

CLASSIFYING AND MANAGING OF ASBESTOS CONTAINING WASTE: ITALIAN EXPERIENCE

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Abstract: Until the 1990s Italy was the first world producer of asbestos, although in 1992 it became one of the first countries to ban this substance internationally, introducing law 257/1992, which prohibits the extraction and production of asbestos and asbestos containing products. The aim of this job is to describe some international experiences in the field of asbestos containing waste (ACW) management, focusing on the acceptance of waste in landfills and deposits and/or pre-treatment centers. In particular, the methodology envisages the analysis of the European and Italian legislation, study of waste classification and management in the main European countries, data analysis of mapping of Italian landfills and quantification of ACW disposed there. The results show criticalities on the classification and management of ACW or non-compliance on a local scale with European and National regulations. Such inconsistencies are the result of an inadequate interpretation of the sector legislation, which is complex and articulated, while, in other cases, of intentional illegal activities. In this paper the main problems of the sector are will be highlighted, and it could be a useful tool for a better classification and management of the ACW. These indications could also be adopted as a reference by various public authorities and trade associations involved in the management of this type of waste. Finally, this study will report the specific tables with indications on the main ACW, on the relevant European waste classification codes to be applied and on the correct final destination in landfills where they should be disposed of; it is a useful manual for classifying worldwide ACPs (asbestos containing products) based on their physical state.

Keywords: landfills, management, storage, hazardous waste

Introduction

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

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 ser-pentine (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). [1-7]

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, no less than 3.000 different types of asbestos containing products (ACP's) were developed over the years, in a broad range of industrial sectors, also as a result of low costs.

Considering the age of these materials, removal and remediation activities are being carried out all over the world, resulting in the production of large quantities of asbestos containing waste (ACW) to be disposed of in suitable preliminary deposits and/or landfills. As the sector regulations, particularly in Italy, appear not very specific, to date there are problems in the classification and management of such waste. [7-8]

The main objective of this work is to start from the Italian experience to provide criteria for the correct classification of such waste and for their safe management in preliminary deposits and landfills, in order to increase the levels of prevention and protection of workers in the sector and better protect living environments. [9-10]

Methods

The authors conducted a research on national and European scale regarding ACW management, focusing on waste acceptance in landfills and storages and/or preliminary treatment centers. In particular, the European waste catalog (EWC) was analyzed to identify all the codes that can be used to correctly classify ACW. Significant critical issues were highlighted due to a small number of specific codes for this type of waste compared to over 3.000 different types of ACW. Comparisons were also made between several codes that can be used for the same refusal, specifying the correct classification methodology to be adopted in order to adopt more suitable personal and collective protection measures thereby limiting the exposure risks to this carcinogen.

We also proceeded to analyze the waste data collected from the various Italian landfills and preliminary storage centers to verify what are the main waste treated, to check the correctness of the codes applied with respect to the type of waste entering and the correspondence between the waste code and the landfill typology (hazardous or non-hazardous landfill) in which it was disposed of.

The results show critical issues on ACW classification and management or local-scale non-compliance with the European and national regulations. The aim of this research was to formulate reference procedures that can be applied by the various sector players and control bodies. Such classification and management procedures could also constitute a useful reference also for other European States in which the legislation is similar and therefore such transposition would be easy; however the authors believe these classification criteria can also be used on an international scale.

Results and Discussion

Classification of asbestos-containing wastes: normative references and European list of waste (LoW)

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/Ec, 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. [10-15]

Given that asbestos containing materials (ACMs), from the outset, have a 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. [15-20]

Initially, the European list of waste (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 No. 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 1).

Table 1: LoW codes of ACW [17, 26-27]

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

Longside the LoW codes shown in Table 1, 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 2). [20-22]

Table 2: Additional LoW codes for identifying landfilled ACW. [17, 26-27]

LoW code (hazardous waste)	LoW interpretation
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 necessary, first and foremost, by the fact that most of the ACW cannot be cataloged with the 8 codes previously mentioned, considering this they are disposed of in landfills with LoW codes referring to "hazardous substances". Although this is necessary, such waste should still be sent to specific landfills for starch or with cells dedicated to asbestos and not to landfills for general waste.

