

# GUIDELINES FOR CLASSIFYING AND MANAGING ASBESTOS-CONTAINING WASTE

**INAIL**

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**COLLANA RICERCHE**





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## Preface

This technical document concerning classification and management of asbestos-containing waste (Acw), was developed as part of the research activity carried out by the Department of Technological Innovation and the Safety of Plants, Products and Human Settlements (Dit) with the aim to provide guidelines for better management and disposal of Acw, increasing the level of safety, in construction and superfund sites, contaminated by asbestos.

The research activity of the Italian National Institute for Insurance against Accidents at Work (Inail), coordinated by the Central Research Department, and conduct by two Research Departments, is carried out through the implementation of three-year plans that examine at 360 ° the multiple aspects of health and safety at workplace.

The Dit develops projects for the improvement of operating procedures, methodologies, instruments, plants, etc., aimed at protecting workers, living environments and safeguarding environmental matrices. The activity, carried out in a participatory context between the various public administration, trade associations, and national and international research bodies, promotes the circularity of technical-scientific knowledge in national and international communities.

The purpose of the research activity is also the dissemination of the prevention culture of which Inail promotes, in a complex work of synergy between public and private bodies, the main purpose of which is to integrate, harmonize and disseminate the correct intervention procedures and safety to be adopted on a national scale. This is in order to indicate reproducible and homogeneous intervention criteria aimed at facilitating the work of the workers involved in the sector and the competent control bodies for the territory.

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## Abstract

Until the 1990s, Italy was the world's number one producer of asbestos, although in 1992 it became one of the first countries to ban this substance, internationally, introducing law 257/1992, which bans the extraction, import, export, marketing and production of asbestos and asbestos/asbestos-containing products. This law, however, does not require the disposal of this substance or of the materials containing it, as a result of which there are still many contaminated sites requiring remediation and significant quantities of asbestos-containing waste to be disposed of.

Italy has issued a number of rules and technical standards for the industry, the principal being enshrined in legislative decree No. 277/1991, ministerial decree of 06.09.94, presidential decree of 08.08.94, ministerial decree of 26.10.95, ministerial decree of 15.05.96, ministerial decree of 20.08.99, law 93/2001, ministerial decree no. 101 of 18.03.2003, ministerial decree no. 248 of 29.07.04, legislative decree No. 81/2008, etc.. These regulations allow the safety of workers exposed to asbestos, provide instructions regarding the effective nationwide mapping of the sites contaminated with asbestos and lay down procedures regarding the safe management of the remediation of the sites contaminated with this carcinogen. Therefore, it is now considered a leading country in the techniques for detecting and preventing the risk of undue exposure to this carcinogen, although there are still significant shortcomings in the management of the flow of Asbestos-containing Waste (Acw). These shortcomings were highlighted at the Second Conference on Asbestos organised by the Government in November 2012 and confirmed in the National Asbestos Action Plan.

In order to further knowledge about this topic, the Inail Dit has circulated data and information on the number of landfills accepting Acw that are either closed, operating, suspended or awaiting authorisation, in a number of previous publications (*"Mapping of landfill facilities in Italy accepting Asbestos-containing Waste"* (2012 edition) and Volume I: *"Mapping of the landfills in Italy accepting Asbestos-containing Wastes and their past, present and future capacity"* - 2013 edition). Furthermore, information has also been provided regarding the quantities of waste landfilled in 2012, and the trend compared to 2011, the residual waste capacity, the future volumes awaiting authorisation and some evaluations of the available information, by considering the data at both the regional and national level. Lastly, an analysis has been carried out of the disposal fees applied by the landfills operating in Italy.

However, the analysis of the data collected on the classification of Asbestos-containing Wastes has highlighted some significant inconsistencies between the European and national regulations and the actual implementation of those regulations. Therefore, in this Volume II: *"Guidelines for Classifying and Managing Asbestos-containing Waste"* we aim to provide some precise indications for the proper assignment of the Low codes, in consideration of the many different and, at times, unconventional uses to which Asbestos-containing Materials have been put in the past, and the relevant landfilling conditions as Asbestos-containing Waste. We have also identified the types of landfills at which Acw should be disposed of, with a view to assisting the persons involved in Acw management to avoid their improper disposal at unsuitable landfills.

Federica Paglietti  
Scientific Coordinator



## Introduction

Asbestos comes from the Greek σβεστος (ásbestos), which means “unquenchable, inextinguishable”.

The definition of asbestos, found in the Italian *Dizionario di merceologia* (Dictionary of Products) of 1972, is: “a mineral that, when adequately prepared, provides fire-resistant and flexible fibres that can be spun and woven and which feature a high dielectric stiffness and chemical resistance.

From a strictly mineralogical point of view, there is no group of minerals that goes under the name “asbestos”, but there are various mineral types that can be distinguished based on their crystal and chemical characteristics.

According to the applicable legal references (directive 2003/18/Ec amending directive 83/477/Eec), the general term “asbestos” is used to identify six naturally occurring silicate minerals belonging to the serpentine (Chrysotile) and amphibole (Amosite, Crocidolite, Tremolite, Anthophyllite and Actinolite):

Chrysotile	CAS No 12001-29-5(12),
Actinolite	CAS No 77536-66-4 (9),
Grunerite (Amosite)	CAS No 12172-73-5(10),
Anthophyllite	CAS No 77536-67-5(11),
Crocidolite	CAS No 12001-28-4(13),
Tremolite	CAS No 77536-68-6(14).

Based on numerous epidemiological studies carried out since the 1960s and proving the carcinogenic nature of these fibres, all the above mentioned asbestos minerals have been classified as carcinogens by the International Agency for Research on Cancer (Iarc).

Therefore, asbestos has been classified as a category 1 carcinogen with the risk codes R 45 T (Toxic: may cause cancer) and R 48/23 (Toxic: danger of serious damage to health by prolonged exposure through inhalation).

For monitoring and prevention purposes, the Italian authorities have introduced the National Mesothelioma Register (*Registro Nazionale Mesoteliomi*) (Renam - legislative decree 277/1991 and Decree President of the Council of Ministers 308/2002) and launched a nationwide “asbestos mapping” project (law 93/2001 and ministerial decree 101/2003), which, to date, has identified more than 100,000 asbestos-contaminated sites.

This widespread contamination is due to the fact that, until the 1990s, Italy was among the world’s leading producers of raw asbestos fibres and Asbestos-containing Materials (Acm). Most of the raw fibres were extracted from the Balangero site (near Turin), which was once the largest asbestos mine in Europe. Closed in 1990, two years later (under law 257/1992) the mine was included in the list of Remediation Sites of National Interest (Sni), with environmental remediation and rehabilitation activities being under way for a number of years now. The Inail Dit has been involved for over 15 years in this major Sni cleanup project, focusing on the protection of the workers employed there and of the surrounding environment and affected environmental matrices (air, water, soil and subsoil).

In Italy, asbestos was also mined at the Sni-classified mines located at Emarese in the Valle d’Aosta region, where the extraction activities were carried out primarily by small-scale family-run businesses. The amounts of mineral mined and sold here were, therefore, much

smaller than at Balangero. Following the Emergency Safety Measures (Esm) put into place here, the mine tunnels are currently inaccessible and the remediation operations are focusing on the nearby spoil materials. Another area of large-scale extraction of long-fibre chrysotile - much requested by the textile industry - was the Val Malenco, especially between the end of the 19th century and 1975.

Asbestos mining boosted during World War II, when it came to be considered a strategic material, and immediately after (with an annual output of up to 700 tonnes, the industry employing over 400 miners), until 1952, when exports plummeted following competition from Canada. Production levels then gradually decreased and finally stopped at the end of the 1970s.

After World War II, the total output in Italy was about 3,800,000 tonnes of raw asbestos, while imports totalled 1,900,000 tonnes. Thanks to its intrinsic characteristics, namely, a fibrous structure with high mechanical resistance and flexibility, combined with the fact that it could be easily spun and woven, besides being resistant to fire, heat, chemical and biological agents, abrasion and (thermal and mechanical) wear, and to possessing sound and heat insulation properties and the capacity to bind easily with construction materials (lime, gypsum, cement) and with several polymers (rubber, Pvc, etc.), no less than 3,000 different types of products containing asbestos were developed over the years, in a broad range of industrial sectors, also as a result of low costs.

The most widely produced and marketed types of asbestos-containing products, for a vast range of "traditional" uses, contained a percentage weight of asbestos of between 10 and 98%. The following table classifies the principal types of asbestos-containing products into 9 categories (Table 1).

**Table 1:** Classification of the principal types of asbestos-containing products.

Physical state	Category	N.	Types of asbestos-containing products (Acp)	Function of the asbestos
Asbestos used in its natural state or present as an accidental contaminant	Natural asbestos fibres without binders	I	<p>Pure asbestos in flakes,</p> <p>Cushions/pillows made of compressed raw fibres,</p> <p>Mattresses, Mats,</p> <p>Blankets, Protective clothing and accessories,</p> <p>Fire-resistant jackets/shells, Ropes, Wicks, Packing,</p> <p>Filters, Filter pads,</p> <p>Felt, Compressed raw fibre panels, Sandwich panels</p> <p>Cores and Dies/Moulds for metal casting</p>	<p>Noise insulation</p> <p>Heat insulation</p> <p>Mechanical resistance</p> <p>Chemical resistance</p> <p>Anti-condensation</p> <p>Dielectric stiffness</p> <p>Fireproof</p>
	Asbestos contained in mineral products	II	<p>Semi-finished Green Stones: Track ballast, Crushed rock for filling, Crushed rock for subgrade, Fines from mining activities, Semi-finished blocks and slabs</p> <p>Finished Green Stones: Polished slabs, Ornamental objects, Soapstone, Tables, Roof tiles, etc.</p>	<p>Mechanical resistance</p> <p>Chemical resistance</p> <p>Ornamental</p> <p>Refractory</p>
Asbestos in solid products	Asbestos textiles (woven, braided and pressed)	III	<p>Sleeves, Straps, Slings,</p> <p>Ropes (twisted, braided, graphite), Cord, Thread, Insulating cords, Ropes, Tapes, String, Wicks, Braids, Packing gland</p> <p>Blankets, Pillows, Mats,</p> <p>Protective clothing and accessories</p> <p>Kerbstones, Film screens, Theatre curtains, Fabrics, Reed mats, Carpets, Conveyor belts, Upholstery, Ironing board covers, Curtains,</p> <p>Felt, Filters, Gaskets and textile or braided packing,</p>	<p>Heat insulation</p> <p>Mechanical resistance</p> <p>Chemical resistance</p> <p>Fireproof</p> <p>Ornamental</p>
	Asbestos-Cement	IV	<p>Slates, Kerbstones, Curved roof tiles, Slabs, Flat roof tiles, Roof tiles, Wall tiles, Panels</p> <p>Fireplaces, Chimneys, Industrial chimneys, Flue pipes, Hoods, Chimney-pots,</p> <p>Tanks, Silos, Sundry containers, Tubs, Vats, Formwork</p> <p>Jet grouting, Columns, Piers, Parapets, Prefabricated building units, Worktops, Cement-based mortar</p> <p>Sludge and wastewater drainage downpipes, Piping, Bulkheads, Gutters, Downpipes, Manholes, Expansion chambers, Fittings, Joints, Partition walls, Ducting, Pipe sleeves,</p> <p>Track sleepers,</p> <p>Electricity control boards, Spark extinguishing chambers.</p>	<p>Heat insulation</p> <p>Noise insulation</p> <p>Anti-drumming</p> <p>Mechanical resistance</p> <p>Chemical resistance</p> <p>Fireproof</p> <p>Binding capacity</p> <p>Sealant</p> <p>Spark quenching</p>

<b>Physical state</b>	<b>Category</b>	<b>N.</b>	<b>Types of asbestos-containing products (Acp)</b>	<b>Function of the asbestos</b>
			Fines resulting from the production of asbestos-cement	
	Asbestos bound in inert matrices (other than cement)	V	Sprayed asbestos grout Cupels, Filler, Gypsum-based materials, Plasterboards, Plastering, Mortar, Plaster stucco, Cores and Dies/Moulds for metal casting	Heat insulation Noise insulation Mechanical resistance Fireproof Binding capacity Sealant
	Asbestos bound in a cellulose matrix	VI	Paper, Wallpaper, Plasterboard, Carboard panels (for cladding, for interposition), Sandwich panels Diaphragms for electrolytic processes, Filters, Seals, Flame screens, Risers, Packing gland, Fire retardant nets, Coatings for surfaces,	Heat insulation Noise insulation Mechanical resistance Chemical resistance Fireproof Binding capacity Filtering capacity
	Asbestos bound in plastic, resin and rubber matrices	VII	Sprayed asbestos grout bound in a vinyl matrix, Glue, Mastic, Seal rings, Slip-resistant edges, Joints, Packing, Washers, Packing gland, Vinyl-asbestos, Vinyl wallpaper, Panels Straps, Gearboxes, Clutch plates, Brake linings, Braking systems, Synthetic stucco, Sundry plastic or composite products (components, games, etc.)	Heat insulation Noise insulation Anti-drumming Mechanical resistance Chemical resistance Fireproof Binding capacity Sealant
	Asbestos in bituminous products	VIII	Glue, Mastic, Surface asphalt, Kerbstones, Felt boards for roofing, Sheaths, Tiles applied with filler, Plasterwork for roofing, Watertight protection elements (for manholes, for basins, for canals, etc.) Felt, Sheets,	Heat insulation Noise insulation Anti-drumming Mechanical resistance Chemical resistance Fireproof Binding capacity Sealant
Asbestos in liquid products	Asbestos in paints and foams	IX	Paints, Enamel paint Foam	Heat insulation Noise insulation Anti-drumming Mechanical resistance Chemical resistance Fireproof Binding capacity Sealant

In order to help the industry operators classify the Acms, the following table provides an overview (in alphabetical order) of the main types of asbestos-containing products with the indication of the relevant risk categories (Table 2).

