

# Lead Sheet

## Product Information



### Three methods of lead sheet manufacture

## Rolled Lead Sheet • Sand Cast • Machine Cast or Direct Method

This information leaflet explains the above three processes, some of the differences between their resulting products, and why specifying the correct manufacturing process can ensure lead sheet used on a project meets British and European Standards.

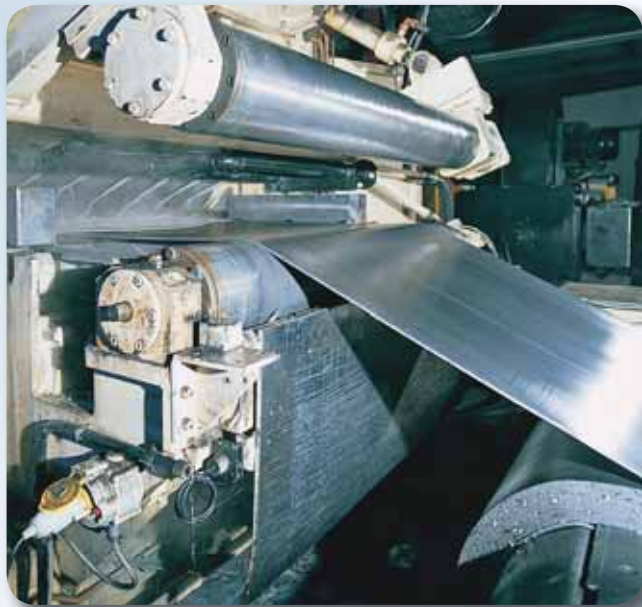
### Rolled Lead Sheet (formerly milled))

#### Background

Sheet metal rolling by machine was invented by Leonardo da Vinci in the 1500s. Records of producing lead sheet by rolling, dating as far back as the mid-1600s, exist in the archives of

in a mould. After solidification, the slab is placed on a rolling mill table and passed through the rolling mill; successive 'passes' reduce the lead to the required consistent finished thickness. After the lead sheet is rolled it is then slit or cut to width and to length and packaged ready for distribution. This process is typical and common to all high quality metal manufacturing.

is available in Codes 3-8; thickness ranges from 1.32mm to 3.55mm (+5% measured at any one point) and from widths ranging from 150mm to 2400mm. While standard lead sheet sizes are made available through a network of builder's merchants, other sheet sizes and thicknesses can be easily produced to order.



Over 100 years' experience has shown that when correctly sized and fitted, rolled lead sheet has a long life equivalent to that of traditional sand-cast sheet.

#### Acceptance

In the UK, rolled lead sheet is the only lead sheet used for building and construction manufactured to a British Standard BS EN 12588: 2006 Rolled Lead Sheet for Building Purposes. This standard specifies thickness and chemical composition, thus ensuring products manufactured to the standard provide the required resistance to creep, and thermal fatigue. The standard also provides guidelines for length and width and stipulates that the sheet shall be free from inclusions and laminations. For building purposes, rolled lead sheet

Member companies of the Lead Sheet Association ensure the lead sheet they produce follows the requirement of BS EN 12588: 2006. Using an LSA members product ensure that the installation follows the technical advice available from the Lead Sheet Association as detailed in 'Rolled Lead Sheet: The Completed Manual'. This manual only relates to the use of Rolled Lead Sheet conforming to BS EN 12588: 2006. Visit [www.leadsheet.co.uk](http://www.leadsheet.co.uk) for link to member companies.

#### Did you know?

The BS EN Euro Codes for structures introduced in 2010 calls for buildings to have a minimum life of 50 years. Rolled lead sheet, when designed and installed correctly, would have an anticipated life of between 60-100 years depending upon the code of lead sheet used; therefore the specification of rolled lead sheet should easily help meet these design requirements. Lead sheet's long service life, coupled with its 100% recyclability and low melting temperature, also means minimum impacts on global warming. Lead sheet is a pedigree construction product that meets all the requirements of construction work and building sustainability.

an LSA member, but it was not until the early 20th century that rolled lead sheet was readily available as an alternative to traditional sand cast sheet for roofing and weathering.

#### Method of manufacture

In current lead rolling technology a lead slab of two tonnes or more is cast

**see overleaf** →

[www.leadsheet.co.uk](http://www.leadsheet.co.uk)



## Sand Cast

### Background

The Romans used sand cast sheet for making ducts and water storage tanks. Its use was extended in the Norman Period to include roofing and weatherings. Many churches and cathedrals were originally roofed with sand cast sheet and records show that the material gives outstanding long life when made and fitted correctly.

### Method of Manufacture

Sand cast lead sheet is still made today by the traditional method of running molten lead over a bed of prepared sand on a casting bench. Compared to the other types of lead sheet, a relatively small amount of this material continues to be produced by specialist companies primarily for replacing old cast lead roofing on a like-for-like basis sometimes preferred by conservators and for ornamental leadwork. Consistency of thickness and composition of sand cast sheet is dependent on two key factors: the skill of the caster, and the blend of reprocessed old sheet and new ingots in its manufacture. The 'sand side' of the sheet has a characteristic smoother finish than the air-cooled strike side and the material is normally available in thicker gauges, typically ranging from 2.65mm to 3.55mm.

### Acceptance

Sand cast sheet is not made to a chemical specification, and relies heavily on the experience of the caster. It is not made to a British Standard and does not have an Agrément Certificate.

## Machine Cast

### Background

Machine cast lead sheet — often referred to as the Direct Method (DM) — had its beginnings in a process suggested by Bessemer in the 1800s. Initially only thin sheets — 0.5 to 1.5mm — were produced for sound attenuation purposes. It was not until the 1950s that the process was developed in Australia to produce the wider range of thicknesses required by the building.

Early in the 1980s, machine cast lead sheet was introduced into the UK. It is made by immersing a rotating water-cooled metal drum into a bath of molten lead at a constant temperature. As the drum turns, the lead solidifies on the surface and is peeled off as it emerges from the melt, slit to width and wound on to a coiler. Altering principally the rotation speed of the drum and the depth of immersion can vary the thickness of sheet produced.

### Acceptance

Machine cast sheet differs from sand cast and rolled sheet in both surface finish and grain structure. The surface of DM sheet not in contact with the drum has a dimpled finish. To achieve the optimum grain structure, it is usual to sand blast the surface of the

drum. Principally due to the point-to-point variation in thickness, DM sheet does not conform to a British Standard. Individual manufacturers in the UK do have British Board of Agrément certificates, but these only detail the specific chemical, physical and technical characteristics of each manufacturer's product. For building purposes, machine cast lead sheet may be available in various thicknesses and width.

### Summary

Lead sheet has always been associated with quality and durability in the built environment, and the Lead Sheet Association is in the forefront of advancing and maintaining that reputation. For this reason the LSA's technical advice in respect of application and installation, as detailed in the Rolled Lead Sheet Manual, only relates to the use of rolled lead sheet conforming to BS EN 12588. While sand cast sheet has a similar pedigree to rolled lead in terms of its performance on many historic buildings, the sheet is produced to greater nominal thickness compared to rolled sheet in order to compensate for the variations in manufacturing techniques and thickness. Machine cast sheet also suffers from thickness variations and this aspect, plus the fact it has only been used for roofing purposes for just over 25 years, prevents its acceptance under BS EN 12588. Furthermore, long-term external testing of both machine cast and rolled lead sheet carried out by Cambridge University has shown that the machine cast lead may be more vulnerable to thermal fatigue. For these reasons the LSA only provide advice on rolled lead sheet.



For further information contact

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Rolled Lead Sheet



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