WASTE PNEUMATIC TYRES

This factsheet is part of a series of fact sheets to support the implementation of the environmentally sound management of hazardous wastes and other wastes, in accordance with the obligations of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

The fact sheet provides information on the environmentally sound management of waste pneumatic tyres (hereafter “waste tyres”), also sometimes referred to as “end-of-life tyres” or “scrap tyres”. It is primarily intended for use by waste tyre transporters, collectors, and operators of facilities that store, recycle or otherwise dispose of waste tyres.

This fact sheet should be read in conjunction with the **Revised Technical Guidelines for the Environmentally Sound Management of Used and Waste Pneumatic Tyres**, developed under the Basel Convention[1].


Source: https://www.aliapur.fr/fr

Classification

Waste tyres are considered non-hazardous waste and are classified under entry B3140 of Annex IX to the Basel Convention. Tyres cannot be identified under any category of waste streams in the first part of Annex I (categories Y1-Y18), but waste tyres contain some constituents listed in Annex I to the Convention, namely copper, zinc, cadmium and lead compounds, stearic acid and halobutyl (under entries Y22, Y23, Y26, Y31, Y34 and Y45, respectively)[1]. These are however usually not present to an extent causing waste tyres to exhibit an Annex III hazardous characteristic.

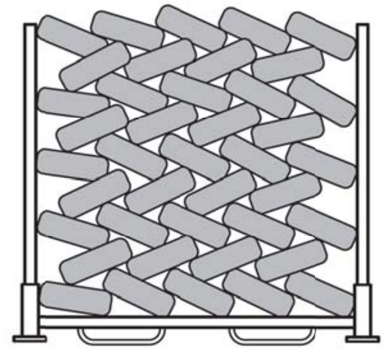
Figure 1. Typical laced storage [3,4]

Storage

Waste tyres can be stored temporarily in outdoor piles in an orderly manner. Tyre storage should preferably be on a level area of concrete or hard packed clay. Tyres should not be stored on wetlands, flood plains, ravines, canyons or steeply graded surfaces, nor should piles be located beneath power lines[2,3,4].

The storage capacity should allow the accumulation of a truckload of tyres for optimum hauling efficiency plus a limited additional scheduling buffer[5] and storage periods limited to the shortest time possible[1]. Moreover, depending on national law and practice, storage of waste tyres above certain threshold quantities may need to be licensed, permitted or authorised. Storage facilities should maintain daily operating records including the numbers of tyres received and removed from the site and its access should be controlled through the use of fences or other means.

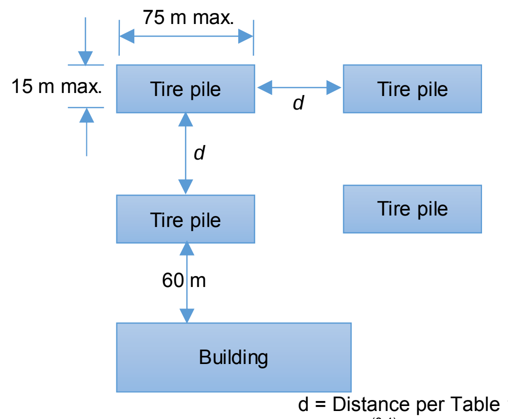

Figure 2. Pile geometry and spacing[3,4]

Maximum height of outdoor piles should be 6 m, maximum pile width should be 15 m, and maximum

Exposed face dimension (m)	Pile eight (m)					
	2.4	3.0	3.7	4.3	4.9	5.5
7.6	17.1	18.9	20.4	22.3	23.5	25
15.2	22.9	25.6	28.3	30.5	32.6	34.4
≥ 30	30.5	35.4	39	41.8	44.5	47.2

Table 1. Representative minimum exposure separation distances, in metres[1,2,3,4]

length should be 75 m[1,2,3,4], or as otherwise required by local fire codes. Minimum separation distances between adjacent piles should be observed in accordance with Table 1 and Figure 2. These are also are also recommended between tyre piles and buildings.

Suitable firebreaks of at least 18 m should be maintained to reduce the spread of a fire. Appropriate fire safety practices should be put in place and strictly adhered to, taking precautions to assure ignition sources are not present (e.g. prohibition of open burning, smoking and operation of cutting devices). A water system should be provided to supply a minimum of 3780 L/min for piles less than 1416 m^3, or 7560 L/min for larger piles for a duration of 6 hours[1,3,4]. Indoor storage of waste tyres may require an automatic sprinkler system, fire walls or column fireproofing depending upon the number of tyres to be stored. Facilities should be constructed to provide protection to bodies of water from runoff of pyrolytic oil resulting from a potential fire. Facilities should also have communication capabilities to immediately summon fire, police, or other emergency service personnel in the event of an emergency.

When stored improperly, waste tyres can harbour mosquitoes which may spread yellow fever, dengue fever or Zika virus, among other diseases. To prevent breeding and habitation of these and other vectors, conformance with a vector control plan which has been approved by the local vector control authority or health department should be instituted (e.g. chemical control of *Aedesaegypti* mosquitoes can include application of larvicides as part of a routine control strategy[6]), unless the piles are covered with impermeable barriers other than soil to prevent entry or accumulation of precipitation[7]. In addition, waste tyres received for storage should be drained of water within 24 hours of receipt.

