trends were apparent for accidents involving over three weeks of absence and accidents leading to permanent disability. It was also observed that certain works obtained very good results for lost-time accidents as a whole, while the results in respect of more serious accidents deteriorated as a function of increasing severity. Other works again had good results for very serious accidents and very poor results for all lost-time accidents.



The present survey, covering a broader sample (48 works belonging to six countries) was organized in order to check these conclusions and made use of annual statistics for the years 1978 to 1980 on industrial accidents, classified on the basis of inclusive and exclusive categories of severity.

A thorough examination of the results from the works shows that:

- (i) generally speaking, the percentage of lost-time accidents accounted for by accidents involving more than three weeks' absence from work varies inversely with the frequency rate for the former;
- (ii) if the frequency rates for the accident categories:
  - (a) at least one day of absence (lost-time),
  - (b) absence lasting more than 21 days, and
  - (c) permanent disability exceeding 20% and fatalitiesare compared and each is assigned a grading on the basis of their statistical distribution, the frequency rate for lost-time accidents is representative or almost representative of the other two rates in only a third of the cases; in almost 70% of the works, the gradings for these three rates differ considerably and the lost-time accident rate alone is not a sufficiently reliable indicator of the overall position;
- (iii) attempts at a works classification on the basis of the frequency rates for the three categories of accident severity mentioned above and a comparison of the gradings so obtained with each of these frequency rates show that sta-

tistics on accidents causing absence from work for more than 21 days would be greatly preferable as in approximately 85% of cases they would be representative or virtually representative of the overall position in the works.

In conclusion, it seems desirable to move towards the compilation of statistics on accidents involving more than three weeks of absence from work as this would ensure much greater comparability of the results.

## **2.2. EUR 8557 — Replacement of hot blast tuyeres on blast furnaces: hazards and precautions**

1981 — 70 pp. — Available in English, French, German and Italian

This report describes a maintenance operation which is particularly dangerous and must be carried out fairly frequently on every blast furnace. The methods employed are similar in principle, but nevertheless vary from one blast furnace to another because of numerous differences in the plant itself or in the machinery used to replace the tuyeres.

The authors of the study visited 11 of the most modern blast furnaces in various Community countries where they carried out an in-depth study of the operations involved, from the preparations for the replacement of tuyeres to putting the furnace back on wind.

The report brings out the differences very clearly and specifies the hazards and precautions to be taken in each case. Its concluding chapter is specially devoted to accident prevention.

These two studies are available on microfiche (format NMA — 96 images per microfiche) at a cost of BFR 120 from the Office for Official Publications, 5 rue du Commerce, L-2985 Luxembourg. The Secretariat of the Steel Industry Safety and Health Commission has a small number of copies on DIN A4 paper and will send these free, and in the language required (subject to availability of stocks) to addressees in the steel industry **only**.

This periodical is published in English, French, German and Italian, and can be obtained free of charge by simply applying to the Commission of the European Communities, Directorate-General XIII, Division for Scientific and Technical Communication, PO Box 1907, L-2920 Luxembourg.

Representatives of the following institutions collaborated in editing this bulletin:

- Associazione industrie siderurgiche italiane  
Piazza Velasca 8, I-20122 Milano
- British Steel Corporation  
12 Addiscombe Road, Croydon CR9 3JH, England
- Contact Office of Miners' and Metalworkers' Free Trade  
Unions in the European Communities  
58 avenue de la Liberté, L-1930 Luxembourg
- Groupement des entreprises sidérurgiques et minières (Gesim)  
1 Rue Eugène Schneider, F-57016 Metz
- Groupement des Hauts fourneaux et Aciéries belges  
47 rue Montoyer, B-1040 Bruxelles
- Wirtschaftsvereinigung Eisen- und Stahlindustrie  
Breite Straße 69, D-4000 Düsseldorf 1

They were assisted by officials of the Commission of the European Communities from:

Directorate-General Employment, Social Affairs and Education; Division: Industrial Safety

Directorate-General Personnel and Administration; Medium and Long-term Translation Service (Terminology Bureau)

Directorate-General Information Market and Innovation; Division: Scientific and Technical Communication



OFFICE FOR OFFICIAL PUBLICATIONS  
OF THE EUROPEAN COMMUNITIES

L-2985 Luxembourg

Catalogue number: CD-37-83-360-EN-C