Following an in-depth research on ACW, accompanied by a market survey at landfills and storage centers, the authors identified the 100 tipology of ACW most frequently managed during the remediation and disposal activities. The correct classification reference was therefore attributed by the authors to each of these 100 types of ACW, also following a comparison with what is happening in France, England, Switzerland, Holland, Germany. In Appendix A, table 3 shows these data, with the aim of facilitating the workers that, on a daily or occasional basis, face with ACW classification.

The authors highlight that the right classification of waste leads to the adoption of suitable PPE and safer procedures for handling and managing waste. This appendix can be considered a useful reference on an international scale.

Management of asbestos containing wastes

ACW classified according to the indications shown above, may be either, Ministerial decree 13/3/2003, 3/8/2005, 27/9/2010 (Annex II) or sent to recovery facilities, pursuant to Ministerial decree 248/2004. [22-25]

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 4 below, subject to periodical checks required by the competent authorities at the treatment facility.

Table 4: Landfill acceptance criteria for treated non-hazardous ACW

Parameter	Values
Asbestos content (% in weight)	≤ 30
Apparent density (g/cm ³)	> 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 4, may be landfilled at non-hazardous waste landfills. [22-25]

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 ACM, 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.

Therefore, to avoid any cases of incorrect management and handling of the ACW, in Appendix B table 5 below gives the 100 types of ACW with the relevant LoW codes, as already shown above but also specifying the type of landfill authorised in which to give them. [22-25]

For proper ACW management is specified that all waste produced must be removed from the site possibly within the day or as soon as a first loading can be organized and in any case within the times indicated for temporary storage. Subsequently, it will be disposed of in preliminary deposits or in landfills for hazardous or non-hazardous waste, specifically dedicated to asbestos only, or in single area dedicated to asbestos. [25]

The use of the aforementioned table (appendix B, table 5) disseminates technical-scientific knowledge and consequently facilitates the work of sector managers. The latter, aware of the state of the art and of the responsibilities in the event of non-implementation, become competitors of a more responsible management of waste, thus hindering the illegal traffic of waste. [25]

Conclusions

In today's world there is a continuous demand for new strategies for the recovery of sites contaminated by dangerous substances, including asbestos, as an essential requirement to protect health in the workplace and living and to recover and/or reuse areas of interest.

The correct management of ACW, the well-being of workers in the workplace and the safety of living environments is therefore an objective to be concretely pursued by planning the related actions with a view to increasing and specific protection.

Only through the synergy of the various actors (landfill managers, sector operators and public and private control bodies), waste management and correct disposal of the same can be carried out safely and regularly, without generating new health or environmental risks.

This work is to start from the Italian experience to provide criteria for the correct classification of such waste and for their safe management in preliminary deposits and landfills, in order to increase the levels of prevention and protection of workers in the sector and better protect living environments. the work provides a useful technical and operational tool for operators in the sector on a national and international scale.

In the future and in from a circular economy perspective we therefore aim at a redevelopment oriented not to the production and disposal of ACW (which exclusively increases landfills with sometimes unsustainable costs and impacting environmental operations) but to the relaunch of an eco-sustainable

redevelopment policy in line with the dictates of the circular economy. A research therefore aimed at contributing more and more to workplace safety and environmental protection, contributing to the reduction of the health impact and the environmental footprint, priority objectives for the future; a research that contributes to social challenges and to create value, not only scientific and ethical, but also economic.

Declaration of Interest Statement

The authors declare that they have no conflict of interests.

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Appendix A

Chapter 3.1 - Classification of asbestos-containing wastes: normative references and european list of waste

Table 3 : LoW codes to be used for the classification of the main types of ACW [26,27]

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.
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	16 01 21*	Discarded equipment, containing

	transport containing asbestos (engines, batteries, gearboxes, etc.)		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
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.)	16.02.12*	Discarded equipment containing

	disposed of entirely		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

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	16.11.03*	Other linings and refractories

	asbestos (foundry cores and dies/moulds)		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
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.
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. ≥ 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

Appendix B

Chapter 3.2 - Management of asbestos-containing wastes

Table 5 - Landfills where to commit the main types of ACW [26,27]

No.	Description of wastes	LoW 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,	17.06.01*	Hazardous

	etc.) containing asbestos		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
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
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,	17.06.05*	Non-

	flat/corrugated slabs, baked clay tiles, etc.)		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
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