Covering the waste tyres may also be required to reduce the potential for leachate generation and avoid possible contamination of soil, surface water and ground water[1]. To minimise the amount of water runoff from the tyre piles a suitable storm water collection system should be installed.

Collection and Transport

Waste tyres should be handled so as not to create a nuisance, a fire hazard, or a hazard to public health or safety.

Careful consideration should be given to travel distance, volume and frequency of tyre collection, and loading techniques to determine optimal equipment usage. Waste tyres can be collected on scheduled intervals or an as-needed basis. For improved transportation efficiency a trailer or other suitable container can be used to facilitate accumulation of tyres and collection can be requested when the trailer is full. Transportation of whole waste tyres depends heavily on the proper lacing of the tyres into the trailer; the more uniform the type of waste tyre the greater the volume of waste tyres that can be loaded into the trailer[5].

Once collected, waste tyres should be sorted so that those suitable for direct reuse and those suitable for reuse following retreading are separated from those that have to be otherwise disposed of[1]. It is noted that also used tyres (that are not waste) may undergo retreading.

Carriers should maintain records of waste tyres transported. Depending on national law and practice, the transportation of waste tyres above a certain threshold quantity may need to be licensed, permitted or otherwise authorised.

Transboundary Movement

Transboundary movements of waste tyres are not subject to the Basel Convention control procedure. To prevent the accidental introduction of invasive mosquitoes, which may be transported with waste tyres in various stages of development, some countries have adopted measures to restrict waste tyre imports (e.g. Chile, Argentina).

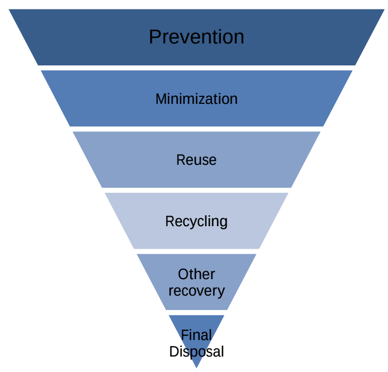

Figure 3. Waste management hierarchy

Environmentally Sound Waste Management

Waste tyres should only be disposed of in facilities that are properly licensed, permitted or authorised, and that practise environmentally sound management (ESM). Uncontrolled burning of waste tyres does not constitute ESM.

> Environmentally sound management (ESM) of hazardous wastes or other wastes, as defined in the Convention, means taking all practicable steps to ensure that hazardous wastes or other wastes are managed in a manner which will protect human health and the environment against the adverse effects which may result from such wastes.

Waste tyre management should be viewed in the context of the waste hierarchy, as shown in Figure 3. The waste hierarchy accords priority to waste prevention (e.g. appropriate tyre maintenance) and reuse (e.g. direct reuse of partly worn tyres), followed by recycling and then energy recovery in preference to final disposal (landfilling). To encourage higher rates of recycling and recovery a number of countries have enacted bans on the landfilling of waste tyres (excluding tyres used as engineering material).

Retreading is placed higher on the waste hierarchy than recycling and other recovery operations because it extends the useful life of the tyre(1). Retreading is a preferred option provided that the casings are of good quality and meet applicable safety standards.

Recycling generally involves cutting, shredding, chipping and grinding—ambient and cryogenic size reduction are the most common technologies—to produce various categories of tyre materials, ranging from large cuts greater than 300 mm, which include all the steel and textile components of the original casings, down to fine rubber powders (below 500 µm), which can be virtually free of those components(8, 16). These tyre materials can be used directly or further processed to modify one or more characteristics by means of treatments such as rubber reclaim and de-vulcanisation. Even though general application practice suggests that there is a low likelihood of leaching from unbound tyre-derived materials, where shredded or crumbed materials are to be applied in the form of loose fill in close proximity to aquatic receptors (including rivers, streams, lakes, ponds and groundwater), the following good practice should be adhered to: materials should not be applied in a way that may potentially cause environmental pollution (e.g. do not spread directly next to watercourses); where practical, all loose tyre-derived materials should be contained by appropriate barrier methods (e.g. lining, kerbing); materials should not be used in areas with very high pH (e.g. pH 8 or above) or very low pH (e.g. pH 5 or below) as there is greater potential for metal/organic mobilisation; materials should not be used for high load bearing applications as their ability to leach chemicals increases; records should be maintained detailing quantities used, application rates, location and date of spreading(9,10). Tyre recycling does not include energy recovery or reprocessing into materials for use as fuels or in backfilling operations(1).

Whole or partially size-reduced tyre-derived rubber materials can be used as an alternative fuel source in energy intensive industries. In addition, when whole tyres are co-processed in cement kilns, the steel belting becomes a component of the clinker, replacing some or all of the iron required by the manufacturing process(11). With the exception of zinc emissions, potential emissions from tyre derived fuel are not expected to be very much different from other conventional fossil fuels(12). However, this needs to be considered on a case by case basis as it is dependent on good operating practice as well as the particular characteristics of the tyres used and the kiln(1).

