June 1984

CRI TECHNOLOGY DIGEST

CEMENT RESEARCH INSTITUTE OF INDIA

APPROPRIATE SYSTEM FOR BULK PACKAGING OF CEMENT IN INDIA

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INTRODUCTION

In India, cement is by and large packed in jute bags and transported by rail, road and other modes of transportation. Jute being the most abundantly and economically available packing material in the country, the cement bags are conventionally made of jute, conforming to relevant Indian Standard specification. Movement and distribution of cement in bulk in India is yet almost negligible, though nearly in all the developed countries, major share of cement produced is packed in bulk. However, along with the advancements in the technology of cement manufacture and utilisation, the systems of cement packaging are also undergoing modernisation and bulk packaging is one of them. Developing countries are also gradually shifting to this method due to its obvious advantages, such as the consumers receiving the proper quality and quantity of cement; negligible loss of cement in transit and handling; minimum possibility of pilferage; exact scheduling of deliveries; saving in time; economic benefits to both manufacturers and consumers, etc.

Currently in India, cement is transported mainly by rail and road. According to the present assessment, the total cement production by the end of Seventh Five-Year Plan would increase to about 50 million tonnes per annum from the present level of about 27 million tonnes. As a result the quantity of cement to be moved both by rail and road will increase substantially. In such a situation bulk packaging of cement will offer special advantages.

The bulk packaging of cement, in brief, comprises filling of cement from the storage silos at the cement plant into suitably designed bulk containers or wagons, moving it by rail, road or waterways and then unloading either directly into the silos in readymix concrete (RMC) plants, precast concrete plants, or at the site of large construction

projects like dams, bridges, etc; or at the Intermediate Distribution Points (IDP) whence cement is further redistributed packed either in bags, drums, small bulk containers or by pneumatic means.

The system consists of three major sub-systems, namely, loading, transportation and unloading. Although the system arrangement remains in general similar to that obtaining elsewhere in the world, the system design of each component needs special attention. Since the bulk packaging of cement is yet to come in a big way in India, the choice of appropriate system has to depend upon its conformity to the existing status of technology, operational practices and facilities in the cement plants as well as geographical, social and economic considerations governing distribution of cement. Accordingly, an R & D project was undertaken in CRI to evolve a system of bulk packaging transportation suitable to Indian conditions, and to study its economic feasibility. This Technology Digest describes the appropriate system of bulk packaging of cement thus evolved. The system described is amenable to both road and rail transportation.

APPROPRIATE SYSTEM

Some of the factors which guided the system design are :

1) Different plant layouts at old and new plants.
2) Desirability of making provision for a suitable mix of bulk and bag packaging.
3) Low capital intensiveness of the system design.
4) Longer distances of transportation of cement compared to those in other countries.
5) System for catering to the needs of relatively smaller consumers also, scattered in rural and semi-urban areas.
6) Versatility of the bulk container design so that it could be used for transportation of material other than cement, on its return journey or otherwise.

Keeping these factors in view an appropriate design of the entire system has been evolved, the salient features of which are given below. The facilities required for bulk packaging including that for loading at cement plant, bulk container and unloading are available or could be fabricated indigenously.

