**Action Research Project Report**

**on**

**IS 4995 (Part 1)**

**CRITERIA FOR DESIGN OF REINFORCED CONCRETE BINS FOR THE STORAGE OF GRANULAR AND POWDERY MATERIALS**

**PART 1 GENERAL REQUIREMENTS AND ASSESSMENT OF BIN LOADS**

*Technical Committee*: Structural Engineering and Structural Sections

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1. **INTRODUCTION**
   1. Bins (silos and bunkers) for storing different materials are one among the important structures coming up in any industrial or organized storage complex. The necessity to store and contain materials like coke, coal, ores in the various steel plants and other industrial establishments cannot be overemphasized. In cement factories as well as in construction projects, cement is stored in "large silos.
   2. This standard, ‘IS 4995 (Part 1) :1974’ deals with the general requirements and assessment of bin loads for granular and powdery materials. This standard covers circular, polygonal and interstice bins
2. **NEED AND OBJECTIVE**
   1. Developments have taken place since the publication of the last version of this standard, the main improvements in this field being those incorporated in the EN, BS EN, ACI and AS Standards published subsequently.
   2. The objective of this action research is to study the developments incorporated in the latest international/other major standards and assimilate the same in the Indian Standard is so far as these are applicable to Indian context.
3. **ACTION RESEARCH METHODOLOGY AND RESEARCH**

**3.1** In the Action Research Project on this Indian standard, the following international standards have been studied in depth:

1. **EN 10248-1:1996** Hot rolled sheet piling of non alloy steels – Part 1 Technical delivery conditions
2. **BS EN 1991-4:2006** Eurocode 1 – Actions on structures – Part 4: Silos and Tanks
3. **ACI 313-97** Standard practice for design and construction of concrete silos and stacking tubes for storing granular materials
4. **ANSI/ASAE EP433 DEC1988 (R2011)** Loads exerted by free-flowing grain on bins
5. **AS 3774-1996** Loads on bulk solids containers

**3.2** After the detail study of the national and international standards it was observed that due to the recent technological developments in the area of steel sheet piling sections, the following modifications need to be reflected in current revision of Indian standard:

1. Terminology section are to be updated.
2. Bin Loads due to Granular Materials are to be updated.
3. All reference standards either updated or withdrawn, these need to be updated.

**3.3** After due examination, it is found that the above modifications would help manufacturers and users understand the new reinforced concrete bins better and to use the reinforced concrete bins with ease with which granular and powdery materials for can be store in better way.

1. **ACTION RESEARCH OUTPUT**

**4.1** In pursuance to the **3.3** above, the modifications as enlisted in **3.2** above have been studied further as given in EN, BS EN, ACI and AS standards. Finally, a draft Indian Standards Revision of IS 4995 (Part 1) has been prepared. The comprehensively revised standard so prepared as a rem of Action Research is submitted herewith.