Piles of tyre-derived rubber materials may be at risk from fire and spontaneous heating(9,13). Accepted practices for mitigating this risk include: minimising pile size; controlling moisture levels; managing stock to prevent piles being left for long periods; monitoring sub-surface temperature; turning piles at risk of spontaneous heating; minimising external heating (e.g. shading from direct sunshine); and controlling ventilation by enclosure if possible(9).

Extended Producer Responsibility

There are a number of countries that have implemented extended producer responsibility (EPR) schemes covering waste tyres. Under EPR, producers take responsibility for the management of waste tyres, for example by creating a Producer Responsibility Organisation (PRO) to achieve EPR goals. See the reference section for examples of existing EPR schemes(14).

All waste should be managed according to ESM practices, whether or not it falls under an EPR scheme.

Certification and Auditing Systems

Environmental management systems (EMS) can help organisations identify and manage their environmental impacts as well as compliance with environmental legislation. Collectors and recyclers can become certified (e.g. using ISO, EMAS or industry standards) by demonstrating to an accredited, independent third-party auditor that they meet specific standards to safely manage waste tyres. An organization can, however, achieve the same benefits from an EMS whether or not it pursues certification. Non-standardised systems can in principle be equally effective provided that they are properly designed and implemented.

General guidelines and recommendations exist to help small and medium-sized businesses develop EMS(15).

References

(1) Revised Technical Guidelines for the Environmentally Sound Management of Used and Waste Pneumatic Tyres, 2013. http://www.basel.int/Implementation/Publications/TechnicalGuidelines/tabid/2362/Default.aspx

(2) NFPA 1, Fire Code (Chapters 33 and 34), 2015 edition. http://www.nfpa.org/codes-and-standards/document-information-pages

(3) NFPA 230, Standard for the Fire Protection of Storage (Annex F), 2003 edition. http://www.nfpa.org/codes-and-standards/document-information-pages

(4) NFPA 231D, Standard for Storage of Rubber Tires, 1998 edition. http://www.nfpa.org/codes-and-standards/document-information-pages

(5) U.S. Environmental Protection Agency (2010) Scrap Tires: Handbook on Recycling Applications and Management for the U.S. and Mexico (EPA-530-R-10-010). http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100ACUU.TXT

(6) WHO (2006) Pesticides and their Application for the Control of Vectors and Pests of Public Health Importance. Sixth edition. http://apps.who.int/iris/handle/10665/69223

(7) California Integrated Waste Management Board (2002) Tire Pile Fires: Prevention, Response, Remediation. http://osfm.fire.ca.gov/codedevelopment/pdf/tirefire/TPFReportFinal.pdf

(8) PAS 107:2012 Specification for the Manufacture and Storage of Size Reduced Tyre Materials. http://tyrerecovery.org.uk/specification/pas-107/

(9) Quality Protocol: Tyre-derived rubber materials, End of waste criteria for the production and use of tyre-derived rubber materials https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/321419/LIT_8273.pdf

(10) ASTM 6270/1998 use of scrap tyres in civil engineering applications

(11) Technical Guidelines on the Environmentally Sound Co-Processing of Hazardous Wastes in Cement Kilns. http://www.basel.int/Implementation/Publications/TechnicalGuidelines/tabid/2362/Default.aspx

(12) U.S. Environmental Protection Agency (1997) Air Emissions from Scrap Tire Combustion (EPA-600/R-97-115). http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=30003KWK.TXT

(13) The Waste & Resources Action Programme (2006) UK Waste Tyre Management Best Practice: Handling of Post-Consumer Tyres – Collection & Storage. http://www.wrap.org.uk/sites/files/wrap/8%20-%20UK%20Waste%20Tyre%20Management%20-%20May%202006.pdf

(14) For further information on extended producer responsibility see:
- Recytyre http://www.recytyre.be/
- Aliapur https://www.aliapur.fr/
- Ecopneus http://www.ecopneus.it/
- Signus http://www.signus.es/
- Tire Stewardship BC http://www.tsbc.ca/
- OECD http://www.oecd.org/env/tools-evaluation/extendedproducerresponsibility.htm

(15) For further information on environmental management systems see:
- European Environment Agency (1998) Environmental Management Tools for SMEs: A Handbook. http://www.eea.europa.eu/publications/GH-14-98-065-EN-C
- U.S. Environmental Protection Agency Environmental Management Systems (EMS) https://www.epa.gov/ems
- Bureau of International Recycling (2006) Tools for Environmentally Sound Management for an ISO compliant Environmental Management System that includes OECD Core Performance Elements for the World's Recycling Industries http://www.bir.org/publications/esm-tools/

(16) For an example of national experiences in environmentally sound management of tyres, see Resolution 523/2013 on sustainable tyre management (Argentina) http://www.ambiente.gob.ar/?idarticulo=12730