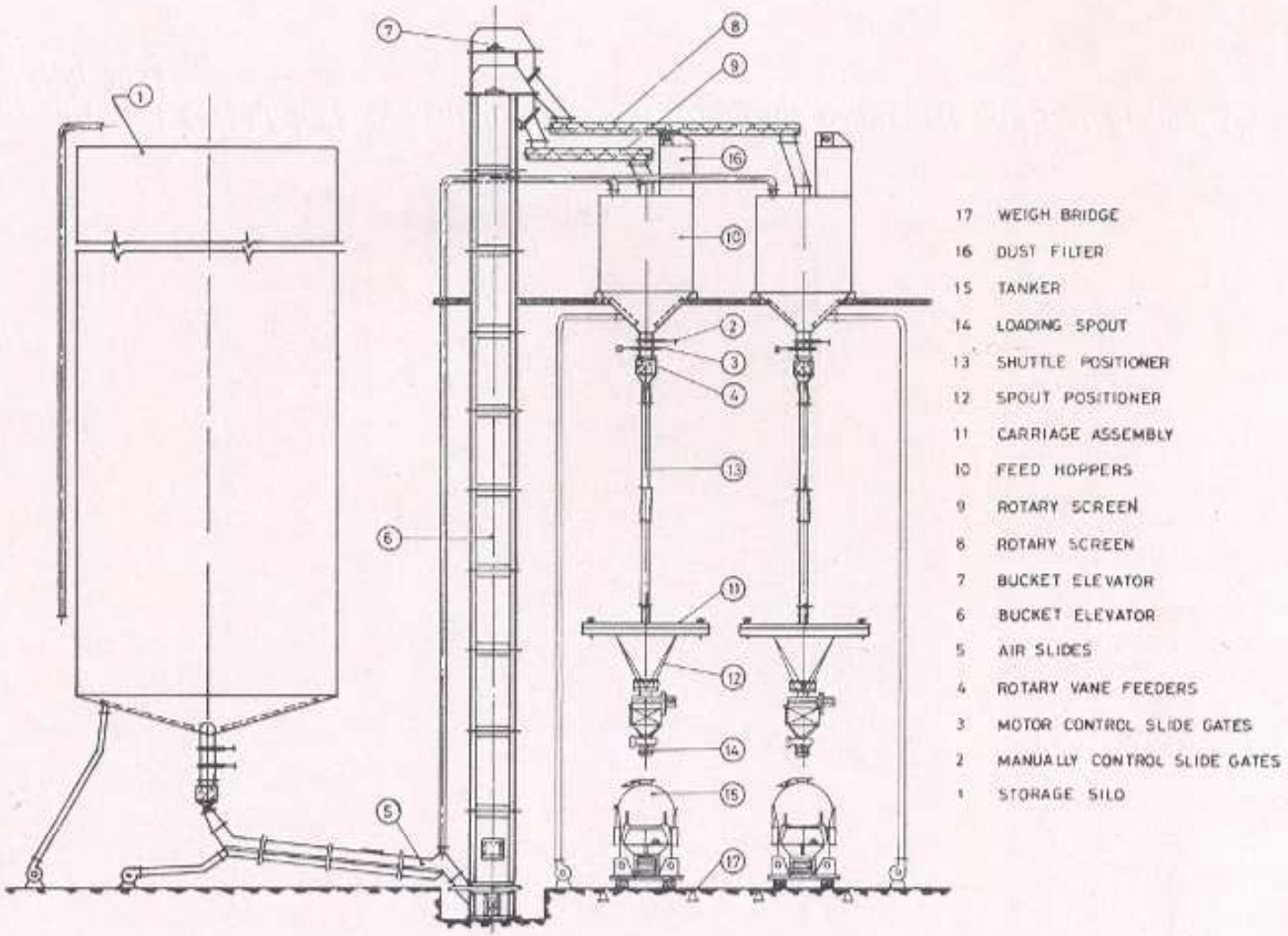

Fig 1 A typical bulk loading system for cement

Loading

The loading of cement into bulk container consists of equipment for extraction of cement from the silo, loading into bulk container and for weighing. Two types of system arrangements are in vogue, that is, loading the container from under the silo, and from the side of the silo. The loading spout for cement can be stationary or mobile. A typical system arrangement for loading from the side of silo is given in Fig 1.

Transportation

CRI has developed a design for versatile cement container. The container having suitable number of compartments can be vertically mounted on a chasis or rolling stock. The cement is extracted by air assisted gravity. The container is designed such that it can be used for transporting any other solid granular material on its return journey or otherwise (*see* Fig 2). In case of road transportation, the container capacity of 21 tonnes has been found economical based on the available chasis capacity in the country; for rail transportation the container capacity could be up to 53 tonnes.

Unloading

The cement received through bulk movement by rail or road can be unloaded either at the consuming site or in storage silo at an Intermediate Distribution Point (IDP) from where it is further redistributed to consuming sites, which could be an asbestos cement plant, prefabrication unit, ready mix concrete plant, or a large construction site.

Economic Considerations

The investment cost for bulk packaging system in the plant has been found to be favourable in case of higher capacities. The operating cost for such a system is also lower for various capacities when compared with the bag packaging system.

