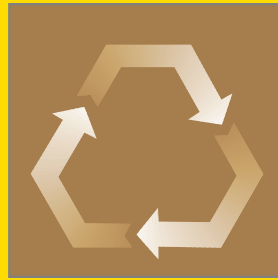


H*healthier building* with gypsum products



No. 4 REDUCTION OF WASTE

This publication looks at the problem of wastage of materials in the construction industry and presents an analysis of the causes of waste and approaches to dealing with them. Particular emphasis is given to the subject in relation to design and installation of gypsum products. The issue of recycling waste is also discussed.

GPDA

Gypsum Products Development Association

*This publication can form part of a structured programme of CPD
(Continuing Professional Development)*

R

eduction of waste

It is generally acknowledged that there is considerable scope within the construction industry to reduce the amount of material wasted on site. The Building Research Establishment estimates that wastage could be as much as 100 per cent more than usually allowed for in estimating and accounting conventions. Given the size of the industry, this is reckoned to be equivalent to enough raw materials to build a small town every year!

The advantages of reducing waste are greater efficiency and therefore profitability through:-

- lower costs of raw materials
- reduced handling costs
- avoidance of reordering delays
- reduced disposal costs
- tidier sites etc.

Achieving this reduction in waste will make a significant contribution to achieving the 30 per cent productivity improvement target of the Latham Report championed by the Construction Industry Board.

Gypsum Products

Some materials are more susceptible to wastage than others. A Building Research Establishment study published in 1981 gives a 5 per cent allowance for normal wastage of drylining materials. Some sites studied managed to stay within this, however, drylining products had the highest average wastage of all the materials studied (concrete, masonry, timber, pipes). Nearly 20 per cent of deliveries to site were wasted in some cases. There is, therefore, a considerable need to be aware of the causes of wastage and to take action to keep waste to a minimum.



Wastage on some sites can be considerable

The Healthier Building Campaign

The series *Healthier Building with Gypsum Products* addresses current concerns about the impact on health, the environment and efficiency of the way we build.

The series covers five topics:

1. Health and Safety - The CDM Regulations & Safety, Health and Welfare At Work (Construction) Regulations (July 1997)
2. Sustainable Development (July 1997)
3. The Building Regulations (July 1997)
4. Reduction of Waste (March 1998)
5. Efficient Building (March 1998)

The series is aimed at members of the design team and contractors. It is not intended to provide detailed design guidance, which is readily available in manufacturer's product literature, but rather to raise awareness of the issues involved.

The publications can form part of a structured programme of CPD (Continuing Professional Development).

The Problem

The analysis of the causes of waste and the controls needed to reduce this are based on two Building Research Establishment Digests, 'Waste of Building Materials' and 'Materials Control to Avoid Waste'. (See references). Waste is divided into three categories:-

- **Direct waste:** due to loss, damage etc.
- **Indirect waste:** where materials are used for purposes for which they were not intended or where they are used in excess quantities.
- **Repetition waste:** where materials have to be replaced due to damage after installation.

Direct Waste

Site storage and handling waste -

Damage to plaster and wallboard products can result from exposure to moisture and water. Wastage also occurs due to physical damage - from incorrect storage, impact from dropping, collision, accidental damage from other site activities (especially movement of plant). Metal framing components can also suffer physical damage and corrosion if stored incorrectly.

Excess materials at the workplace -

Wastage is caused by over mixing plaster which is then left to harden at the end of the day, and over provision of drywall products which are not returned to storage.

Fixing waste - Wallboard products can be damaged by poor handling and fixing at the workplace.

Cutting waste - This can also be termed 'design waste', as often in the case of gypsum wallboard extra cutting waste can occur due to the lack of thought by the designer on the use of standard dimensions.

Criminal waste - Theft and pilfering from the site and vandalism.

Waste due to the wrong specification / use - Wrongly specified wallboard systems which do not meet the required performance can result in work being redone during construction or as a result of later defects. This situation can also arise if the contractor uses a lower performance system due to unclear project documentation or incorrect substitution. (See also indirect waste).

Learning waste - New systems and fixing methods can lead to wastage without the proper training, trials.

Storage waste - Storage of bagged plaster products beyond their shelf life.

