

## A Novel Application of Waste Polythene in Concrete

Ankit Kumar & Paratibha Aggrawal *Iranian Journal of Science and Technology, Transactions of Civil Engineering* (2023)54 Accesses | [Metrics](#)

### Abstract

This study focuses on the effective uses of waste polyethylene bags in concrete. In the present era, polythene has become a part of our routine lives that lead to the growth of plastic waste, which is either combined with municipal waste or disposed of on land. On the recommendation of the Ministry of Environment, Forest and Climate Change and Plastic Waste Management Amendment Rules, 2021, regulation of plastics waste, particularly the manufacture, import, stocking, distribution, sale, and use of recycled plastics carry bags and containers, which have low utility and high littering potential is banned in India, from July 1, 2022. Concrete has the lion's share in most used construction materials in the world. To overcome the safe disposal of residual plastic in the environment, it is necessary to experiment with the use of non-recyclable polythene waste. This research presents a new concept of adding polythene waste to concrete mix with the comparative study of workability, compressive, split tensile and flexural strength of concrete made using polythene bags in fibrous form with different doses. In this study polythene bags in the fibrous form are added 0.4%, 0.5%, 0.6% 0.7%, 0.8%, 0.9%, and 1.0% by weight of cement for making M20 concrete. A total of 216 concrete specimens were prepared including 72 cubes, 72 cylinders, and 72 beams throughout the study for analyzing the workability, compressive, split tensile and flexural strengths of polythene waste mix concrete. An increment of 24.76%, 15.5%, and 27.6% was observed in compressive strength, split tensile strength, and flexural strength was observed at 28 d.

This is a preview of subscription content, [access via your institution](#).

#### Access options

<p>Buy article PDF</p> <p><b>39,95 €</b></p> <p>Price includes VAT (India)</p> <p>Instant access to the full article PDF.</p>	<p><a href="#">Rent this article via DeepDyve.</a></p> <p><a href="#">Learn more about Institutional subscriptions</a></p>
---	--

### References

- Bhogayata AC, Arora NK (2017) Fresh and strength properties of concrete reinforced with metalized plastic waste fibers. *Constr Build Mater* 146:455–463
- Bhogayata A, Shah KD, Vyas BA, Arora NK (2012a) Performance of concrete by using non-recyclable plastic wastes as concrete constituent. *Int J Eng Res Technol* 1(4):1–3
- Bhogayata A, Shah KD, Vyas BA, Arora NK (2012b) Feasibility of waste metalized polythene used as concrete constituent. *Int J Eng Adv Technol* 1(5):204–207
- Chaudhary M, Srivastava V, Agarwal V (2014) Effect of waste low density polyethylene on mechanical properties of concrete. *J Acad Ind Res* 3(3):123–126
- Ismail ZZ, Al-Hashmi EA (2008) Use of waste plastic in concrete mixture as aggregate replacement. *Waste Manag* 28(11):2041–2047
- Kandasamy R, Murugesan R (2011) Fibre reinforced concrete using domestic waste plastics as fibres. *ARPN J Eng Appl Sci* 6(3):75–82
- Krishna CBR, Jagadeesh P (2017) Influence of admixtures on plastic wastes in an eco-friendly concrete a review. *Int J Civ Eng Technol* 8:388–397
- Kumar A, Srivastava V, Kumar R (2014) Effect of waste polythene on compressive strength of concrete. *J Acad Ind Res (JAIR)* 3(3):152
- Kumar Gupta B, Kapoor K, Nazeer M, Kaur M (2021) Waste plastic aggregates as a replacement of natural aggregates. In: Reddy KR, Agnihotri AK, Yukselen-Aksoy Y, Dubey BK, Bansal A (eds) *Sustainable environment and infrastructure*. Springer, Cham, pp 249–258

Mustafa MAT, Hanafi I, Mahmoud R, Tayeh BA (2019) Effect of partial replacement of sand by plastic waste on impact resistance of concrete: experiment and simulation. In: Structures, Vol. 20. Elsevier, pp. 519–526

Pacheco-Torgal F, Ding Y, Jalali S (2012) Properties and durability of concrete containing polymeric wastes (tyre rubber and polyethylene terephthalate bottles): an overview. Constr Build Mater 30:714–724

Pooja P, Vaitla M, Sravan G, Reddy MP, Bhagyawati M (2019) Study on behavior of concrete with partial replacement of fine aggregate with waste plastics. Mater Today Proc 8:182–187

Rai B, Rushad ST, Kr B, Duggal SK (2012) Study of waste plastic mix concrete with plasticizer. Int Sch Res Not. <https://doi.org/10.5402/2012/469272>

Saini RO, Daniel NN, Taiwo EE, Odetoyan AO (2018) Evaluation of split tensile strength of shredded polythene bags in concrete. Int J Civ Eng Technol (IJCIET) 9(10):1041–1047

Srivastava V, Chaudhary M, Kumar A (2015) Waste polythene in concrete—an attempt towards its disposal. Int J Eng Res Technol (IJERT) ISSN 3:2278–3181

Thornecroft J, Orr J, Savoikar P, Ball RJ (2018) Performance of structural concrete with recycled plastic waste as a partial replacement for sand. Constr Build Mater 161:63–69

Usman M, Javaid A, Panchal S (2015) Feasibility of waste polythene bags in concrete. Int J Eng Trends Technol 23(6):317–319

Záleská M, Pavlíková M, Pokorný J, Jankovský O, Pavlík Z, Černý R (2018) Structural, mechanical and hygrothermal properties of lightweight concrete based on the application of waste plastics. Constr Build Mater 180:1–11

#### Author information

##### Authors and Affiliations

**Department of Civil Engineering, National Institute of Technology, Kurukshetra, Haryana, 136119, India**

Ankit Kumar & Paratibha Aggrawal

##### Corresponding author

Correspondence to [Paratibha Aggrawal](#).

#### Ethics declarations

##### Conflict of interest

No conflict.

#### Rights and permissions

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

#### [Reprints and Permissions](#)

#### About this article

##### Cite this article

Kumar, A., Aggrawal, P. A Novel Application of Waste Polythene in Concrete. *Iran J Sci Technol Trans Civ Eng* (2023). <https://doi.org/10.1007/s40996-022-01032-3>

Received	Accepted	Published
29 August 2022	28 December 2022	06 January 2023

##### DOI

<https://doi.org/10.1007/s40996-022-01032-3>

#### Keywords

**Waste polythene    Workability    Compressive    Split tensile    Flexural strength**

Not logged in - 106.211.61.192

National Institute of Technology Kurukshetra (2000418671) - INDEST AICTE Consortium Indian Institute of Technology (3000185589) - INDEST AICTE Consortium C/o Indian Institute of Technology (3000188743) - Information and Library Network (INFLIBNET) Centre (3994475188)

**SPRINGER NATURE**

© 2023 Springer Nature Switzerland AG. Part of [Springer Nature](#).