**Table 2:** Principal types of asbestos-containing products.

Risk category	Principal types of asbestos-containing product (Acp)S	Used in/for
III	Blankets (asbestos textile)	Blankets for personal protection
I	Blankets (pure asbestos)	Protective blankets for extinguishing fires and for personal protection
III	Braids	Windings, packing
VII	Brake linings	Friction systems
VII	Braking systems	Mechanical systems for motion transmission
IV	Bulkheads	Partitioning and screening systems
VI	Carboard panels	Claddings, partitions, false ceilings, etc.
III	Carpets	Fire-retardant products
IV	Cement-based mortar	Cladding, insulation
IV	Chimney-pots	Terminals of exposed smoke/fume conveying systems
VII	Clutch plates	Mechanical devices for motion transmission
I	Compressed raw fibre panels	Claddings, partitions, false ceilings, etc.
III	Conveyor belts	Passenger/goods transport systems
III	Cord	Windings, insulating and fireproof cladding, packing
I/IV	Cores (metal casting)	Hot processing of metals
III	Curtains	Domestic and industrial use
IV	Curved roof tiles	Roofing
I	Cushions (pure asbestos)	Cushion padding for civil, industrial, military, etc. use
III	Cushions (textile)	Special cushion covers (whether or not padding contains asbestos)
VI	Diaphragms for electrolytic processes	Systems used in connection with electrolysis plants for producing chlorine, etc.
IV	Downpipes	Rainwater drainage systems
IV	Ducting	Air, water, fluid, etc. conveyance systems, exposed or running inside a wall
IV	Fines from the production of asbestos-cement	Fillings and insulation (attics, courtyards, etc.)
IV	Electricity control boards (asbestos-cement)	For fireproofing cabinets
IX	Enamel paint	Claddings
IV	Expansion chambers	Hydraulic components
III	Fabrics	Fireproof protective fabrics
VIII	Felt (bituminous)	Roofing

<b>Risk category</b>	<b>Principal types of asbestos-containing product (Acp)S</b>	<b>Used in/for</b>
I	Felt (pure asbestos)	Fireproof protection systems and heat/noise insulation
III	Felt (textile)	Fireproof protection systems and insulation of stoves, boilers and ovens
V	Filler	Fillers in the building industry and for equipment (thermos flasks, etc.)
III	Film screens	Recreational panels
I	Filter pads	Industrial filtering systems (chemical, physical, food industry, wine making, etc.)
VI	Filters (bound in a cellulose matrix)	Industrial filtering systems
I	Filters (pure asbestos)	Filtering systems used for HVAC appliances, industrial filtering, etc.
III	Filters (textile)	Industrial filtering systems (beverages, wine, etc.)
II	Finished Green Stones	Polished slabs, Ornamental objects, Soapstone, Tables, Roof tiles, etc.
IV	Fireplaces (asbestos-cement)	Decorative cladding
I	Fire-resistant jackets/shells (pure asbestos)	Insulating and protection layers
V	Fire-resistant jackets/shells bound in inert matrices	Insulating and protection layers
IV	Fittings	Joints
VI	Flame screens	Protective and insulating systems (in transport vehicles, etc.)
IV	Flat roof tiles	Roofing
IV	Flue pipes/Chimneys	Smoke and fume exhaust systems in non-industrial environments (homes, restaurants, etc.)
IX	Foam	Insulation
IV	Formwork	Industrial use
VII	Glue	Adhesives
VIII	Glue (bituminous)	Adhesives for cladding
IV	Gutters	Rainwater drainage systems
IV	Hoods	Extraction and conveyance systems, exposed or built into the wall (domestic, industrial, laboratory, etc.)
IV	Industrial chimneys/Smokestacks/Flue pipes	Smoke and fume conveyance systems in industrial environments
III	Insulating cords	Packing and Joints
III	Ironing board covers	Domestic use
VII	Joints	Pipe joints
IV	Joints (asbestos-cement)	Pipe joints
VII	Joints (kinetic cones)	Mechanical systems for the transmission of motion
IV	Kerbstones (asbestos-cement)	Gardens, roads, flower beds and roofs
VIII	Kerbstones (bituminous)	Roofing

Risk category	Principal types of asbestos-containing product (Acp)S	Used in/for
III	Kerbstones (textiles)	Curtains, textiles and protective clothing
IV	Manholes	Inspection, maintenance, etc. of underground conduits
VII	Mastic	Adhesives
VIII	Mastic (bituminous)	Anti-drumming insulating adhesives, for bonding bituminous layers, etc.
III	Mats (asbestos textile)	Lining for special-purpose mattresses (whether or not padding contains asbestos)
I	Mats (pure asbestos)	Heat insulation
I	Mattresses	Heat insulation
V	Mortar	Insulating pipes, boilers, walls, etc.
III	Packing	Braided packing for: pipe flanges, oven doors, packing glands, boats, etc.
VI	Packing (asbestos paper/cardboard)	Packing for household appliances, etc.
VII	Packing (asbestos rubber)	Sealing systems for water or steam, etc.
I	Packing (pure asbestos)	Sealing systems for high temperatures
III	Packing (woven or braided asbestos)	Sealing systems
III/VI/VII	Packing gland	Sealing systems
IX	Paint	Cladding
IV	Panels (asbestos-cement)	Cladding, partitions, false ceilings, etc.
VII	Panels (bound in a plastic or resin matrix)	Cladding, partitions, false ceilings, etc.
V	Panels (gypsum)	Cladding, partitions, false ceilings, etc.
V/VI	Panels (plasterboard)	Cladding, partitions, false ceilings, etc.
VI	Paper	High-quality publications
IV	Parapets	Systems for protecting from falls from a height
IV	Partition walls	Partition wall systems
I/IV	Patterns/moulds for metal casting	Refractory containers
IV	Piers	Bearing structures
IV	Pipe sleeves	Protection cladding (asbestos-cement) comprising insulating layers (whether nor not they contain asbestos)
IV	Piping	Conveying fluids, gas, air, etc., drainage pipes
V	Plastering	Cladding
IV	Prefabricated building units	Emergency dwellings
I/III	Protective clothing and accessories (Vestiaro e accessori di protezione (gaiters, aprons, gloves, overalls, etc.)	Personal protective equipment
I	Pure asbestos in flakes	Cladding, filling, applications for hot processing, etc.
IV	Track sleepers	Railway construction

<b>Risk category</b>	<b>Principal types of asbestos-containing product (Acp)S</b>	<b>Used in/for</b>
III	Reed mats	Refractory insulating cladding for combustion chambers and stoves, protective
VII	Rings (sealing)	Fittings, Joints
VI	Risers	Hot metal working
IV	Roof tiles	Roofing
VIII	Roofing felts (bituminous)	Roofing insulation
III	Ropes	Windings
I	Ropes (pure asbestos)	Windings, insulating and fireproof cladding, insulating packing
III	Ropes (twisted, braided, graphite)	Windings, insulating packing (for ovens, boilers, transportation vehicles, etc.)
I/IV/VI	Sandwich panels	Cladding, partitions, false ceilings, etc
II	Semi-finished Green Stones	Track ballast, Crushed rock for filling, Crushed rock for subgrade, Fines from mining activities, Semi-finished blocks and slabs
VIII	Sheaths	Insulating cladding
VIII	Sheets (bituminous)	Roofing
IV	Silos	Container systems (raw asbestos fibres, fines, agricultural products, animal feed, etc.)
IV	Slabs (asbestos-cement)	Roofing, partition walls
IV	Slates tiles (asbestos-cement)	Slabs and tiles for roofing
III	Sleeves	Cable sheathing
III	Slings	Cable sheathing, insulating coating for engines, pipe joints
VII	Slip-resistant edges	Applications on stairs and steps
IV	Sludge and waste drainage pipes	Condominium systems for the drainage of household wastewater and waste
IV	Spark extinguishing chambers	Electricity substation switches
IV	Sprayed asbestos grout (bound in a cement matrix, Jet Grouting)	Cladding of: vaults, intrados and/or extrados ceilings, pillars, beams, plinths, posts, metal/wood structures, walls, pipes, etc.
V	Sprayed asbestos grout (bound in a gypsum matrix)	Cladding of: vaults, intrados and/or extrados ceilings, pillars, beams, plinths, posts, metal/wood structures, walls, pipes, etc.
VII	Sprayed asbestos grout (bound in a vinyl matrix)	Cladding of: vaults, intrados and/or extrados ceilings, pillars, beams, plinths, posts, metal/wood structures, walls, pipes, transportation vehicles (railway carriages, ships, etc.)
III	Straps	Systems for the transmission of motion
VII	Straps	Systems for the transmission of motion
III	String	Windings and wicks
V	Plaster	Filling

Risk category	Principal types of asbestos-containing product (Acp)S	Used in/for
VIII	Plaster (bituminous)	Special insulating filling
VII	Plaster (synthetic)	Filling
IV	Sundry containers (asbestos-cement)	Sundry containers of different sizes for different purposes (office, domestic, etc. use)
VII	Sundry plastic and composite products	For sundry industrial and household use (synthetic tiles, special parts for manufacturing industries, parts for toys, household appliances, etc.)
VIII	Surface asphalt	For surfacing roads
VI	Surface coatings	Insulation systems
IV	Tanks	Containers for stocking liquids
IV	Tanks	Containers for liquids, water, lubricants, fuels, etc.
IV	Tanks	Containers for liquids, water, lubricants, fuels, etc.
III	Tapes	Insulating windings
III	Theatre curtains	Curtains and panels for recreational purposes
III	Thread	Protective clothing and windings
IV	Tiles	Cladding, for pedestrian walkways
VIII	Tiles applied with filler	Insulating cladding
IV	Tubs, Vats,	Containers for liquids
III	Upholstery	Domestic and industrial use
VII	Gearboxes	Mechanical devices for the transmission of motion
VII	Vinyl wallpaper	Wall claddings
VII	Vinyl-asbestos	Flooring
VI	Wallpaper	Wall decorations
VII	Washers	Packing
VIII	Watertight protection elements	Insulation systems (for manholes, basins, canals)
I/III	Wicks	Candlemaking
VI	Wire net flame spreader	Systems for uniform heat distribution
IV	Worktops	Surfaces

These Acms have been produced for different purposes, depending on the intrinsic technical characteristics of the materials produced. Therefore, it is often possible to identify the asbestos in both the overall systems and in the components of various devices and equipment, for either household or industrial use. The former include, by way of example, the pipelines used in various industrial sectors for channelling or removing gases, vapours or fluids or all the materials used for various purposes in the building sector; the latter include electro-medical equipment, accessories for aircraft, hairdryers, tumble driers, extractors, gas cylinders, batteries, helmets, safes, cookers, purifiers, vacuum appliances, irons sewing

machines, electrical motors, hobs, doors and walls of passenger/freight lifts, fire doors, hot presses for shoe uppers, radiators, circular saws, sterilizers, heating stoves, drills, fire extinguishing valves, etc..

In addition to the above, it should also be remembered that asbestos has also been widely used for domestic purposes. In particular, it was used in manufacturing components for: sundry electrical appliances, hair dryers, washing machines and tumble dryers, dishwashers, refrigerators, freezers, extraction hoods, fireplaces, electric ventilators and radiators, hood hairdryers, electric/gas cookers, toasters, irons, sewing machines, coatings and upholstery, stoves, drills, protective clothing (gloves, etc.), boilers, etc..

In order to provide further assistance in classifying Acms, Table 3 shows the materials broken down by reference "Categories", with the types of products used in connection with the principal Economic Activities. This Table also refers to the Italian "Ateco" industry standard classification codes (Ateco is the contraction of the Italian words Attività Economiche- economic activities - and the relevant codes are adopted by the Italian Office of Statistics for statistical surveying purposes). In order to represent all the industrial sectors in which Acms have been used in the past, we have decided to use the Ateco codes dating back to 1991 (before Italian prohibition to produce Acms) and not the current codes.

Some examples are given below, which are by no means exhaustive:

- Agriculture, livestock and fisheries - Farm machinery, jute bags previously used to hold asbestos and re-used for animal feed, fertilizers, etc., Buildings used to store tools, animals or for processing or storing farm products, Engines, Ovens, Boilers, Ship holds, Ship cabins, etc., Dedicated maintenance workshops, Animal bedding.
- Hotels, restaurants, bars - Ovens, Refrigeration cells, Professional coffee machine boilers, Protective clothing for kitchen staff.
- Banks, insurance companies, post offices - presence in the insulating cavities of metal doors and walls of safes for protection against the use of explosives or oxy-acetylene cutting torches, gasket systems and coatings of fire doors, gaskets for technical systems, insulating sleeves for pipes, boilers or gensets.
- Shipyards - Engines, pipe insulating (for fuels, liquids, steam), gasket systems and coatings for fire doors, Milling powders, Fire doors, Fillers, Anti-condensation coatings, Circular saws.
- Wholesale and retail trade: in warehouses, highly inflammable commercial premises, hardware shops, gun shops, household appliance repair shops.
- Military defence - in accessories for vehicles, armoured vehicles, aircraft, ships and only marginally in submarines, fire-fighting valves. In fire suits worn on runways for air rescue purposes and in particular during drills.
- Building construction - Electrical tools, Bearing structures, False ceilings, Roofing, Flagging, Fillers, Indoor/outdoor wall fillers, Road surfaces, Flooring, Electrical plants and systems, Heat plants and systems, Hydraulic systems and accumulations, HVAC systems, Skylight shafts, Flue pipes, drainpipes and refuse shafts.
- Crude petroleum extraction and refining - in coatings for pipelines conveying hot fluids, valves and equipment, wells, escape route walls (shafts, stairs, etc.). In the relevant laboratories, especially in the flame spreaders, distillation apparatus and insulating of stoves and kilns.
- Mining and quarrying - present in the mining/quarrying spoil and in semi-finished products of various sizes awaiting to be sold.
- Mechanical engineering industry - Electrical equipment, Milling powders, Fire extinguishing valves.
- Manufacture of basic metals and fabricated metal products - insulating materials used in blast furnaces, furnaces and converters, in the gantry crane cabins and system controls,

in the components of machines and pipes for oil and lubricants or cooling water, rolling mills, foundry risers, melting systems, continuous slab casting plants, rolling systems, for covering ladies, casting channels and ingot moulds. In the acetylene canisters beneath the valves. In the syndanio products.