Indirect Waste

An example of indirect waste in relation to gypsum products would be where a lower specification would suffice. For example, if there had been an excess of acoustic boards ordered for one part of a building which were then used in place of standard boards in another location, this would be considered as indirect waste.

Repetition Waste

Probably the largest risk of wastage results from work being condemned because it has been damaged after installation. The constant pressure for faster construction can mean that the work is often installed before there is proper protection from the elements. Any significant wetting of finished wallboard can result in the loss of structural integrity.

Poor sequencing and co-ordination of trades can lead to following trades removing or damaging wallboard because there is still work to be completed behind the finished surface.

Tackling the problem

Waste is often considered only a site management problem; this is not so. All those involved in a building project can contribute to waste: designers, quantity surveyors, material suppliers, estimators and site operatives all have a part to play in reducing waste.

Design and specification

GPDA members produce gypsum wallboard and system framing materials in a large range of sizes to suit the needs of most projects. For special projects and where the volume is large enough manufacturers may also produce bespoke sizes to special order to help speed construction and reduce on-site wastage. Designers should, where possible, take account of standard sizes to avoid unnecessary cutting waste.

To avoid waste caused by incorrect specification or use, the project documentation should state clearly the materials and wallboard systems to be used and make it clear if this varies in different parts of the building. It should also provide acceptable alternatives, where relevant. The GPDA Website provides guidance on interchangeability between member companies' products.

In order to create interesting features using gypsum products, such as curved bulkheads, always use the manufacturers' recommended systems, where available. It is possible to create curved features using standard basic products, but the experimentation and testing required may lead to wastage which can be avoided.

If wallboard is to be installed prior to full weather protection of the workplace, a suitable moisture resistant board may be used depending on site conditions.

Tendering

The quantity surveyor should ensure that the tender documentation is clear and consistent about the materials, systems and standards of work required. Tender documentation could also indicate the likely levels of waste to arise. If these exceed the normal allowances for gypsum products, it may be necessary to review the design and specification.

Auditing of waste levels

The Building Research Establishment recommends that building firms have established procedures for estimating and recording levels of waste. For these to work, there needs to be a proper allocation of responsibility for carrying out an audit.

Key measures in the audit trail are the normal allowances for the product, the likely levels of waste indicated in the bill of quantities, the quantities delivered to site, stock and measured completed work - all relating to the same point in time.



Avoiding direct waste by correct handling and storage

Project Management

Managing Subcontractors

Often, the main contractor is responsible for providing materials for subcontractors and disposing of their waste - an approach that gives little incentive for subcontractors to follow good materials management practice. This need not be the case. Contract documents can be used to encourage better materials management on site, as follows:

- contracts can make the subcontractor responsible for both the purchase of their materials and the disposal of their wastes. This provides a dual incentive to keep wastage of their materials to a minimum.
- contracts can set a limit on the amount of waste that a subcontractor is allowed to generate, and include penalty clauses for losses above the limit and bonus clauses for less waste.

Working with GPDA Members

Contractors can hold discussions with their major suppliers to agree on how an improved service can be provided without entailing excessive costs to either party. Their discussions should include consideration of the key areas of wastage on the contractor's sites to examine whether the supplier can address them at the production or packaging stage. The supplier may consider altering the following:

- form of packaging used
- unit quantity in which the material or component can be delivered
- quality of the material or component
- delivery arrangements.

These discussions can lead to formal partnering arrangements being drawn up between the two parties.

Reproduced from *Managing Materials and Components on Site*, CIRIA.

On site

The site manager should plan in advance suitable storage space to ensure security, safety and protection of plaster products, gypsum wallboard and accessories. This should be dry and protected from damp and extreme temperatures. Where possible, this should avoid the need to move materials to subsequent storage positions as moving materials increases the risk of damage.

There should be a strategy in place which makes the best use of a central storage area with procedures for moving materials to the workplace.

The site manager should ensure that different trades are correctly sequenced and co-ordinated to ensure that materials are installed in the correct order. Particular attention should be given to the installation of pipes, cables and conduits within drywall construction.

Delivery

The buyer / purchaser should specify precisely the quality of materials, the timing and method of delivery.

