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THE REMEDIATION OF UNDERGROUND ASBESTOS CEMENT WATER PIPES

FOREWORD - Asbestos and Asbestos Containing Materials (ACMs) were widely used throughout the country until the 1990s. Indeed, in the past, Italy was among the world's largest producers of asbestos and ACMs. The mineral was extracted in the European largest mine, located in Balangero, Piedmont, and in the Municipality of Emarese in Valle D'Aosta. Since the post-war period, about 3,800,000 tons of raw asbestos have been extracted in Italy, plus an import of about 1,900,000 tons. Asbestos was processed in various industrial plants, scattered throughout the peninsula, to produce multiple types of artefacts. In 1992, Italy banned the extraction and marketing of the mineral, classified as a carcinogen in 1973, but many materials that contain this dangerous substance still remain in place, including asbestos cement pipes (ACPs).

USE OF ACPS

The Ministerial Decree 06/09/1994 distinguishes ACMs in:

- Friable: materials that can be easily crumbled or reduced to powder with simple manual pressure;
- Compact: hard materials that can be crumbled or reduced to dust only with the use of mechanical tools.

Compact ACMs have particular mechanical resistance, resistance to chemical attacks, fireproof resistance, refractory resistance, anti-condensation, sound-absorbing, dielectric strength, thermal insulation and noise reduction. These technical characteristics have led to the production of numerous types of products containing asbestos including ACPs, used for decades for civil and military purposes. They have had a wide diffusion throughout the national territory.
Most of the ACPs currently used are found in the following sectors:

- Private and public buildings;
- Agriculture and animal husbandry;
- Shipyards;
- Production and distribution of fossil fuels and electricity;
- Water collection and distribution for civil and industrial uses.

RISKS FOR THE HEALTH AND SAFETY OF WORKERS

Asbestos cement pipes do not in themselves constitute a primary source of danger for public health if underground, intact and still in place; this is because the main health risk linked to asbestos is related to inhalation. However, risk situations may arise if the pipes become subject to removal or maintenance interventions that lead to the partial or total exposure of the product to the ambient air with possible airborne dispersion of fibers. The greatest dangers occur above all in the case of incorrect cutting and/or manipulation of the pipes and in the event that the external surface of the product is damaged, even partially, with a dissolution of the cement matrix. These risk conditions can be remedied by adopting specific prevention and protection measures.

OPERATING INSTRUCTIONS FOR SAFE REMOVAL OF ACPS

Taking into account the extreme variability of the situations that may be encountered on site, in this fact-sheet we will briefly indicate some reference operating methods to be adopted for interventions on underground sections of an AC water network. For maintenance activities (e.g., installation of a gasket with containment band) a notification is required pursuant to art. 250 of Legislative Decree 81/08. On the other hand, it should be remembered that all removal interventions, total or partial, are subject to the submission of a specific Work Plan to the Supervisory Body competent for the territory, pursuant to art. 256 of Legislative Decree 81/08. Therefore, the interventions must be carried out in compliance with the provisions of Title IX - Chapter III "Protection from the risks associated with exposure to asbestos", applying the appropriate technical, procedural and organisational measures to protect the workers, the people and the environment. In general, for these activities it is recommended to proceed as follows:

- The site area must be fenced and have suitable signs with characteristics such as to prevent access by outsiders;
- If possible, the water flow in the pipe subject to the interventions must be interrupted before the works;
- Removal phases and times must be minimised;
- It is necessary to excavate until reaching a depth of 15 cm above the upper surface of the pipe. During this phase it is advisable to wet the excavation area with spray guns without causing stagnation or run-off, in order to limit the emission of dust;
- The static safety of the excavation walls must always be guaranteed also through the use of provisional structures.

Image 1 **Cutted asbestos-cement water pipe still in place**

The parts affected by separation/breaking/cutting must be completely exposed using only manual tools (shovels, spades, trowels, etc.) taking care not to scrape the external surface of the ACPs.