- Manufacture of textiles and wearing apparel - in sack manufacturing plants, the boilers and pipes of silkworks, in laundry facilities for anti-condensation purposes, in the steam boilers for ironing, in the crimpers and yarn spinners.
- Manufacture of non-metallic mineral products (excluding asbestos-cement) and ceramics - in furnaces, machinery, industrial assembly lines, cooking trays, heavy fuel oil pipelines.
- Asbestos-cement industry - generally speaking, in all the materials not containing asbestos, contaminated during the asbestos cement production process.
- Food & beverage industry, including sugar production - for insulating the boiler room, in boilers, in the pipelines serving the circulation of fluids, in the product processing machines, in the braking systems for the centrifuges, in the drying ovens of the packaging department, in the valve packing, in the liquid tanks; also, in many cases, in the plant roofing and in the turbine/centrifuge braking systems.
- Chemical and plastics industry - in the “chlorine-sodium” processes, in the boilers, in the furnaces of the electrolytic cells, in the catalysation processes, in the air, gas and liquid filtering processes.
- Rubber industry - in the machines for manufacturing and vulcanising tyres, in the boilers, in the insulation of the hot-fluid pipelines, in the boiler rooms.
- Wood and woodworking industry - in the insulation of the hot presses for the production of plywood and coated panels, generally speaking, in the woodworking machines.
- Tobacco industry - in the boilers, cigarette filters, electrical resistances of drying ovens.
- Tanning industry and production of leather and fur products - in the cutting and sewing machines, in the hot presses for shoe uppers, in the insulation of the pipes conveying hot fluids.
- Glass industry - in the furnaces, machine insulation, for cooling incandescent glass items, in the automatic pushers, in the funnel-shaped guides for the drops of molten glass, in the coatings for manual tools, in the full buckets (pure asbestos) used to receive the pearls of glass for slow cooling.
- Paper industry and products (including publishing and printing) - in the insulation of boilers and hot-fluid pipelines, in the linotype machine components, in the lead crucible cladding, in the containers for carbon coating, in recycled sacks contaminated with asbestos.
- Manufacturing industry (furniture, jewellery, musical instruments, sports equipment, etc.) - in the mouths of crucibles used to melting gold, in furnace doors, presence in the cavities between metal doors and walls of safes.
- Education - in pipe insulation, in the boilers, electrical control boards, false ceilings and lift brake shoes; in the laboratories of secondary schools (food-processing, chemical, mechanical, electrotechnical, etc.); gyms, auditoriums and theatres.
- Transport and cargo handling equipment (rolling stock, manufacture and maintenance of transport equipment; motor vehicle and motorcycle workshops, maritime cargo handling, maritime transport, land and air transport) - in the cabinets for storing hot food on board; in the maintenance/repair workshops; in the driver cabins; in the aircraft reactors; in the soundproofing panels for aircraft; in the insulating materials used for means of transport; in the sacks contaminated with asbestos and reused; in the technical rooms for anti-condensation, anti-drumming and heat insulation purposes; for anti-drumming purposes; in hangars.
- Production and distribution of electricity, gas and water - in acetylene cylinders for porous

baffle functions; in thermoelectric and geothermal plants for insulating the (gas and steam) turbines; in the heat generators (boilers) and the pipelines for conveying hot fluids, in the electricity cable ducts, in the water treatment plants.

- Public administration - in the building maintenance rooms, in the electrical and heating/water supply systems.
- Health and social services - in blow-dryers and hood hairdryers, in the hot-fluid pipelines, in laundries, theatres and cinemas, in dental surgeries, in sterilisation equipment, in the insulation of heat-treated air, in the boilers and steam pipes for heating buildings, in laundries and ironing rooms, due to the presence of mangles and ironing boards with asbestos coatings, in the hot food trolleys, in child incubators (rare).

**Table 3: Principal Economic Activities in which Asbestos-containing Materials were used.**

Category	Products typology	Economic activity	Ateco code (year 1991)
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed) Asbestos - Cement Asbestos bound in a cellulose matrix Asbestos bound in plastic, resin and rubber matrices Asbestos contained in mining products Asbestos in paints and foams Asbestos in bituminous products	Straps (III, VII), Clutch plates (VII), Ropes (III), Cord (III), Ropes (III), Braking systems (VII), Packing (I, III, VI, VII), Gearboxes (VII), Protective clothing (I, II), Packing (III), Slings (III), Blankets (I, III), Reed mats (III), Filters (I, II, VI), Mastic (VII, VIII), Seal rings (VII), Brake linings (VII), Foam (IX), Fines from extraction/processing activities in mining (II) Products used in building structures (see building construction sector)	agriculture, livestock and fisheries	01* (Agriculture, hunting and related service activities) 02* (Forestry, logging and related service activities) 05* (Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing)
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed) Asbestos - Cement Asbestos bound in a cellulose matrix Asbestos bound in plastic, resin and rubber matrices	Packing (I, II, VI, VII), Carpets (III), Upholstery (III), Curtains (III), Protective clothing (I, III), Ropes (III), Cord (III), Filters (I, II) Products used in building structures (see building construction sector)	hotels, restaurants, bars	55* (Hotels and restaurants)
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed) Asbestos - Cement Asbestos bound in inert matrices (other than cement) Asbestos bound in a cellulose matrix Asbestos bound in plastic, resin and rubber matrices Asbestos in bituminous products	Pure asbestos in flakes (I), Compressed raw fibre panels (I), Sleeves (III), Straps (III), Slings (III), Ropes (III), Cord (III), Braids (III), Kerbstones (III; IV; VII), Packing (I, III, VI, VII), Paper (VI), Carboard panels (VI), Plasterboards (V, VI), Sandwich panels (I,VI) Products used in building structures (see building construction sector)	banks, insurance companies, post offices	64* (Post and telecommunications) 65* (Monetary and financial intermediation (except insurance and pension funding)); 66* (Insurance and pension funding, except compulsory social security); 67* (Activities auxiliary to financial intermediation)
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed) Asbestos - Cement Asbestos bound in inert matrices (other than cement) Asbestos bound in a cellulose matrix Asbestos in bituminous products	Pure asbestos in flakes (I), Sprayed asbestos grout (V, VII), Seal rings (VII), Packing (III), Slip-resistant edges (VII), Sleeves (III), Straps (III), Glue (VII, VIII), Blankets (I, III), Fire-resistant jackets/shells (I, V), Ropes (I, III), Cord (III), Pillows (I, III), Slings (III), Brake linings (VII), Filler (V), Insulating cords (III), Filters (I, III, VI), Felt (I, III, VIII), Ropes (III), Packing (I, II, VI, VII), Mastic (VII, VIII), Mats (I, III), Tapes (III), Compressed raw fibre panels (I), Carboard panels (VI), Plasterboards (V, VI), Sandwich panels (I,VI), Bulkheads (IV), Packing gland (VI, VII), Tanks (IV), Braking systems (VII), Paint (IX), Enamel paint (IX), Flame screens (VI), Foam (IX), String (III), Wicks (III), Plaster stucco (V, VII), Upholstery (III), Curtains (III), Braids (III), Protective clothing and accessories (I, II) Products used in building structures (see building construction sector)	shipyards	35.11.0 (Building and repairing of ships) 35.11.1 (Shipyards for metal constructions) 35.11.2 (Shipyards for non-metal constructions) 35.11.3 (Ship repair yards) 35.11.4 (Ship breaking yards)

Category	Products typology	Economic activity	Ateco code (year 1991)
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed) Asbestos - Cement Asbestos bound in inert matrices (other than cement) Asbestos bound in a cellulose matrix Asbestos bound in plastic, resin and rubber matrices Asbestos in paints and foams	Sleeves (II), Gearboxes (VII), Straps (III,VII), Ropes (III), Cardboard, Clutch plates (VII), Packing, Slings (II), Brake linings (VII), Filters (I, III), Thread (III), Mats (I, II), Tapes (III), Plasterboards (VVI), Sandwich panels (IVI), Paint (IX), Foam (IX), Enamel paint (XI), Braking systems (VII), Fabrics (III), Reed mats (III), Upholstery (III), Curtains (II), Tessuti(III), Braids (III), Protective clothing and accessories (I, III).	wholesale and retail trade	50.0* (Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel) 50.1* (Sale of motor vehicles) 50.3* (Sale of motor vehicle parts and accessories) 50.4* (Sale, maintenance and repair of motorcycles and related parts and accessories) 50.5* (Retail sale of automotive fuel)
	Products used in building structures (see building construction sector)		51* (Wholesale trade and commission trade, except of motor vehicles and motorcycles); 52* (Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods) 70* (Real estate activities)
			71* (Renting of machinery and equipment without operator and of personal and household goods) 72* (Computer and related activities)
			75.22* (Homeland defence)
			military defence
	Pure asbestos in flakes (I), Sprayed asbestos grout (V, VII), Seal rings (VII), Packing (III), Slip-resistant edges (VII), Sleeves (II), Gearboxes (VII), Straps (III), Glue (VII, VIII), Blankets (I, III), Fire-resistant jackets/shells (I, V), Ropes (I, II), Cord (III), Pillows (I, III), Clutch plates (VII), Slings (III), Brake linings (VII), Filler (V), Thread (III), Insulating cords (III), Filters (I, II, VI), Felt (I, II, VIII), Ropes (III), Joints (IV), Packing (I, III, VI, VII), Sheaths (VIII), Mastic (VII, VIII), Mats (I, III), Tapes (III), Compressed raw fibre panels (I), Carboard panels (VI), Plasterboards (V, VI), Sandwich panels (IVI), Bulkheads (IV), Worktops (IV), Packing gland (VI, VII), Fittings (IV), Flame screens (VI), Tanks (IV), Braking systems (VII), Paint (IX), Enamel paint (IX), Flame screens (VI), Foam (IX), (Braking systems (VII), String (III), Fabrics (III), Wicks (III), Plaster stucco (V, VII), Reed mats (III), Conveyor belts (III), Upholstery (III), Curtains (II), Braids (III), Piping (IV), Protective clothing and accessories (I, II)		
Products used in building structures (see building construction sector)			

Category	Products typology	Economic activity	Ateco code (year 1991)
<p>Asbestos in its natural state without binders</p> <p>Asbestos contained in mining products</p> <p>Asbestos textiles (woven, braided and pressed)</p> <p>Asbestos-Cement</p> <p>Asbestos bound in inert matrices (other than cement)</p> <p>Asbestos bound in a cellulose matrix</p> <p>Asbestos bound in plastic, resin and rubber matrices</p> <p>Asbestos in bituminous products</p> <p>Asbestos in paints and foams</p>	<p>Pure asbestos in flakes (I) Sprayed asbestos grout in a cement matrix - jet grout (IV), Sprayed asbestos grout bound in a vinyl matrix (VII), Seal rings (VII), Slates (IV), Surface asphalt (VIII), Packing (III), Kerbstones (III, IV, VIII), Slip-resistant edges (VII), Sleeves (III), Chimneys (IV), Ducting (IV), Flue pipes (IV), Hoods (IV), Tanks (IV), Paper (VI), Wallpaper (VI), Roofing felts (VIII), Tanks (IV), Glue (VII, VIII), Columns (IV), Chimney-pots (IV), Fire-resistant jackets/shells (I, V), Curved roof tiles (IV), Pipe sleeves (IV), Ropes (I, III), Cord (III), Slings (III), Felt (I, III, VIII), Filler (V), Sheets (VIII), Joints (VII), Gutters (IV), Sheaths (VIII), Packing (I, III, VI, VII), Plastering (V), Slabs (IV), Mortar (V), Mastic (VIII), Gypsum-based materials (V), Tapes (III), Panels (VI, VII), Sandwich panels (I,VI), Parapets (IV), Vinyl wallpaper (VI), Flat roof tiles (IV), Worktops (IV), Tiles applied with filler (VIII), Semi-finished green stones II), Finished green stones (II), Piers (IV), Paint (IX), Downpipes (IV), Polverino di risulta della produzione di asbestos-cement (IV), Manholes (IV), Watertight protection elements (VIII), Electricity control boards (IV), Fittings (IV), Coatings for worktops and shelves (VI), Washers (VII), Foam (IX), Tanks (IV), Enamel paint (IX), String (III), Plaster stucco (V, VI, VIII), Roof tiles (II, IV), Partition walls (IV), Braids (III), Piping (IV), Prefabricated building units (IV), Tubs, Vats, (IV), Expansion vessels (IV), Vinyl-asbestos (VII).</p>	<p>building construction</p>	<p>45*(Construction)</p>
<p>Pure asbestos in flakes (I), Sprayed asbestos grout (V, VII), Seal rings (VII), Sleeves (III), Paper (VI), Straps (III, VII), Glue (VII, VIII), Blankets (I, III), Fire-resistant jackets/shells (I, V), Ropes (I, III), Cord (III), Pillows (I, III), Clutch plates (VI), Slings (III), Brake linings (VII), Filler (V), Insulating cords (III), Filters (I, III, VI), Felt (I, III, VIII), Sheets (VIII), Ropes (III), Joints (IV), Packing (I, III, VI, VII), Sheaths (VII), Mastic (VI, VIII), Mats (I, III), Tapes (III), Fittings (IV), Washers (IV), Flame screens (VI), Tanks (IV), Braking systems (VII), Paint (IX), Reticelle frangifiamma (VI), Enamel paint (IX), Flame screens (VI), Foam (IX), (Braking systems (VII), String (III), Reed mats (III), Braids (III), Filter pads (I), Piping (IV), Tubs, Vats, (IV), Protective clothing and accessories (I, III)</p> <p>Products used in building structures (see building construction sector)</p>	<p>Pure asbestos in flakes (I), Sprayed asbestos grout (V, VII), Seal rings (VII), Sleeves (III), Paper (VI), Straps (III, VII), Glue (VII, VIII), Blankets (I, III), Fire-resistant jackets/shells (I, V), Ropes (I, III), Cord (III), Pillows (I, III), Clutch plates (VI), Slings (III), Brake linings (VII), Filler (V), Insulating cords (III), Filters (I, III, VI), Felt (I, III, VIII), Sheets (VIII), Ropes (III), Joints (IV), Packing (I, III, VI, VII), Sheaths (VII), Mastic (VI, VIII), Mats (I, III), Tapes (III), Fittings (IV), Washers (IV), Flame screens (VI), Tanks (IV), Braking systems (VII), Paint (IX), Reticelle frangifiamma (VI), Enamel paint (IX), Flame screens (VI), Foam (IX), (Braking systems (VII), String (III), Reed mats (III), Braids (III), Filter pads (I), Piping (IV), Tubs, Vats, (IV), Protective clothing and accessories (I, III)</p> <p>Products used in building structures (see building construction sector)</p>	<p>crude petroleum extraction and refining</p>	<p>23.20* (Manufacture of refined petroleum products)</p> <p>11.11* (Extraction of crude petroleum)</p>