It is important to plan the optimum delivery loads according to size of the project, the available storage space and the rate at which the materials will be used. Full loads of materials can be obtained directly from the manufacturer but there will often be cost penalties for part loads; in this case the specialist distributor or builders merchant may be a more appropriate source. The specification of special off-loading vehicles can help minimise damage.

Particular attention should be given to confined sites where storage space is at a premium. Phased delivery, "just in time" delivery and delivery directly to the workplace may be the best solutions in such situations.



Purpose designed trolley for moving wallboard. Photo credit W A Browne Ltd

There should be adequate procedures in place for reception of materials including checking type and quantity, inspection for quality or damage and documentation for use in audit procedures.

Storage

Gypsum wallboards with decorative surfaces are supplied in pairs with the decorative surfaces on the inside. The cut ends of the board are bound together, but some manufacturers are now omitting the paper binding to reduce packaging waste. It is important that the decorative surfaces are kept facing each other for protection until the board is ready for use.

Gypsum wallboard should be stored on a dry level surface, stacked flat. Stack only to the height recommended by the manufacturer. Take care not to exceed the specified floor loadings where large quantities are stored.

Boards which are stored for handling later by forklift must be supported at regular intervals and at their ends so that they are not damaged by deflection.

The site manager should also lay down procedures for the on-site issue of materials, reception by operatives and recovery of unused materials (including, for example, any storage and protection materials).

Handling

Careful handling of materials can also reduce risk of wastage of materials on site. This will

begin with provision of facilities for unloading the materials on delivery.

Movement of materials to storage or the workplace should also be planned to minimise distances and the number of times they are handled. Wallboard should be carried on edge to avoid damage. Several mechanical methods for moving wallboard are available.

Installation

The site manager should ensure that areas are weathertight and dry before installation begins. Other wet trades such as screeding should be completed and dried out before work begins.

The workplace should be properly planned to avoid wastage from poor handling, fixing or spillage.

Operatives should not use materials for purposes other than intended: as well as waste - both direct and indirect - this could also result in poor performance, for example, impaired sound or thermal performance.

Although wallboard systems are designed for simplicity, they require knowledge and skill to be applied efficiently. Often incorrect handling, sequencing, fixing and finishing will result in work being condemned both during and after completion of the project. Operatives and subcontracting companies should be appropriately qualified to undertake the work.

Operatives should take care to ensure that correct amounts of plaster are mixed to avoid excess materials at the workplace.

Operatives should keep the workplace tidy.

Finally, there must be an adequate control system so that when avoidable waste is identified, remedial action can be taken.

Recycling

The recycling of **manufacturing waste** is dealt with in part 2 of this series - *Sustainable Development*.

Recycling of **site waste** of gypsum products is an issue which is currently at the idea stage only. It is not the practice of gypsum producers to collect site waste for recycling. Following the correct procedures for reduction of waste should remove the need to do so as quantities should be small. Indeed, to encourage the recycling of site waste may lead to bad design and site practice and therefore make poor economic sense.

The re-use of **demolition waste** containing gypsum products is one of the fastest developing challenges facing the industry. In countries such as the USA, Canada and Germany where charges for disposal in landfill sites can be 10 times higher than the UK and the Republic of Ireland there is already an economic argument for recycling gypsum wallboard.

In these countries the recycling plants are able to purchase gypsum wallboard waste from demolition contractors at a price which makes the cost of separation from other waste products attractive.

The recycling process needs to remove paper, nails and other extraneous material from the waste before the material can be returned to the production process. Some difference in quality of the finished product can result.

There is every likelihood that gypsum wallboard specified now will be recycled when it reaches the end of its useful life as the pressure on landfill sites increases and the developments in recycling techniques are adopted.

Recycling wallboard from the manufacturing process: inset shows the pulped waste.



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The Gypsum Products Development Association (GPDA) comprises a permanent Secretariat and member companies, in the UK and the Republic of Ireland, all engaged in the manufacture of gypsum products. The primary function of the GPDA is to develop and encourage the understanding of gypsum-based building products and systems and to pioneer new applications for these products.

It also has an ongoing commitment to advise on matters of environmental impact, energy conservation and health and safety, wherever gypsum based products are used. The members promote the use of systems which maximise the conservation of energy and give a high priority to waste reduction and recycling initiatives.



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