- In the case of pipes located below the water table, techniques must be adopted that make it possible to operate in dry conditions, to be evaluated according to the hydraulic model of the subsoil.
- As soon as the the pipe is fully dug-out and partially suspended, it is advisable to interpose a high-density polyethylene sheet with a thickness of at least 0.15 mm between it and the underlying ground.
- During the operating phases, a complete cleaning of the external surface of the pipeline must be carried out together with a localised nebulisation of the separation/cutting area(s), with either water or a biodegradable encapsulating product.
- Cutting operations must be performed using suitable tools, including:
  1) Manual hacksaw (dry working tool) for pipes with small diameters, to be used only when forced suction with HEPA H13 or higher class absolute filters is performed, or continuous atomisation/ nebulisation of the cutting area with biodegradable encapsulating products.
  2) Motorised jigsaws (petrol powered) with low speed, only if equipped with integrated systems for the continuous spraying of the cutting area with water or impregnating encapsulating solution, to be used preferably for pipes with diameters and thicknesses compatible with the length and characteristics of the cutting blade.
  3) Manual chain pipe cutter (dry working tool), to be used only when forced suction with HEPA H13 or higher class absolute filters is performed, or continuous atomisation/nebulisation of the cutting area with a biodegradable encapsulating product.
- The use of medium/high speed electrical dry working tools and equipment is always prohibited;
- It is advisable to dismantle and replace a whole pipe, instead of cutting and replacing only the damaged portion;
- At the end of the operations, a visual inspection must be carried out by the appointed company, together with the construction supervision, in order to verify the removal of all waste containing or contaminated by asbestos;
- Exposed workers must use proper Personal Protective Equipment (PPE) in all phases, including the characterisation that precedes the intervention. Please note that for the asbestos risk only Third Category PPE is envisaged, to be used only following specific training. In case of works lasting more than 5 days or removal of pipelines longer than 50 m, the use of a four-stage Personal Decontamination Unit (PDU) is recommended. In the absence of a PDU, strict procedures must be followed for dressing and decontamination operations.

ASBESTOS CONTAINING WASTE (ACW) PRODUCED BY REMOVAL OF PIPES

The ACW produced by the removal of AC piping must be classified as follows:

- The removed portions of pipes, previously encapsulated, both externally and internally, and subsequently packaged, must be classified with List of Waste (LoW) code 17.06.05* - "Construction materials containing asbestos";
- The soil covering and touching the pipe, once removed, must be managed as contaminated soil and classified with LoW code 17.05.03* - "Earth and rocks containing dangerous substances";
- Exhausted PPE and sheets, contaminated by asbestos, must be classified with LoW code "15.02.02* - Absorbents, filtering materials, rags and protective clothing contaminated with dangerous substances", to be packaged separately from the removed pipes. However, both can be sent to the same destinations.

All waste produced must be removed from the site possibly within the day or as soon as a transport can be organized - always in compliance with the times indicated for a temporary storage. Subsequently, it will be disposed of in preliminary deposits or in landfills for hazardous or non-hazardous waste, either fully dedicated to asbestos, or within a specific asbestos-dedicated cell.

Normative and bibliographic references

- Min. Decree 06/09/1994 - Regulations and technical methodologies for the cessation of asbestos;
- Min. Decree 14/05/1996 - Ministry of Health - Regulations and technical methodologies for reclamation interventions;
- Min. Decree 20/08/1999 - Expansion of the regulations and technical methodologies for reclamation interventions;
- Min. Decree 248/04 - Asbestos waste: regulations on transport, storage and treatment;
- Leg. Decree 152/06 - Consolidated law on environmental matters;
- Min. Decree 27/09/2010 - Definition of eligibility criteria for landfill waste;
- Leg. Decree 81/08 - Consolidated text on health and safety in the workplace Buongiorno F., Colini L., Despini F., Garzonio R., Musacchio M., Panigada C., Palombo A., Pignatti S., Pascucci S., Teggi S., Silvestri M., Bogliolo M.P., Paglietti F., Bellagamba S., Malinconico S., De Simone P. "Procedure operative per l'identificazione di superfici con cemento-amianto da telerilevamento". BRIC 57/2016. Forthcoming.

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