Category	Products tipology	Economic activity	Ateco code (year 1991)
Asbestos contained in mining products	Semi-finished Green Stones (II) Finished Green Stones (II)  Products used in building structures (see building construction sector)	mining and quarrying	10* (Mining of coal and lignite; extraction of peat)  11* (Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying), excluding 11.11*;  12* (Mining of uranium and thorium ores)  13* (Mining of metal ores)  14* (Other mining and quarrying)
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed) Asbestos-Cement Asbestos bound in inert matrices (other than cement) Asbestos bound in a cellulose matrix Asbestos bound in plastic, resin and rubber matrices Asbestos in bituminous products Asbestos in paints and foams	Pure asbestos in flakes (I), Sprayed asbestos grout (V, VII), Seal rings (VII), Sleeves (III), Industrial chimneys (IV), Hoods (IV), Spark extinguishing chamber (IV), Straps (III, VII), Tanks (IV), Blankets (I, III), Fire-resistant jackets/shells (I, V), Ropes (I, III), Cord (III), Pillows (I, III), Clutch plates (VII), Slings (II), Brake linings (VII), Insulating cords (II), Felt (I, III, VII), Ropes (III), Joints (IV), Packing (I, III, VI, VII), Sheaths (VII), Mastic (VI, VIII), Mattresses (I, III), Tapes (III), Panels (I, VI), Sandwich panels (I,VI), Worktops (IV), Electricity control boards (VI), Fittings (IV), Washers (IV), Flame screens (VI), Foam (IX), Tanks (IV), Braking systems (VII), Reed mats (III), Braids (III), Piping (IV), Tubs, Vats, (IV), Protective clothing and accessories (I, III)  Products used in building structures (see building construction sector)	mechanical engineering industry	29* (Manufacture of machinery and equipment n.e.c., including installation, assembly, repair and maintenance)  30* (Manufacture of office machinery and computers)  31* (Manufacture of electrical machinery and apparatus n.e.c.)  32* (Manufacture of radio, television and communication equipment and apparatus)  33* (Manufacture of medical, precision and optical instruments, watches and clocks)
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed) Asbestos-Cement Asbestos bound in inert matrices (other than cement) Asbestos bound in a cellulose matrix Asbestos bound in plastic, resin and rubber matrices Asbestos in bituminous products Asbestos in paints and foams	Pure asbestos in flakes (I), Sprayed asbestos grout (V, VII), Seal rings (VII), Cores and Dies/Moulds for metal casting/forme per fonderia (I), Sleeves (III), Industrial chimneys (IV), Hoods (IV), Spark extinguishing chamber (IV), Blankets (I, III), Fire-resistant jackets/shells (I, V), Ropes (I, III), Cord (III), Pillows (I, III), Slings (II), Brake linings (VII), Insulating cords (III), Felt (I, III, VII), Ropes (III), Joints (IV), Packing (I, III, VI, VII), Mastic (VI, VIII), Mats (I, III), Tapes (III), Panels (I, VI, VII), Sandwich panels (I,VI), Worktops (IV), Electricity control boards (VI), Flame screens (VI), Foam (IX), Cloth (III), Reed mats (III), Braids (III), Protective clothing and accessories (I, III)  Products used in building structures (see building construction sector)	manufacture of basic metals and fabricated metal products	27.0* (Manufacture of basic metals and their alloys);  27.1* (Manufacture of basic iron and steel and of ferro-alloys (ECSO));  27.2* (Manufacture of tubes);  27.3* (Other first processing of iron and steel and production of non-ECSO ferro-alloys);  27.4* (Manufacture of basic precious and non-ferrous metals);

Category	Products tipology	Economic activity	Ateco code (year 1991)
			27.5* (Casting of metals)
			28* (Manufacture of fabricated metal products, except machinery and equipment)
			11.11* (Extraction of crude petroleum)
			17* (Manufacture of textiles)
			18* (Manufacture of wearing apparel; dressing and dyeing of fur), excluding 18.10* and 18.30*
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed) Asbestos-Cement Asbestos bound in a cellulose matrix Asbestos bound in plastic, resin and rubber matrices	Pure asbestos in flakes (I), Packing (III), Kerbstones (III), Sleeves (III), Straps (III, VII), Blankets (I, II), Ropes (I, II), Cord (II), Pillows (I, II), Slings (III), Thread (III), Insulating cords (III), Ropes (III), Packing (I, II, VI, VII), Mattresses (I), Mats (I, III), Tapes (III), Film screens (III), Theatre curtains (III), String (III), Cloth (III), Wicks (III), Reed mats (III), Carpets (III), Upholstery (III), Ironing board covers (III), Curtains (III), Braids (III), Protective clothing and accessories (I, III).  Products used in building structures (see building construction sector)	manufacture of textiles and wearing apparel	24.7* (Manufacture of man-made fibres)
			26.20* (Manufacture of non-refractory ceramic goods other than for construction purposes; manufacture of refractory ceramic products);
			26.21* (Manufacture of ceramic household and ornamental articles);
			26.22* (Manufacture of ceramic sanitary fixtures);
			26.23* (Manufacture of ceramic insulators and insulating fittings);
			26.24* (Manufacture of other technical and industrial ceramic products);
			26.25* (Manufacture of other ceramic products)
			26.26* (Manufacture of refractory ceramic products);
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed) Asbestos-Cement Asbestos bound in inert matrices (other than cement) Asbestos bound in a cellulose matrix Asbestos bound in plastic, resin and rubber matrices Asbestos in bituminous products Asbestos in paints and foams	Pure asbestos in flakes (I), Sprayed asbestos grout (V, VII), Seal rings (VII), Cores and Dies/Moulds for metal casting/forme per fonderia (I), Packing (III), Sleeves (III), Industrial chimneys (IV), Hoods (IV), Spark extinguishing chamber (IV), Blankets (I, II), Fire-resistant jackets/shells (I, V), Ropes (I, III), Cord (III), Pillows (I, II), Clutch plates (VI), Slings (III), Brake linings (VII), Insulating cords (III), Felt (I, III, VIII), Ropes (III), Joints (IV), Packing (I, II, VI, VII), Mastic (VI, VII), Mortar (IV), Mats (I, III), Tapes (III), Panels (I, VI, VII), Sandwich panels (I, VI), Worktops (IV), Electricity control boards (VI), Flame screens (VI), Foam (IX), Tanks (IV), Braking systems (VII), Cloth (III), Reed mats (III), Braids (III), Protective clothing and accessories (I, III).  Products used in building structures (see building construction sector)	manufacture of non-metallic mineral products (excluding asbestos-cement and ceramics)	26.20* (Manufacture of non-refractory ceramic goods other than for construction purposes; manufacture of refractory ceramic products); 26.21* (Manufacture of ceramic household and ornamental articles); 26.22* (Manufacture of ceramic sanitary fixtures); 26.23* (Manufacture of ceramic insulators and insulating fittings); 26.24* (Manufacture of other technical and industrial ceramic products); 26.25* (Manufacture of other ceramic products) 26.26* (Manufacture of refractory ceramic products);

Category	Products typology	Economic activity	Ateco code (year 1991)
			26.3* (Manufacture of ceramic tiles and flags);
			26.4* (Manufacture of bricks, tiles and construction products, in baked clay);
			26.5* (Manufacture of cement, lime and plaster);
			26.6* (Manufacture of articles of concrete, plaster and cement), excluding 26.65*
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed) Asbestos-Cement Asbestos bound in inert matrices (other than cement) Asbestos bound in a cellulose matrix Asbestos bound in plastic, resin and rubber matrices Asbestos in bituminous products	Pure asbestos in flakes (I), Slates (IV), Baderna (III), Kerbstones (IV), Sleeves (III), Spark extinguishing chambers (IV), Fireplaces (VI), Chimneys (IV), Industrial chimneys (VI), Ducting(IV), Flue pipes (IV), Hoods (IV), Tanks (IV), Straps (III, VII), Tanks (IV), Columns (IV), Chimney-pots (IV), Sundry containers (VI), Fire-resistant jackets/shells (I, V), Curved roof tiles (IV), Pipe sleeves (IV), Ropes (I, III), Pillows (I, III), Clutch plates (VII), Slings (III), Felt (I, III, VIII), Brake linings (VII), Filler (V), Joints (IV), Gutters (IV), Packing (I, III, VI, VII), Slabs (IV), Mats (I, III), Tapes (III), Panels (IV, VI), Sandwich panels (I, VI), Parapets (IV), Bulkheads (IV), Flat roof tiles (IV), Worktops (IV), Piers (IV), Downpipes (IV), Polverino di risulta della produzione di asbestos-cement (IV), Manholes (IV), Electricity control boards (IV), Fittings (IV), Tanks (IV), Silos (VI), Braking systems (VII), Reed mats (III), Roof tiles (IV), Partition walls (IV), Track sleepers (IV), Braids (III), Piping (IV), Prefabricated building units (IV), Tubs, Vats, (IV), Protective clothing and accessories (I, III).	asbestos-cement industry	26.65* (Manufacture of fibre cement)
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed) Asbestos-Cement Asbestos bound in inert matrices (other than cement) Asbestos bound in a cellulose matrix Asbestos bound in plastic, resin and rubber matrices	Pure asbestos in flakes (I), Slates (IV), Baderna (III), Kerbstones (IV), Sleeves (III), Spark extinguishing chambers (IV), Fireplaces (VI), Chimneys (IV), Industrial chimneys (VI), Ducting(IV), Flue pipes (IV), Hoods (IV), Tanks (IV), Straps (III, VII), Tanks (IV), Columns (IV), Chimney-pots (IV), Sundry containers (VI), Fire-resistant jackets/shells (I, V), Curved roof tiles (IV), Pipe sleeves (IV), Ropes (I, III), Pillows (I, III), Clutch plates (VII), Slings (III), Felt (I, III, VIII), Brake linings (VII), Filler (V), Joints (IV), Gutters (IV), Packing (I, III, VI, VII), Slabs (IV), Mats (I, III), Tapes (III), Panels (IV, VI), Sandwich panels (I, VI), Parapets (IV), Bulkheads (IV), Flat roof tiles (IV), Worktops (IV), Piers (IV), Downpipes (IV), Polverino di risulta della produzione di asbestos-cement (IV), Manholes (IV), Electricity control boards (IV), Fittings (IV), Tanks (IV), Silos (VI), Braking systems (VII), Reed mats (III), Roof tiles (IV), Partition walls (IV), Track sleepers (IV), Braids (III), Piping (IV), Prefabricated building units (IV), Tubs, Vats, (IV), Protective clothing and accessories (I, III).	Products used in building structures (see building construction sector)	15* (Manufacture of food products and beverages),
		food & beverage industry, including sugar production	15.83* (Manufacture of sugar)

Category	Products typology	Economic activity	Ateco code (year 1991)
<p>Asbestos in its natural state without binders</p> <p>Asbestos textiles (woven, braided and pressed)</p> <p>Asbestos-Cement</p> <p>Asbestos bound in inert matrices (other than cement)</p> <p>Asbestos bound in a cellulose matrix</p> <p>Asbestos bound in plastic, resin and rubber matrices</p> <p>Asbestos in bituminous products</p> <p>Asbestos in paints and foams</p>	<p>Products used in building structures (see building construction sector)</p> <p>Pure asbestos in flakes (I), Sprayed asbestos grout (V, VII), Seal rings (VII), Packing (II), Sleeves (II), Glue (VI, VIII), Blankets (I, II), Fire-resistant jackets/shells (I, V), Ropes (II), Diaphragms for electrolytic processes (VI), Joints (IV, VII), Felt (I, III, VIII), Filters (I, III, VI), Packing (I, III, VI, VII), Tapes (III), Panels (I, V, VI), Sandwich panels (I, VI), Paint (IX), Packing gland (VII), Sundry plastic or composite products (VII), Coatings for worktops and shelves (VI), Washers (VII), Foam (IX), Enamel paint (IX), Filter pads (I), Braids (III), Protective clothing and accessories (I, III), Vinyl-asbestos (VII).</p>	<p>chemical and plastics industry</p>	<p>25.2* (Manufacture of plastic products)</p> <p>23* (Manufacture of coke, refined petroleum products and nuclear fuel), excluding 23.20*;</p> <p>24* (Manufacture of chemicals and chemical products), excluding 24.7*</p>
<p>Asbestos in its natural state without binders</p> <p>Asbestos textiles (woven, braided and pressed)</p> <p>Asbestos bound in inert matrices (other than cement)</p> <p>Asbestos bound in a cellulose matrix</p> <p>Asbestos bound in plastic, resin and rubber matrices</p>	<p>Products used in building structures (see building construction sector)</p> <p>Pure asbestos in flakes (I), Sprayed asbestos grout (V, VII), Cores and Dies/Moulds for metal casting/forme per fonderia (I, V), Fire-resistant jackets/shells (I, V), Blankets (I, II), Ropes (II), Packing (I, III, VI, VII), Mastic (VI, VIII), Tapes (III), Panels (I, V, VI), Sandwich panels (I, VI), Coatings for worktops and shelves (VI), Cloth (III), Reed mats (III), Braids (III), Protective clothing and accessories (I, II).</p>	<p>rubber industry</p>	<p>25.0* (Manufacture of rubber and plastic products);</p> <p>25.1* (Manufacture of rubber products)</p>
<p>Asbestos in its natural state without binders</p> <p>Asbestos textiles (woven, braided and pressed)</p> <p>Asbestos bound in inert matrices (other than cement)</p> <p>Asbestos bound in a cellulose matrix</p> <p>Asbestos bound in plastic, resin and rubber matrices</p> <p>Asbestos in bituminous products</p> <p>Asbestos in paints and foams</p>	<p>Products used in building structures (see building construction sector)</p> <p>Pure asbestos in flakes (I), Glue (VII, VIII), Panels (I, V, VI), Sandwich panels (I, VI), Paint (IX), Braking systems (VII), Protective clothing and accessories (I, III).</p> <p>Products used in building structures (see building construction sector)</p>	<p>wood &amp; woodworking industry</p>	<p>20* (Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials)</p>
<p>Asbestos in its natural state without binders</p> <p>Asbestos textiles (woven, braided and pressed)</p> <p>Asbestos-Cement</p> <p>Asbestos bound in a cellulose matrix</p> <p>Asbestos bound in plastic, resin and rubber matrices</p> <p>Asbestos in bituminous products</p>	<p>Pure asbestos in flakes (I), Glue (VII, VIII), Filters (I, III, VI), Panels (I, V, VI), Piping (IV).</p> <p>Products used in building structures (see building construction sector)</p>	<p>tobacco industry</p>	<p>16* (Manufacture of tobacco products)</p>