It is more economical to transport bulk cement directly to the consumers. The cost of transportation of cement in bulk by road has been found to be expedient for different distances and at 350 km it equals the present packing charge (January-March 1984) and freight pool charges (Fig 3). The economics are likely to be more favourable if bulk cement is transported by rail.

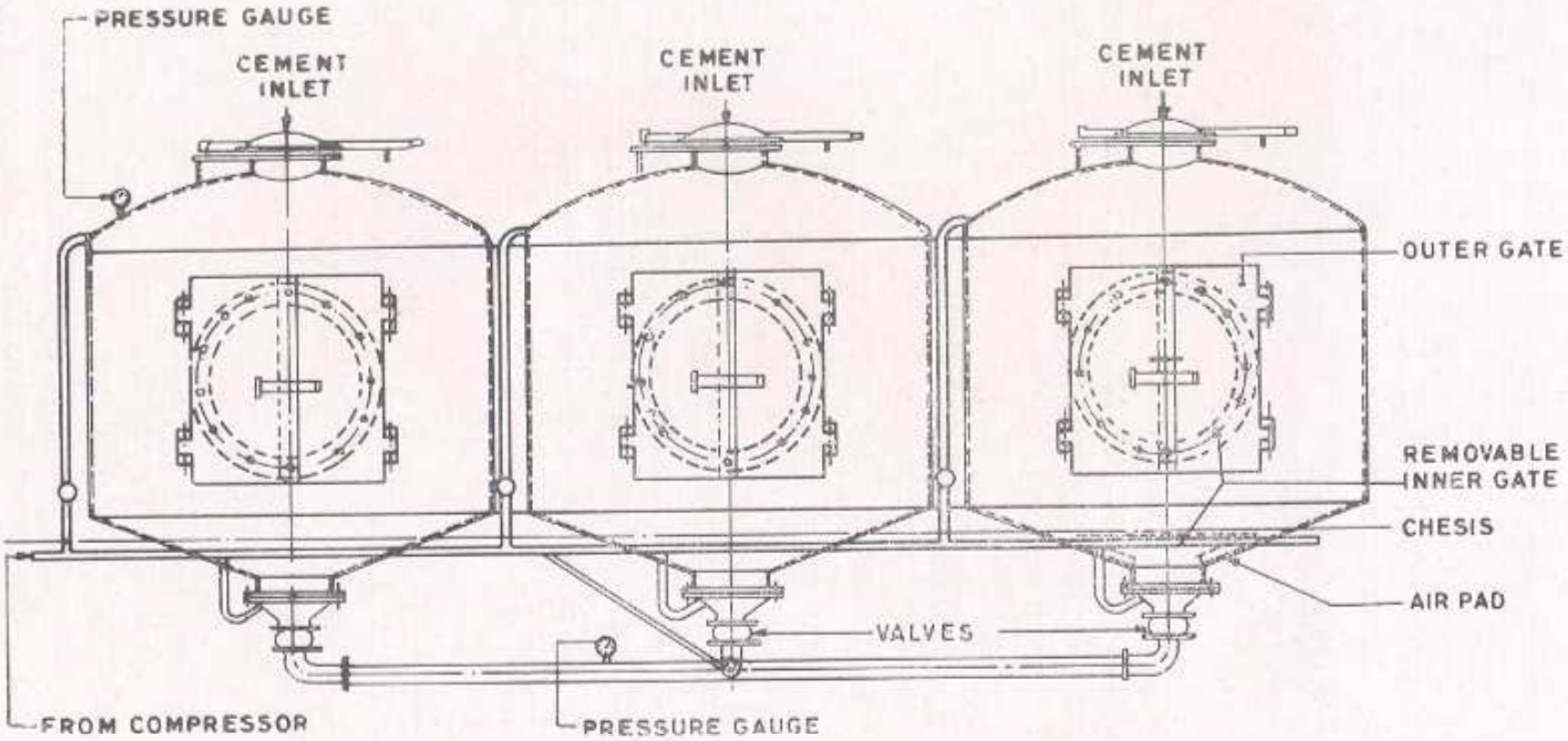

Fig 2 CRI container for bulk cement

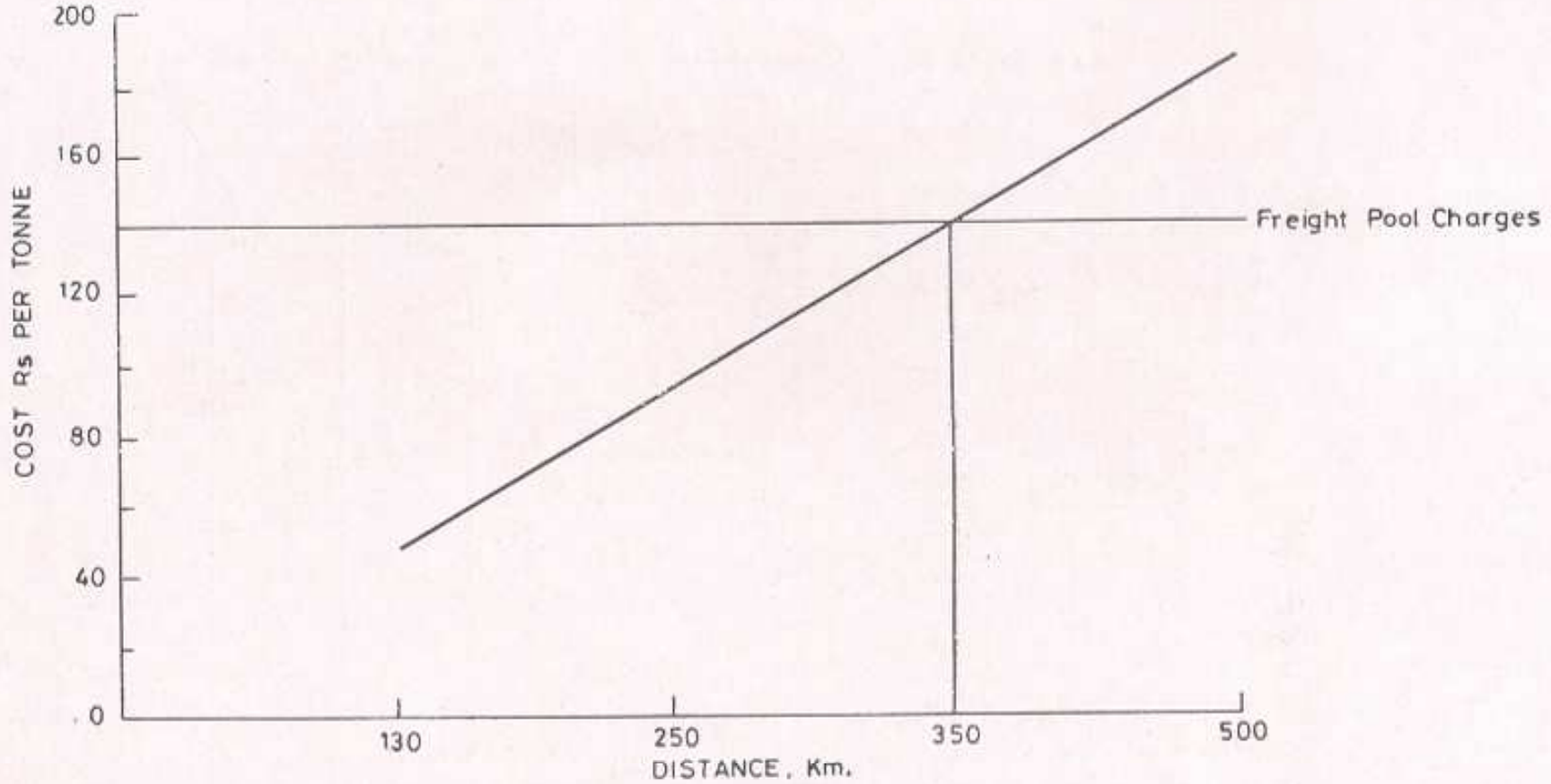

Fig 3 Transportation cost of bulk cement by road directly to the consumers and freight pool Charges as on 31 Marh 1984

CRI Expertise

CRI's expertise for system design of bulk packaging of cement, its economic evaluation and execution and CRI's assistance are available to such organisations as may like to incorporate bulk packaging and distribution system in their organisation.

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Published by Shri S K Khanna on behalf of Cement Research Institute of India, M 10 South Extension II, New Delhi 110 049 and Printed at Indraprastha Press (CBT), Nehru House, New Delhi 110 002
Regd No. R N 40434/82