Category	Products typology	Economic activity	Ateco code (year 1991)
Asbestos bound in plastic, resin and rubber matrices	Straps (VII), Clutch plates (VII), Brake linings (VII), Braking systems (VII), Protective clothing and accessories (I, III), Products used in building structures (see building construction sector)	tanning industry and production of leather and fur products	18.10* (Manufacture of leather clothes); 18.30* (Dressing and dyeing of fur; manufacture of articles of fur); 19* (Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear)
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed) Asbestos - Cement Asbestos bound in inert matrices (other than cement) Asbestos bound in a cellulose matrix	Pure asbestos in flakes (I), Packing (III), Paper (IV), Ropes (III), Insulating cords (III), Cement-based mortar (IV), Tapes (III), Panels (I, V, VI), Sandwich panels (I, VI), Worktops (IV), Coatings for worktops and shelves (VI), Cloth (III), Protective clothing and accessories (I, III), Products used in building structures (see building construction sector)	glass industry	26.1* (Manufacture of glass and glass products);
Asbestos bound in inert matrices (other than cement) Asbestos bound in a cellulose matrix Asbestos bound in plastic, resin and rubber matrices	Sprayed asbestos grout (V, VII), Paper (VI), Carte da parati (VI), Diaframmi (VI), Filters (VI), Packing (VI), Risers (VI), Panels (V, VI), Sandwich panels (VI), Vinyl wallpaper (VII), Packing gland (VI), Fire retardant nets (VI), Coatings for worktops and shelves (VI), Flame screens (VI), Braking systems (VII), Products used in building structures (see building construction sector)	paper industry and products (including publishing and printing)	21* (Manufacture of pulp, paper and paper products); 22* (Publishing, printing and reproduction of recorded media)
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed) Asbestos - Cement Asbestos bound in a cellulose matrix Asbestos bound in plastic, resin and rubber matrices	Packing (I, III, VI, VII), Worktops (IV), Coatings for worktops and shelves (VI), Products used in building structures (see building construction sector)	manufacturing industry (furniture, jewellery, musical instruments, sports equipment, etc.)	36* (Manufacture of furniture; manufacturing n.e.c.)
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed) Asbestos bound in inert matrices (other than cement) Asbestos bound in a cellulose matrix Asbestos bound in plastic, resin and rubber matrices Asbestos in bituminous products Asbestos in paints and foams	Sprayed asbestos grout (IV, V, VII), Slip-resistant edges (VII), Hoods (IV), Straps (III, VII), Ropes (III), Clutch discs (VII), Brake linings (VII), Felt (I, III), Filters (I, III, VI), Mats (I, III), Panels (I, V, VI), Sandwich panels (I, VI), Vinyl wallpaper (VII), Worktops (IV), Paint (IX), Sundry plastic or composite products (VII), Fire retardant nets (VI), Coatings for worktops and shelves (VI), Braking systems (VII), Cloth (III), Filter pads (I), Upholstery (III), Curtains (III), Protective clothing and accessories (I, III), Vinyl-asbestos (VI), Products used in building structures (see building construction sector).	education	80* (Education)

Category	Products typology	Economic activity	Ateco code (year 1991)
			35.20* (Manufacture of railway and tramway locomotives and rolling stock)
			34* (Manufacture of motor vehicles, trailers and semi-trailers);
			35* (Manufacture of other transport equipment), excluding 35.20* and 35.11*;
			50.2* (Maintenance and repair of motor vehicles);
Asbestos in its natural state without binders	Pure asbestos in flakes (I), Sprayed asbestos grout (V, VII), Seal rings (VII), Packing (III), Slip-resistant edges (VII), Sleeves (III), Gearboxes (VII), Straps (III, VII), Glue (VII, VIII), Blankets (I, II), Fire-resistant jackets/shells (I, V), Ropes (III), Pillows (I, II), Clutch discs (VII), Joints (IV, VII), Felt (I, III, VII), Brake linings (VII), Filler (V), Threads (III), Insulating cords (II), (Sheets (VIII), Sheaths (VII), Packing (I, III, VI, VII), Mattresses (I, III), Mats (I, II), Mastic (VII, VIII), Tapes (II), Panels (I, V, VI), Sandwich panels (I, VI), Paint (IX), Packing gland (VI), Washers (VII), Flame screens (VI), Foam (IX), Enamel paint (IX), Cloth (III), Plaster stucco (VII), Reed mats (III), Conveyor belts, Braids (III), Braking systems (VII), Protective clothing and accessories (I, III),	transport and cargo handling equipment (rolling stock, manufacture and maintenance of transport equipment; motor vehicle and motorcycle workshops, maritime cargo handling, maritime transport, land and air transport)	50.40.3 (Repair of motorcycles and mopeds)
Asbestos bound in a cellulose matrix			61* (Water transport)
Asbestos bound in plastic, resin and rubber matrices			60* (Land transport; transport via pipelines);
Asbestos textiles (woven, braided and pressed)			62* (Air transport);
Asbestos in paints and foams	Products used in building structures (see building construction sector)		63* (Supporting and auxiliary transport activities; activities of travel agencies), excluding 63.11*
			40* (Produzione di energia elettrica, di gas, di vapore e acqua calda)
Asbestos in its natural state without binders	Pure asbestos in flakes (I), Sprayed asbestos grout (IV, V, VII), Seal rings (VII), Sleeves (III), Spark extinguishing chambers (IV), Industrial chimneys (VI), Ducting (IV), Flue pipes (IV), Hoods (IV), Blankets (I, II), Fire-resistant jackets/shells (IV), Pipe sleeves (IV), Ropes (I, III), Cord (III), Pillows (I, II), Clutch plates (VII), Slings (III), Felt (I, III, VIII), Brake linings (VII), Filler (V), Thread (III), Insulating cords (III), Filters (I, III), Sheets (VIII), Joints (IV, VI), Sheaths (VIII), Packing (I, II, VI, VII), Mortar (V), Cement-based mortar (IV), Mastic (VII, VIII), Mats (I, VI, VII), Gypsum-based materials (V), Tapes (III), Panels (I, VI, VII), Sandwich panels (I, VI), Bulkheads (IV), Paint (IX), Manholes (IV), Packing gland (VI, VII), Watertight protection elements (VIII), Electricity control boards (IV), Fittings (IV), Washers (VII), Flame screens (VI), Foam (XI), Braking systems (VII), Cloth (III), Reed mats (III), Filter pads (I), Braids (II), Piping (IV), Tubs, Vats, (IV), Expansion vessels (IV), Protective clothing and accessories (I, III).	production and distribution of electricity, gas and water	41* (Collection, purification and distribution of water)
Asbestos contained in mining products			
Asbestos bound in a cellulose matrix			
Asbestos textiles (woven, braided and pressed)			
Asbestos bound in plastic, resin and rubber matrices			
Asbestos - Cement			

Category	Products typology	Economic activity	Ateco code (year 1991)
Asbestos textiles (woven, braided and pressed) Asbestos bound in plastic, resin and rubber matrices Asbestos - Cement	Products used in building structures (see building construction sector).  Sprayed asbestos grout (IV.V, VII), Slip-resistant edges (VII), Paper (VI), Wallpaper (VI), Glue (VII), Ropes (II), Felt (I, III), Filters (I, III, VI), Vinyl wallpaper (VII), Sundry plastic or composite products (VII), Upholstery (III), Curtains (III), Protective clothing and accessories (I, III),  Products used in building structures (see building construction sector).	public administration	75* (Public administration and defence; compulsory social security), excluding 75.22*;  99* (Extra-territorial organisations and bodies)
Asbestos in its natural state without binders Asbestos textiles (woven, braided and pressed)  Asbestos bound in plastic, resin and rubber matrices Asbestos - Cement	Pure asbestos in flakes (I), Sprayed asbestos grout (IV.V, VII), Slip-resistant edges (VII), Paper (VI), Wallpaper (VI), Glue (VII), Blankets (I, III), Ropes (II), Felt (I, III), Filters (I, III, VI), Panels (I, V, VI), Sandwich panels (I, VI), Vinyl wallpaper (VII), Paint (IX), Sundry plastic or composite products (VII), Film screens (III), Theatre curtains (III), Cloth (III), Carpets (III), Upholstery (III), Curtains (III), Protective clothing and accessories (I, III), Vinyl-asbestos (VII).  Products used in building structures (see building construction sector).	health and social services	85* (Health and social work);  90* (Sewage and refuse disposal, sanitation and similar activities);  91* (Activities of membership organizations n.e.c.);  92* (Recreational, cultural and sporting activities);  93* (Other service activities)

**Asbestos was also used for numerous “unconventional” purposes, such as:**

- street furniture (bicycle racks, partitions, flower beds, kerbstones, fences, etc.),
- internal sanitary pads,
- synthetic cashmere,
- asbestos-insulated cauldrons,
- hot food trolleys,
- bird nest boxes,
- WC flush box,
- artificial logs for fireplaces,
- electric blankets,
- dog kennels,
- gypsum powder,
- cigarette and pipe filters,
- filters for gas masks,
- flower boxes,
- toys (parts),
- cement-asbestos games for kindergartens,
- incubators,
- insulating cavities in safety boxes,
- table tennis boards,
- school blackboards,
- raised-bed gardening equipment,
- linotype machines,
- carbon-paper printers,
- foundry risers,
- window sills,
- shelving,
- decorative panels and plasterwork,
- bathtub panels,
- refrigerated cell walls,
- prefabricated modular partition walls,
- cookware,
- lamp-holders,
- ashtrays,
- hot presses for footwear uppers,
- rail point heaters,
- racks,
- snow-simulation scenarios,
- garden tables and chairs,
- packing glands,
- musical instruments (padding for pianos),
- internal footwear soles,
- home deodorizer supports,
- door plaques,
- packaging fabrics,
- pet bowls and beds,
- leg wraps (bandages for protecting the joints of cattle and horses).

As above reported, it emerges that Asbestos-containing Materials have been widely used, for different purposes, in a variety of manufacturing activities, public and private buildings,

and in various consumer products. Due to the huge diversity of Acms and the vast scale of their use for both industrial and other purposes, they can obviously be found in many different locations.

Table 4 gives an overview of the principal places of use where asbestos can be found, also indicating the technical characteristics whereby the Acms were used. The locations have been mapped in accordance with law 93/01 and ministerial decree 101/03.

**Table 4:** Principal places where Acms are used and their technical characteristics.

Location	Use of Acms for the following functions											
	Noise insulation	Fireproof	Heat insulation	Mechanical resistance	Chemical resistance	Dielectric stiffness	Ornamental	Refractory	Anti-drumming	Sealant	Anti-condensation	Binding capacity
Accommodation establishments	x	x	x							x		
Concert halls	x	x	x									
Garages	x	x	x	x		x			x			
Libraries	x	x	x									
Care homes	x	x	x									
Power plants	x	x	x	x		x				x	x	x
Boiler rooms	x	x	x	x		x				x	x	x
Cinemas	x	x	x									
Elderly care homes	x	x	x									
Boarding schools	x	x	x									
Farm buildings	x	x	x	x	x					x		
Workshops	x	x	x	x								
Industrial buildings	x	x	x	x	x					x	x	x
Residential buildings	x	x	x	x			x					
Wholesale centres/ Retail outlets	x	x	x	x	x			x			x	
Sports facilities	x	x	x			x				x	x	
Prisons	x	x	x	x		x						
Places of worship	x	x	x				x					
Canteens	x	x	x	x	x						x	
Means of transport	x	x	x	x		x			x	x	x	x
Hospitals	x	x	x	x	x						x	
Gyms	x	x	x	x							x	
Ports, airports and stations	x	x	x	x	x					x	x	x
Restaurants	x	x	x	x	x						x	
Conference facilities	x	x	x									
Dance halls	x	x	x									
Schools	x	x	x									
Military establishments	x	x	x	x	x				x		x	
Theatres	x	x	x									
Office buildings	x	x	x								x	

Over time, Acms are subject to more or less intense deterioration, as a result of their exposure:

- indoor or outdoor environment;
- natural aggressive processes (acid attacks, exposure to particularly intense; atmospheric phenomena, sudden changes in temperature, exposure to high winds etc.);
- tampering by man (cutting, abrasion, perforation of Acms, etc.);
- strong accidental events (fires, earthquakes, floods, etc.);
- frequently accidental events (hailstorm).

Therefore, it is necessary to assess the state of conservation of the different Acms. It should be noted in this regard that, according to the ministerial decree of 6/9/94, Acms can be classified as either:

- Friable: materials that can, by hand pressure, be easily crumbled or reduced to powder;
- or
- Non - Friable (Bonded): hard materials that can be crumbled or reduced to powder only by using mechanical means (abrasive discs, milling cutters, drills, etc.).

The various levels of dangerousness due to the different composition of the original materials, different friability and state of preservation require essential and specific remediation actions by public or private entities.

In order to properly perform these activities, in 2010 the Inail Dit published its *"General Guidelines for the proper management of asbestos remediation operations at Superfund sites"*. These were approved by the Ministry of the Environment, which required their adoption by all the Italian Superfund sites in need of remediation. The Guidelines are also applied in connection with regional and local remediation operations. The Interdepartmental Committee for Economic Policies and Supervision (Cipe) too has requested their application to the excavations for the Turin-Lyon high speed line currently under construction. The Guidelines are now in the process of being updated.

However, managing remediation operations is a very complex task due to the very large number of contaminated sites, as mentioned earlier. To date, in fact, more than 100,000 sites have been mapped, in accordance with ministerial decree 101/03, which add on to the 10 Italian Superfund sites primarily contaminated with asbestos (*Banca Dati della Mappatura dei siti contaminati con asbestos, Inail Dit, 2012 - Asbestos-contaminated Site Mapping Database*). Furthermore, there are only limited available financial resources, especially by the public sector. These difficulties are further worsened by the fact that the remediation operations themselves produce a very large amount of Acw (*Italian landfills accepting asbestos-containing wastes: an analysis of the disposal costs, Inail Dit 2013*). This is also a result of the limited number of operating landfills in Italy, for both hazardous and non-hazardous waste, whose capacity is insufficient to handle the large amount of Acw produced every year in this country (*Mapping of landfills in Italy accepting Asbestos-containing Wastes and their past, present and future capacity for disposal, Inail Dit 2013*). Since landfilling fees are higher in Italy compared to other European countries and so, at best, the Acw produced in Italy is often disposed of abroad. This involves having to transport the Acw across the country, an often complex and hazardous operation. In other cases, the Acw is either:

- incorrectly classified, with the ensuing landfilling of hazardous waste at non-hazardous landfills,
- or
- disposed of at unsuitable landfills, even though the type of waste has been properly classified.

Besides not conforming to the applicable European and national regulations, this can also be harmful to the landfill operatives and to the environment surrounding the landfills.

At worst, the Acw is simply dumped illegally, a practice that represents a serious risk for public health, besides spoiling the urban and natural landscape, which is one of the country's most important, and internationally renowned, assets.

Therefore, in order to prevent undue exposure of workers to this carcinogenic substance, and, at the same, to protect the environment, this Volume II: *"Guidelines for Classifying and Managing Asbestos-containing Waste"* aims to assist in effectively identifying waste based on the codes set out in the Law, also taking into consideration the varied and, at times, unusual uses to which Asbestos-containing Materials have been put in the past, and the related disposal conditions as Asbestos-containing Waste.

We also identify the types of landfills at which the Acw must be disposed of.

## Classification of asbestos-containing wastes: normative references and european list of waste

The rules on the classification of waste (ministerial decree of 9/4/2002 and legislative decree No. 152/2006) establish that a waste should be classified as hazardous, according to directive 91/689/EEc, if it contains *“one or more substances known to be carcinogenic of category 1 or 2 at a total concentration  $\geq 0.1\%$ ”*.

Since asbestos is a Category 1 substance, all wastes that contain it in concentrations of 0.1% or more are classified as hazardous.

Given that Acms, from the outset, have concentrations of asbestos ranging, on average, between 10% and 98% of the hazardous substance, when they become waste, that is, *“any substance or object which the holder discards or intends or is required to discard”*, should be classified as special hazardous waste.

It should also be noted that all special wastes are classified as hazardous when they meet the criteria set out in Annexes G (nature of the waste or of the activities producing the waste), H (components of the waste) and I (hazard characteristics) of legislative decree No. 22/97. Furthermore, all special hazardous and non-hazardous wastes, including Acw, are classified, according to their origin, in a list defined at community level Low introduced by Commission Decision No. 2000/532/EC and in force from 1 January 2002.

Initially, the Low featured six types of Acw, only two of which were included in the list of hazardous waste. Subsequently, following the changes and additions made by Commission Decisions Nos. 2001/118/EC and 2001/119/EC and Council Decision No. 2001/573/EC, implemented in Italy by legislative decree No. 152/2006, the types of Acw have risen to eight and they are all now classified as hazardous waste and marked with an asterisk (Table 5).

**Table 5:** Low codes of Acw

Low code (hazardous waste)	Low interpretation
06.07.01*	Wastes containing asbestos from electrolysis
06.13.04*	Wastes from asbestos processing
10.13.09*	Wastes from asbestos-cement manufacture containing asbestos
15.01.11*	Metallic packaging containing a dangerous solid porous matrix (for example asbestos), including empty pressure containers
16.01.11*	Brake pads containing asbestos
16.02.12*	Discarded equipment containing free asbestos
17.06.01*	Insulation materials containing asbestos
17.06.05*	Construction materials containing asbestos

Alongside the Low codes shown in Table 5, where the presence of asbestos is well specified, there are other codes which, although no specific mention of “*asbestos*” is made, are nevertheless used to classify and manage certain types of waste containing this carcinogen. Based on a careful examination of the Low codes, we have identified other Low codes also applicable to Acw, as confirmed by the data received on landfillings carried out from the operators of the landfills currently operating in Italy. The analysis of this data has highlighted how the number of Low codes with which Acw is identified and accepted at landfills is actually higher than the 8 shown in the table above. Below are a further 21 codes with which landfill sites currently dispose of Acw (Table 6).

**Table 6:** Additional Low codes for identifying landfilled Acw

<b>Low code (hazardous waste)</b>	<b>Low interpretation</b>
08.01.17*	Wastes from paint or varnish removal containing organic solvents or other hazardous substances
08.04.09*	Waste adhesives and sealants containing organic solvents or other hazardous substances
10.01.16*	Fly ash from co-incineration containing hazardous substances
15.02.02*	Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated with hazardous substances
15.01.10*	Packaging containing residues of, or contaminated with hazardous substances
16.10.01*	Aqueous liquid wastes containing hazardous substances
16.11.03*	Other linings and refractories from metallurgical processes containing hazardous substances
16.11.05*	Linings and refractories from non-metallurgical processes containing hazardous substances
17.01.06*	Mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing hazardous substances
17.02.04*	Glass, plastic and wood containing or contaminated with hazardous substances
17.04.09*	Metal waste contaminated with hazardous substances
17.05.03*	Soil and stones containing hazardous substances
17.05.07*	Track ballast containing hazardous substances
17.06.03*	Other insulation materials consisting of or containing hazardous substances
17.08.01*	Gypsum-based construction materials contaminated with hazardous substances
17.09.03*	Other construction and demolition wastes (including mixed wastes) containing hazardous substances
19.03.04*	Wastes marked as hazardous, partly stabilised
19.03.06*	Wastes marked as hazardous, solidified
19.07.02*	Landfill leachate containing hazardous substances
19.13.01*	Solid wastes from soil remediation containing hazardous substances
19.13.03*	Sludges from soil remediation containing hazardous substances

The use of these further codes is explained, first and foremost, by the fact that asbestos is disposed of in landfills also with Low codes referring to *“hazardous substances”*, and secondly by the fact that sometimes reference is made to different codes if the Acw comes from particular situations. Several of these stand out:

- 15.02.02\*- *“Absorbents, filter materials, wiping cloths, protective clothing contaminated with dangerous substances”*, generally applied to the classification and disposal of the Personal Protective Equipment (Ppe) used during asbestos remediation activities;
- 17.05.07\*- *“Track ballast containing dangerous substances”*, generally employed for the classification and disposal of asbestos-containing green stones from the dismantling of permanent ways;
- 10.01.16\*- *“Fly ash from co-incineration containing dangerous substances”*, which refers to asbestos cement roofs after a fire;
- 16.11.03\*- Other linings and refractory materials from processing metallurgical plants containing dangerous substances, 16.11.05 \* - Coatings and materials refractories from non-metallurgical processes containing dangerous substances, with which are managed in most cases the related waste contaminated by, and not containing asbestos as required by the definition of the European Waste Catalog;
- 08.01.11 \* - Waste paints and varnishes containing organic solvents or other substances hazardous, 08.04.09 \* - Waste adhesives and sealants, containing organic or other solvents dangerous substances, 15.01.10 \* - Packaging containing residues of dangerous substances or contaminated by these substances, 16.10.01 \* - Aqueous waste solutions, containing dangerous substances and 17.08.01 \* - Contaminated gypsum-based construction materials from hazardous substances, do not refer to asbestos containing materials in production or in trade (taking into account the notice established by the L. 257/1992 and subsequent amendments), but to waste generated by the remediation of contaminated sites;
- 16.10.01 \* - Aqueous waste solutions containing dangerous substances, 19.07.02 \* - *“Landfill litter containing dangerous substances”*, referred to waste in treatment at authorized plants.

Furthermore, *“Insulating materials containing asbestos”* should be disposed of, in accordance with the applicable regulations, with the code 17.06.01\*, as mentioned in Table 7. Instead, the Inail Dit has found that certain landfills and temporary Storage Facilities, have accepted Acw having these characteristics with the code 17.06.03\*- *“Other insulating materials containing or composed of hazardous substances”*. This is incorrect, because the European Waste Catalogue explicitly assigns the code 17.06.01\* to insulation waste containing asbestos. It should also be noted that in many industrial sites where certain products had been manufactured in the past (asbestos-cement) (Bari-Fibronit, Broni-Fibronit, Ex-Sacelit- Milazzo, etc.), the Inail Dit has found numerous cases of incorrect waste classification (asbestos-cement). In fact, in many cases, the latter have been classified with the code 17.06.05\* - *“Construction materials containing asbestos”*, rather than - in accordance with ministerial decree 248/2004 - with the code 10.13.09\* - *“Asbestos-containing waste from the manufacturing of asbestos-cement”*.

Finally, draws attention to the case of ferrous materials contaminated by asbestos classified with the code 17.04.09 \* - Metal waste contaminated with dangerous substances. They are generally attributed to Chapter 17 - waste generated from building construction and demolition operations. However, such metal waste could also be generated by other industrial sectors (vehicle demolition, etc.) for which additional codes are more suitable like Low 16.01. In general it has been considered appropriate, in doubtful cases or not foreseen by the Low, prefer a code whose definition contains the wording asbestos, rather than codes for wastes

containing or contaminated with hazardous substances. This is in order to manage the Acw in a precautionary manner, keeping the information of the presence of asbestos. It therefore follows the possibility of collecting the Acw in dedicated landfills or landfills with cells dedicated to asbestos, avoiding the mixing with other typologies of hazardous waste, as required by the European standard. For example:

1. adhesives and sealants containing asbestos: 17.06.01 \* - Insulating materials asbestos rather than 08.04.09 \* - Waste adhesives and sealants, containing organic solvents or other dangerous substances.
2. glass, plastic or wood containing or contaminated by asbestos: 17.06.01 \* - Insulating materials containing asbestos and 17.06.05 \* - Building materials containing asbestos rather than 17.02.04 \* - Glass, plastic, wood containing or contaminated with dangerous substances.
3. asbestos-contaminated tiles and ceramics :17.06.05 \* - Building materials containing asbestos rather than the code 17.01.06 \* - Mixtures or slags of cement, tiles, bricks, tiles and ceramics, containing hazardous substances.

Following an in-depth research on Acw, accompanied by a market survey at landfills and storage centers, Inail Dit identified the 100 tipology of Acw most frequently managed during the remediation and disposal activities. The correct classification reference was therefore attributed to each of these 100 types of Acw, also following a comparison with what is happening in France, England, Switzerland, Holland, Germany. Table 7 shows these data, with the aim of facilitating the workers that, on a daily or occasional basis, face with Acw classification.

**Table 7:** L.o.W Codes to be used for the classification of the main types of RCA

No.	Description of wastes	Low code assigned	Low definition
1	Acw found during soil remediation operations	19.13.01*	Solid wastes from soil remediation containing dangerous substances
2	Anti-drumming substances containing asbestos (foam, mastic, bitumens, etc.)	17.06.01*	Insulating materials containing asbestos
3	Anti-slip edges for stairs containing asbestos	17.06.01*	Insulating materials containing asbestos
4	Asbestos-cement cisterns and tanks	17.06.05*	Construction materials containing asbestos
5	Asbestos-cement formwork	17.06.05*	Construction materials containing asbestos
6	Asbestos-cement ventilation and conditioning ducts	17.06.05*	Construction materials containing asbestos
7	Asbestos-containing paints	08.01.11*	Waste paint and varnish containing organic solvents or other dangerous substances
8	Ash and dust from the co-incineration of materials (asbestos-cement) (fires)	10.01.16*	Fly ash from co-incineration containing dangerous substances.
9	Belts for moving walkways, conveyor belts	17.06.01*	Insulating materials containing asbestos

<b>No.</b>	<b>Description of wastes</b>	<b>Low code assigned</b>	<b>Low definition</b>
10	Bituminous products containing asbestos (wearing courses, edges, felt boards for roofing, sheathing, fillerised tiles, stucco plaster, felt, sheets)	17.06.01*	Insulating materials containing asbestos
11	Bituminous road surfaces containing asbestos	17.06.01*	Insulation materials containing asbestos
12	Bituminous sealants (for manholes, basins, ducts, etc.) containing asbestos	17.06.01*	Insulating materials containing asbestos
13	Ceramic and other tiles containing or contaminated with asbestos	17 06 05* -	Mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing dangerous substances
14	Cladding, revetements in general and facings, pavings and floorings with sublayer containing asbestos (carpeting, linoleum, etc.)	17 06 01*	Glass, plastic and wood containing or contaminated with dangerous substances
15	Columns, pillars, (asbestos-cement)	17.06.05*	Construction materials containing asbestos
16	Components or spare parts of means of transport containing asbestos (engines, batteries, gearboxes, etc.)	16 01 21*	Discarded equipment, containing free asbestos
17	Compressed raw fibre panels (in partition walls, false ceilings, etc.) containing asbestos	17.06.01*	Insulating materials containing asbestos
18	Concrete road surfaces containing asbestos (including screeds containing fines in the mixture)	17.06.05*	Construction materials containing asbestos
19	Cupels and other insulating coatings in friable matrix	17.06.01*	Insulation materials containing asbestos
20	Cylinders containing asbestos	15.01.11*	Metallic packaging containing a dangerous solid porous matrix (for example asbestos), including empty pressure containers
21	Debris and waste from the processing of asbestos or asbestos-containing products, excluding asbestos-cement (es. fines, fragments, pieces of packing, asbestos-cardboard, fabrics, asbestos-plaster panels, plastic products, etc.)	06.13.04*	Wastes from asbestos processing
22	Deteriorated or non-deteriorated wood contaminated with asbestos	17 06 05*	Glass, plastic and wood containing or contaminated with dangerous substances
23	Devices insulated with asbestos (ovens, boilers, radiators, purifiers, etc.) disposed of whole	16.02.12*	Discarded equipment, containing free asbestos
24	Drainpipes and other pipes (asbestos-cement)	17.06.05*	Construction materials containing asbestos
25	Dust containing asbestos	17.09.03*	Other construction and demolition wastes (including mixed wastes) containing dangerous substances
26	Electrical boxes (non-asbestos-cement) and cables contaminated with asbestos	17 06 01*	Glass, plastic and wood containing or contaminated with dangerous substances
27	Electricity control boards and spark extinguishing chambers (asbestos-cement)	17.06.05*	Construction materials containing asbestos
28	Engines and motion transmission equipment (industrial motors, centrifuges, conveyor-belt motors, etc.)	16.02.12*	Discarded equipment, containing free asbestos

No.	Description of wastes	Low code assigned	Low definition
29	Equipment with components containing asbestos (extractors, stoves, irons, hair dryers, tumble dryers, hood hairdryers, electric/gas cookers, sewing machines, drills, etc.) disposed of whole	16.02.12*	Discarded equipment, containing free asbestos
30	Equipment with filters containing asbestos (extraction systems, laboratory hoods, etc.) disposed of whole	16.02.12*	Discarded equipment, containing free asbestos
31	Equipment with filters containing asbestos (suction systems, laboratory hoods, etc.) disposed of entirely	16.02.12*	Discarded equipment containing free asbestos
32	Fabrics, Theatre curtains, cinema screens, carpets, Upholstery	17.06.01*	Insulating materials containing asbestos
33	Felt	17.06.01*	Insulating materials containing asbestos
34	Ferrous materials contaminated with asbestos	17.04.09*	Metal waste contaminated with dangerous substances
35	Filler	17.06.01*	Insulating materials containing asbestos
36	Filters, felt and filtering tampons containing asbestos (from extractors, industrial processes, etc.)	17.06.01	Insulating materials containing asbestos
37	Filters, felt and filtering tampons contaminated of asbestos (from extractors, industrial processes, etc.)	15.02.02*	Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated with dangerous substances
38	Fire doors, doors of passenger/freight lifts containing asbestos (if they cannot be remediated or have not been remediated) disposed of whole	17 06 01*	Discarded equipment, containing free asbestos
39	Fireplaces, chimneys, smokestacks, flues, hoods, chimney-pots, (asbestos-cement)	17.06.05*	Construction materials containing asbestos
40	Fireplaces, flues, hoods, chimneys, for domestic use in asbestos cement	17.06.05*	Construction materials containing asbestos
41	Fire-retardant and anti-drumming paints applied containing asbestos (ordinary/enamel etc. paints)	17.06.01*	Insulating materials containing asbestos
42	Flame screens containing asbestos	17.06.01*	Insulating materials containing asbestos
43	Flong for printing containing asbestos	17.06.01*	Insulating materials containing asbestos
44	Friction materials containing asbestos (braking systems, clutch discs, etc.)	16.01.11*	Brake pads containing asbestos
45	Glass wool contaminated with asbestos	17 06 05*	Glass, plastic and wood containing or contaminated with dangerous substances
46	Gutters, downpipes, (asbestos-cement)	17.06.05*	Construction materials containing asbestos
47	Gypsum and / or plasterboard panels contaminated by asbestos	17.08.01*	Gypsum-based construction materials contaminated with dangerous substances
48	Insulating materials bound in a cellulose matrix containing asbestos (foundry risers, flame spreaders, surface/shelf coatings)	17.06.01*	Insulating materials containing asbestos
49	Joints in pure asbestos or containing asbestos	17.06.01*	Insulation materials containing asbestos

No.	Description of wastes	Low code assigned	Low definition
50	Laboratory wastes contaminated with asbestos	15.02.02*	Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated with dangerous substances
51	Linings, padding and fillings of raw or woven asbestos fibres (cushions, mattresses, mats)	17.06.01*	Insulating materials containing asbestos
52	Loose materials (asbestos-cement) (processing fines, sludge, wastes, fragments, processing scraps, refuse, etc.) from the remediation of decommissioned asbestos-cement manufacturing plants	10.13.09*	Wastes from the production of asbestos-cement, containing asbestos
53	Packs of lubricants containing asbestos	17.06.01*	Insulation materials containing asbestos
54	Panels (asbestos-cement)	17.06.05*	Construction materials containing asbestos
55	Panels made of asbestos-cardboard	17.06.01*	Insulating materials containing asbestos
56	Paper, wallpaper, vinyl paints containing asbestos	17.06.01*	Insulating materials containing asbestos
57	Parapets, sills, fencing, containing asbestos	17.06.05*	Construction materials containing asbestos
58	Personal or collective protective equipment contaminated with asbestos as a result of asbestos remediation operations (overalls, footwear, gloves, masks monouso, filtri di ricambio di masks facciali e semifacciali, etc.)	15.02.02*	Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated with dangerous substances
59	Plasterboards or other inert matrices containing asbestos (other than concrete)	17.06.01*	Insulating materials containing asbestos
60	Plastering, plaster stucco, mortar, cement mortar, etc. containing asbestos	17.06.01*	Insulating materials containing asbestos
61	Plastic and composite materials containing or contaminated with asbestos (special parts, components, etc.)	17 06 05*	Glass, plastic and wood containing or contaminated with dangerous substances
62	Plastic, resin or rubber panels	17 06 01*	Construction materials containing asbestos
63	Polyethylene contaminated with asbestos during asbestos remediation operations (containment sheets)	15.02.02*	Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated with dangerous substances
64	Prefabricated building units (asbestos-cement)	17.06.05*	Construction materials containing asbestos
65	Pressing/moulding equipment containing asbestos (foundry cores and dies/moulds)	16.11.03*	Other linings and refractories from metallurgical processes containing dangerous substances
66	Pressure and other pipes, Fittings, Joints, channels, conduits and ducts, pipe-sleeves (asbestos-cement)	17.06.05*	Construction materials containing asbestos
67	Products containing asbestos fibers (sheets for ironing boards, upholstery, curtains, electrothermal blankets, cookware, games, etc.)	17.06.01*	Insulating materials containing asbestos
68	Protective clothing and accessories containing asbestos from the start (overalls, gloves, blankets, etc.)	17.06.01*	Insulating materials containing asbestos

<b>No.</b>	<b>Description of wastes</b>	<b>Low code assigned</b>	<b>Low definition</b>
69	Pure asbestos in flakes	17.06.01*	Insulation materials containing asbestos
70	Raw asbestos sacks	06.13.04*	Wastes from asbestos processing
71	Reed mats, blankets	17.06.01*	Insulating materials containing asbestos
72	Refractory bricks contaminated with asbestos (from metallurgical processes)	16.11.03*	Other linings and refractories from metallurgical processes containing dangerous substances
73	Refractory bricks contaminated with asbestos (from non-metallurgical processes)	16.11.05*	Linings and refractories from non-metallurgical processes containing dangerous substances
74	Remediation soil contaminated with asbestos	17.05.03*	Soil and stones containing dangerous substances
75	Roofing insulation materials (filler, fines from the production of asbestos-cement)	17.06.01*	Insulating materials containing asbestos
76	Roofing materials (asbestos-cement) (slate, borders, roof tiles, flat/corrugated slabs, baked clay tiles, etc.)	17.06.05*	Construction materials containing asbestos
77	Ropes, cords, wires, ropes, bands, containing asbestos	17.06.01*	Insulating materials containing asbestos
78	Sacks contaminated with asbestos	15.01.10	Packaging containing residues of or contaminated by dangerous substances
79	Sandpapering and polishing residues containing asbestos	17.09.03*	Other construction and demolition wastes (including mixed wastes) containing dangerous substances
80	Sandwich panels (asbestos-cement) with internal friable asbestos disposed of whole	17.06.01*	Insulating materials containing asbestos
81	Sandwich panels faced with materials not containing asbestos but featuring friable asbestos internally	17.06.01*	Insulating materials containing asbestos
82	Seal rings, joints, washers, sleeves, packing gland, gaskets, containing asbestos	17.06.01*	Insulating materials containing asbestos
83	Sealants bound in bituminous matrices, containing asbestos or contaminated with asbestos (glues, mastic and foam) for windows, false ceilings, panels, slabs, media, etc.	17.06.01*	Insulating materials containing asbestos
84	Sealants bound in plastic, resin and rubber matrices containing asbestos or contaminated with asbestos (glues, mastic and foam) for windows, false ceilings, panels, slabs, media, etc.	17.06.01*	Insulating materials containing asbestos
85	Silos, sundry storage facilities and containers,	17.06.05*	Construction materials containing asbestos
86	Slabs (asbestos-cement)	17.06.05*	Construction materials containing asbestos
87	Sleeves, belts, straps, wicks, braids, containing asbestos	17.06.01*	Insulating materials containing asbestos
88	Sludges containing asbestos	19.13.03*	Sludges from soil remediation containing dangerous substances
89	Solidified waste from Acw stabilisation processes, featuring I.R. < 0.6 (Table A, Annex A, ministerial decree 248/04).	19.03.06*	Wastes marked as hazardous, solidified
90	Spoil from asbestos extraction (fines, mining refuse, etc.)	06.13.04*	Wastes from asbestos processing

<b>No.</b>	<b>Description of wastes</b>	<b>Low code assigned</b>	<b>Low definition</b>
91	Sprayed asbestos in cement matrix for facings, structures, etc.	17.06.01*	Insulating materials containing asbestos
92	Stabilised waste from Acw stabilisation processes, featuring I.R. $\geq 0.6$ (Table A, Annex A, ministerial decree 248/04)	19.03.04*	Wastes marked as hazardous, partly stabilised
93	Sundry manufactured items (asbestos-cement) (ashtrays, plaques, letterboxes, kennels for dogs, bird boxes, shelves, furnishings, containers, vases, etc.)	17.06.05*	Construction materials containing asbestos
94	Tanks of any kind, sort or nature, (asbestos-cement)	17.06.05*	Construction materials containing asbestos
95	Track ballast containing asbestos	17.05.07*	Track ballast containing dangerous substances
96	Track sleepers (asbestos-cement)	17.06.05*	Construction materials containing asbestos
97	Vinyl-asbestos	17.06.05*	Construction materials containing asbestos
98	Wastes containing asbestos from electrolysis	06.07.01*	Wastes containing asbestos from electrolysis
99	Wells, shafts, manholes, Expansion chambers, (asbestos-cement)	17.06.05*	Construction materials containing asbestos
100	Worktops (asbestos-cement)	17.06.05*	Construction materials containing asbestos

## Management of asbestos-containing wastes

Acw classified according to the indications shown above, may be either landfilled (pursuant to legislative decree 36/2003 (Annex I)), ministerial decree 13/3/2003, 3/8/2005, 27/9/2010 (Annex II) or sent to recovery facilities (pursuant to ministerial decree 248/2004 (Annex III)). In particular, the applicable regulations provide that Acw may be landfilled at:

- a) hazardous waste landfills, either dedicated landfills or landfills with dedicated cells
- b) non-hazardous waste landfills, a) either dedicated landfills or landfills with specifically dedicated cells:
  - in the case of wastes classified with Low code 17.06.05\*;
  - in the case of other Acw, provided that they have been treated in accordance with ministerial decree 248/2004 and comply with the values shown in Table 1 below, subject to periodical checks required by the competent authorities at the treatment facility.

**Table 8:** Landfill acceptance criteria for treated non-hazardous Acw

Parameter	Values
Asbestos content (% in weight)	≤ 30
Apparent density (g/cm <sup>3</sup> )	> 2
Relative density (%)	> 50
Leachate index	< 0.6

Based on the above, only *“Construction materials containing asbestos”* classified with code 17.06.05\*, or other treated Acw featuring values consistent with Table 1 of ministerial decree 248/04, may be landfilled at non-hazardous waste landfills.

All other types of Acw must be landfilled at hazardous waste landfills, except for certain wastes classified with code 15.02.02\*. It should be remembered, in fact, that *“Personal protective equipment used in connection with asbestos remediation operations and contaminated with asbestos”* should be disposed of at the landfill category corresponding to the treated materials. Therefore, if the said type of waste comes from the remediation of friable Acw, it should be disposed of exclusively at hazardous waste landfills. Only in the case of the remediation performed in respect of *“Construction materials containing asbestos”* (Low 17.06.05\*), the waste, classifiable with Low code 15.02.02\*, may be landfilled at non-hazardous waste landfills.

In the Inail book *“Mapping of landfills in Italy accepting Acw: past, present and future capacity”* (2013) anomalies/unconformities in waste management have been highlighted by the analysis of the data. It has emerged, in fact, that seven operating landfills, classified as non-hazardous waste landfills, have been authorised by the competent Regional/Provincial authorities to accept the following hazardous Acw:

*“Insulating materials containing asbestos”* - 17.06.01\*;

*“Soil and stones containing dangerous substances”* - 17.05.03\*;

*"Gypsum-based construction materials contaminated with dangerous substances" - 17.08.01\*;  
"Discarded equipment containing free asbestos" - 16.02.12\*;  
"Wastes marked as hazardous, partly stabilised" - 19.03.04\*.*

Based on the data surveyed, the Inail Dit has verified that all the above seven landfills effectively accept the specified hazardous wastes. This is clearly in contrast with the national and European regulations. In fact, the ministerial decree of 27 September 2010, consistently with legislative decree 36/2003, establishes that wastes may be accepted at landfills only if they conform to the acceptance criteria for the corresponding landfill class.

Moreover, article 1, paragraph 4, "General principles" of the decree of 27 September 2010, states: *"Taking into account that landfills for hazardous waste are subject to more stringent environmental protection regulations than landfills for non-hazardous waste, and that the latter are subject to more stringent environmental protection measures than landfills for inert waste, it shall be possible to dispose of waste that fulfils the acceptance criteria of any class of landfill at the landfills subject to more stringent environmental protection regulations".*

Article 4 of the same decree - On-site verification - then goes on to say that: *"Prior to acceptance, each load of waste delivered to a landfill shall be visually inspected (by the landfill operator) before and after unloading and the required documentation shall be checked to ensure that the waste complies with the acceptance criteria laid down herein for the relevant landfill class".*

Furthermore, a ruling by the Supreme Court (Corte di Cassazione), Div. III no. 9192 of 2/3/2009, sets out that *"both legislative decree 36/03, implementing directive 1999/31/EC on the landfill of waste, and ministerial decree 3/8/2005 specifically require the landfill operator to inspect the waste. Therefore, if it is found that the Low code assigned to the landfilled waste by the producer of the waste is incorrect and incompatible with the nature of the said waste, and with the relevant landfill class, based on the permit obtained, the landfill operator shall be held accountable for the incorrect landfilling, because he or she is obliged to ensure the conformity of the waste with the characteristics indicated in the Low waste description".*

Therefore, to avoid any cases of incorrect management and handling of the Acw, Table 9 below gives the 100 types of Acw with the relevant Low codes, as already shown above but also specifying the type of landfill authorised to accept each one.

**Table 9:** Landfills where to commit the main types of Acw

No.	Description of wastes	Ewc code assigned	Type of landfill
1	Acw found during soil remediation operations	19.13.01*	Hazardous waste landfill
2	Anti-drumming substances containing asbestos (foam, mastic, bitumens, etc.)	17.06.01*	Hazardous waste landfill
3	Anti-slip edges for stairs containing asbestos	17.06.01*	Non-hazardous waste landfill
4	Asbestos-cement cisterns and tanks	17.06.05*	Non-hazardous waste landfill
5	Asbestos-cement formwork	17.06.05*	Non-hazardous waste landfill
6	Asbestos-cement ventilation and conditioning ducts	17.06.05*	Non-hazardous waste landfill
7	Asbestos-containing paints	08.01.11*	Hazardous waste landfill
8	Ash and dust from the coincineration of materials (asbestos-cement) (fires)	10.01.16*	Hazardous waste landfill
9	Belts for moving walkways, conveyor belts	17.06.01*	Hazardous waste landfill
10	Bituminous products containing asbestos (wearing courses, edges, felt boards for roofing, sheathing, fillerised tiles, stucco plaster, felt, sheets)	17.06.01*	Hazardous waste landfill
11	Bituminous road surfaces containing asbestos	17.06.01*	Hazardous waste landfill
12	Bituminous sealants (for manholes, basins, ducts, etc.) containing asbestos	17.06.01*	Hazardous waste landfill
13	Ceramic and other tiles containing or contaminated with asbestos	17 06 05* -	Hazardous waste landfill
14	Cladding, revetements in general and facings, pavings and floorings with sublayer containing asbestos (carpeting, linoleum, etc.)	17 06 01*	Hazardous waste landfill
15	Columns, pillars, (asbestos-cement)	17.06.05*	Non-hazardous waste landfill
16	Components or spare parts of means of transport containing asbestos (engines, batteries, gearboxes, etc.)	16 01 21*	Hazardous waste landfill
17	Compressed raw fibre panels (in partition walls, false ceilings, etc.) containing asbestos	17.06.01*	Hazardous waste landfill
18	Concrete road surfaces containing asbestos (including screeds containing fines in the mixture)	17.06.05*	Non-hazardous waste landfill
19	Cupels and other insulating coatings in friable matrix	17.06.01*	Hazardous waste landfill
20	Cylinders containing asbestos	15.01.11*	Hazardous waste landfill
21	Debris and waste from the processing of asbestos or asbestos-containing products, excluding asbestos-cement (es. fines, fragments, pieces of packing, asbestos-cardboard, fabrics, asbestos-plaster panels, plastic products, etc.)	06.13.04*	Hazardous waste landfill
22	Deteriorated or non-deteriorated wood contaminated with asbestos	17 06 05*	Hazardous waste landfill
23	Devices insulated with asbestos (ovens, boilers, radiators, purifiers, etc.) disposed of whole	16.02.12*	Hazardous waste landfill
24	Drainpipes and other pipes (asbestos-cement)	17.06.05*	Non-hazardous waste landfill
25	Dust containing asbestos	17.09.03*	Hazardous waste landfill
26	Electrical boxes (non-asbestos-cement) and cables contaminated with asbestos	17 06 01*	Hazardous waste landfill
27	Electricity control boards and spark extinguishing chambers (asbestos-cement)	17.06.05*	Non-hazardous waste landfill

<b>No.</b>	<b>Description of wastes</b>	<b>Ewc code assigned</b>	<b>Type of landfill</b>
28	Engines and motion transmission equipment (industrial motors, centrifuges, conveyor-belt motors, etc.)	16.02.12*	Hazardous waste landfill
29	Equipment with components containing asbestos (extractors, stoves, irons, hair dryers, tumble dryers, hood hairdryers, electric/gas cookers, sewing machines, drills, etc.) disposed of whole	16.02.12*	Hazardous waste landfill
30	Equipment with filters containing asbestos (extraction systems, laboratory hoods, etc.) disposed of whole	16.02.12*	Hazardous waste landfill
31	Equipment with filters containing asbestos (suction systems, laboratory hoods, etc.) disposed of entirely	16.02.12*	Hazardous waste landfill
32	Fabrics, Theatre curtains, cinema screens, carpets, Upholstery	17.06.01*	Hazardous waste landfill
33	Felt	17.06.01*	Hazardous waste landfill
34	Ferrous materials contaminated with asbestos	17.04.09*	Hazardous waste landfill
35	Filler	17.06.01*	Hazardous waste landfill
36	Filters, felt and filtering tampons containing asbestos (from extractors, industrial processes, etc.)	17.06.01*	Hazardous waste landfill
37	Filters, felt and filtering tampons contaminated by asbestos (from extractors, industrial processes, etc.)	15.02.02*	Hazardous or non-hazardous waste landfill
38	Fire doors, doors of passenger/freight lifts containing asbestos (if they cannot be remediated or have not been remediated) disposed of whole	17 06 01*	Hazardous waste landfill
39	Fireplaces, chimneys, smokestacks, flues, hoods, chimney-pots, (asbestos-cement)	17.06.05*	Non-hazardous waste landfill
40	Fireplaces, flues, hoods, chimneys, for domestic use in asbestos cement	17.06.05*	Non-hazardous waste landfill
41	Fire-retardant and anti-drumming paints applied containing asbestos (ordinary/enamel etc. paints)	17.06.01*	Hazardous waste landfill
42	Flame screens containing asbestos	17.06.01*	Hazardous waste landfill
43	Flong for printing containing asbestos	17.06.01*	Hazardous waste landfill
44	Friction materials containing asbestos (braking systems, clutch discs, etc.)	16.01.11*	Hazardous waste landfill
45	Glass wool contaminated with asbestos	17 06 05*	Hazardous waste landfill
46	Gutters, downpipes, (asbestos-cement)	17.06.05*	Non-hazardous waste landfill
47	Gypsum and / or plasterboard panels contaminated by asbestos	17.08.01*	Hazardous waste landfill
48	Insulating materials bound in a cellulose matrix containing asbestos (foundry risers, flame spreaders, surface/shelf coatings)	17.06.01*	Hazardous waste landfill
49	Joints in pure asbestos or containing asbestos	17.06.01*	Hazardous waste landfill
50	Laboratory wastes contaminated with asbestos	15.02.02*	Hazardous or non-hazardous waste landfill
51	Linings, padding and fillings of raw or woven asbestos fibres (cushions, mattresses, mats)	17.06.01*	Hazardous waste landfill
52	Loose materials (asbestos-cement) (processing fines, sludge, wastes, fragments, processing scraps, refuse, etc.) from the remediation of decommissioned asbestos-cement manufacturing plants	10.13.09*	Hazardous waste landfill
53	Packs of lubricants containing asbestos	17.06.01*	Hazardous waste landfill
54	Panels (asbestos-cement)	17.06.05*	Non-hazardous waste landfill

<b>No.</b>	<b>Description of wastes</b>	<b>Ewc code assigned</b>	<b>Type of landfill</b>
55	Panels made of asbestos-cardboard	17.06.01*	Hazardous waste landfill
56	Paper, wallpaper, vinyl paints containing asbestos	17.06.01*	Hazardous waste landfill
57	Parapets, sills, fencing, containing asbestos	17.06.05*	Non-hazardous waste landfill
58	Personal or collective protective equipment contaminated with asbestos as a result of asbestos remediation operations (overalls, footwear, gloves, masks , filtri di ricambio di masks facciali e semifacciali, etc.)	15.02.02*	Hazardous or non-hazardous waste landfill
59	Plasterboards or other inert matrices containing asbestos (other than concrete)	17.06.01*	Hazardous waste landfill
60	Plastering, plaster stucco, mortar, cement mortar, etc. containing asbestos	17.06.01*	Hazardous waste landfill
61	Plastic and composite materials containing or contaminated with asbestos (special parts, components, etc.)	17 06 05*	Non-hazardous waste landfill
62	Plastic, resin or rubber panels	17 06 01*	Hazardous waste landfill
63	Polyethylene contaminated with asbestos during asbestos remediation operations (containment sheets)	15.02.02*	Hazardous or non-hazardous waste landfill
64	Prefabricated building units (asbestos-cement)	17.06.05*	Non-hazardous waste landfill
65	Pressing/moulding equipment containing asbestos (foundry cores and dies/moulds)	16.11.03*	Hazardous waste landfill
66	Pressure and other pipes, Fittings, Joints, channels, conduits and ducts, pipe-sleeves (asbestos-cement)	17.06.05*	Non-hazardous waste landfill
67	Products containing asbestos fibers (sheets for ironing boards, upholstery, curtains, electrothermal blankets, cookware, games, etc.)	17.06.01*	Hazardous waste landfill
68	Protective clothing and accessories containing asbestos from the start (overalls, gloves, blankets, etc.)	17.06.01	Hazardous waste landfill
69	Pure asbestos in flakes	17.06.01*	Hazardous waste landfill
70	Raw asbestos sacks	06.13.04*	Hazardous waste landfill
71	Reed mats, blankets	17.06.01*	Hazardous waste landfill
72	Refractory bricks contaminated with asbestos (from metallurgical processes)	16.11.03*	Hazardous waste landfill
73	Refractory bricks contaminated with asbestos (from non-metallurgical processes)	16.11.05*	Hazardous waste landfill
74	Remediation soil contaminated with asbestos	17.05.03*	Hazardous waste landfill
75	Roofing insulation materials (filler, fines from the production of asbestos-cement)	17.06.01*	Hazardous waste landfill
76	Roofing materials (asbestos-cement) (slate, borders, roof tiles, flat/corrugated slabs, baked clay tiles, etc.)	17.06.05*	Non-hazardous waste landfill
77	Ropes, cords, wires, ropes, bands, containing asbestos	17.06.01*	Hazardous waste landfill
78	Sacks contaminated with asbestos	15.01.10	Hazardous waste landfill
79	Sandpapering and polishing residues containing asbestos	17.09.03*	Hazardous waste landfill
80	Sandwich panels (asbestos-cement) with internal friable asbestos disposed of whole	17.06.01*	Hazardous waste landfill
81	Sandwich panels faced with materials not containing asbestos but featuring friable asbestos internally	17.06.01*	Hazardous waste landfill

<b>No.</b>	<b>Description of wastes</b>	<b>Ewc code assigned</b>	<b>Type of landfill</b>
82	Seal rings, joints, washers, sleeves, packing gland, gaskets, containing asbestos	17.06.01*	Hazardous waste landfill
83	Sealants bound in bituminous matrices, containing asbestos or contaminated with asbestos (glues, mastic and foam) for windows, false ceilings, panels, slabs, media, etc.	17.06.01*	Hazardous waste landfill
84	Sealants bound in plastic, resin and rubber matrices containing asbestos or contaminated with asbestos (glues, mastic and foam) for windows, false ceilings, panels, slabs, media, etc.	17.06.01*	Hazardous waste landfill
85	Silos, sundry storage facilities and containers,	17.06.05*	Non-hazardous waste landfill
86	Slabs (asbestos-cement)	17.06.05*	Non-hazardous waste landfill
87	Sleeves, belts, straps, wicks, braids, containing asbestos	17.06.01*	Hazardous waste landfill
88	Sludges containing asbestos	19.13.03*	Hazardous waste landfill
89	Solidified waste from Acw stabilisation processes, featuring I.R. < 0.6 (Table A, Annex A, ministerial decree 248/04).	19.03.06*	Non-hazardous waste landfill
90	Spoil from asbestos extraction (fines, mining refuse, etc.)	06.13.04*	Hazardous waste landfill
91	sprayed asbestos in cement matrix for facings, structures, etc.	17.06.01*	Hazardous waste landfill
92	Stabilised waste from Acw stabilisation processes, featuring I.R. ≥ 0.6 (Table A, Annex A, ministerial decree 248/04)	19.03.04*	Hazardous waste landfill
93	Sundry manufactured items (asbestos-cement) (ashtrays, plaques, letterboxes, kennels for dogs, bird boxes, shelves, furnishings, containers, vases, etc.)	17.06.05*	Non-hazardous waste landfill
94	Tanks of any kind, sort or nature, (asbestos-cement)	17.06.05*	Non-hazardous waste landfill
95	Track ballast containing asbestos	17.05.07*	Hazardous waste landfill
96	Track sleepers (asbestos-cement)	17.06.05*	Non-hazardous waste landfill
97	Vinyl-asbestos	17.06.05*	Non-hazardous waste landfill
98	Wastes containing asbestos from electrolysis	06.07.01*	Hazardous waste landfill
99	Wells, shafts, manholes, Expansion chambers, (asbestos-cement)	17.06.05*	Non-hazardous waste landfill
100	Worktops (asbestos-cement)	17.06.05*	Non-hazardous waste landfill

## Conclusions

Inail conducted a research on national and European scale regarding Acw management, focusing on waste acceptance in landfills and storages and / or preliminary treatment centers. The results show critical issues on Acw classification and management or local-scale non-compliance with the European and national regulations.

Such incongruities are, sometimes the result of an unsuitable interpretation of the sector regulations, which are complex and articulated while, in other cases, of intentional illegal activities. In order to ensure greater protection for workers, Inail Dit elaborated these Operating Instructions. The latter, in the form of an user-friendly manual, provides information regarding the classification of the various Acw and the type of landfill where they should be disposed of.

Shortly the following issues are analysed:

- Classifying Acp / Acw and their use in different industrial sectors:
  1. Identification and classification of the main Acp (Tables 1 and 2).
  2. Main products containing asbestos used in the various economic activities (Table 3);
  3. Main places of use of products containing asbestos (Table 4);
- Classifying and managing Acw:
  4. Correct Low codes to use managing Acw (Tables 5 and 6).
  5. 100 main Acw typologies and corresponding Low codes (Table 7).
  6. 100 main Acw typologies and corresponding landfills (Table 9).

These operative instruction may be useful for a better Acw classification and management. They should be useful for quicklier mapping of contaminated sites, easier asbestos remediation planning, accurate definition of suitable temporary or preliminary storage as well as landfills disposal for Acw. The technical information here reported may help the competent government departments (Economy, Health, Environment, Labour, Defence and Education). Lawmakers may draw indications and information for the purpose of completing legislation on the subject, based on the above recommendations, in order to concur to resolve the asbestos complex issue and its economic, health, environmental and social security consequences.

These Instructions may be also adopted as a reference by various public authorities and trade associations involved in the management of this type of waste in order to prevent any new exposure to this carcinogen of the workers and population involved.

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