

Health and Safety

Blue signs

Blue safety signs are mandatory signs. These tell us that a specific behaviour must be undertaken before you begin a task or complete an action.



Yellow signs

Yellow safety signs indicate a general hazard/danger and encourage the person to take caution. These health and safety signs are yellow/amber with a black icon and/or text and black border.



Red signs

Red safety signs are used to prohibit dangerous actions or behaviours, or to indicate an activity that cannot be performed in the area of the sign.



Softwoods

Softwoods come from **coniferous** trees. These often have pines or needles, and they stay evergreen all year round - they do not lose leaves in the autumn. They are faster growing than hardwoods, making them cheaper to buy, and are considered a **sustainable** material.



Timbers

Green signs

Green safety signs are used to signal an emergency exit or first-aid services. These signs take the form of an informative white icon on a green background.



Softwood	Physical properties	Working properties
Larch	Pale coloured with a contrasting darker grain, knotty	Durable, easy to machine, high sap content gives it good water resistance, used for exterior building and flooring
Pine	Pale coloured with aesthetically pleasing grain	Lightweight, easy to form, used for construction and decking
Spruce	Pale cream with an even grain	Easy to form, takes stain colour well, used for construction and furniture

Hardwoods

Hardwoods come from **deciduous** trees, which have large flat leaves that fall in the autumn. Hardwoods take longer to grow, are not easily sourced and are expensive to buy.



Manufactured Boards

Manufactured board	Physical properties	Working properties
Medium-density fibreboard (MDF)	Smooth, light brown, can be veneered	Smooth and easy to finish, absorbs moisture so not suitable for outdoor use, used for kitchens and flat pack furniture
Plywood	Odd number of layers of veneer glued at 90 degree angles for strength, aesthetically pleasing outer layer	Easy to cut and finish, can be stained or painted, used for shelving, construction and toys
Chipboard	Compacted wood chips, laminated with a variety of coverings, end cuts are difficult to finish	Strong but absorbent to water, used for veneered worktops and flooring

Hardwood	Physical properties	Working properties
Ash	Pale coloured, narrow grain	Flexible and good for steam bending, tough, used for sports equipment
Beech	Slight pink tint, close grain	Tough, durable and smooth to finish
Mahogany	Dark-reddish colour, very close grain	Cuts and polishes easily, gives a fine finish, used for high-quality furniture
Oak	Moderate-brown colour with unique and attractive grain markings	Tough and durable, polishes well, used for quality furniture
Balsa	Pale and wide-spaced grain due to it being a fast-growing hardwood	Very soft and easy to form, often used to make models

Metals

Ferrous Metals

- Ferrous metals are those which contain IRON.
- They are magnetic
- They are prone to **rust** and therefore require a protective finish, which is sometimes used to improve the aesthetics of the product it is used for as well.

Ferrous metal	Properties	Uses
Cast iron	Brittle if thin, can be cast in a mould, strong compression strength, good electrical and thermal conductivity but poor resistance to corrosion	Manhole covers, pans and gates, vices
High-carbon steel (tool steel)	Hard but brittle, less malleable than mild steel, good electrical and thermal conductivity	Taps and tools, eg screwdrivers and chisels
Low-carbon steel (mild steel)	Ductile and tough, easy to form, braze and weld, good electrical and thermal conductivity but poor resistance to corrosion	Nuts, bolts, screws, bike frames and car bodies

Non-Ferrous Metals

Non-ferrous metals do not contain iron and are not magnetic. They do not rust.

Non-ferrous metal	Physical properties	Working properties
Aluminium	Light grey with a matt finish	Lightweight but strong and ductile, used for drink cans, kitchen utensils and some parts in transport
Copper	Rose coloured, polishes well but can oxidise to a green colour (<u>verdigris</u>)	Good electrical conductor, can be polished, welds easily, used for plumbing parts and electrical cable
Tin	Silver coloured	Soft and malleable, easy to form, used to make food cans
Zinc	Silvery blue with a matt finish	Brittle with average malleability and conductivity, often used to galvanise steel

Alloys

Alloys are mixtures of metal with an element to improve its properties or **aesthetic**.

For example brass is a mixture of copper and zinc. Alloys can also be classified as ferrous or non-ferrous.

Alloy	Physical properties	Working properties
Brass	Non-ferrous metal that is gold coloured and darkens when oxidised with age	An alloy of copper and zinc, can be cast and machined, used for musical instruments and ornamental hardware
Stainless steel	Ferrous metal that is silver when polished, resists rust	An alloy of chromium, nickel and manganese, hard and smooth, used for cutlery and sinks
High-speed steel	Ferrous metal is dark grey when used for tool bits	Can be alloyed with a variety of materials for different properties, can withstand high temperatures, used for drill bits and saw blades



Polymers

Thermoforming polymers

★ We use these in school

Thermoforming polymers can be heated and formed repeatedly. They are **pliable** and **recyclable**.

Thermoforming polymer	Characteristics and properties	Further properties and uses
Acrylic (PMMA) ★	Hard, brittle, shiny, available in a wide range of <u>colours</u>	Resists weather well, can be cut, folded and polished well, scratches easily, used for car lights, visors and baths
High impact polystyrene (HIPS) ★	Rigid, cheap, available in a lot of <u>colours</u>	Can be cut and vacuum formed easily, food safe but toxic when burned, used for CD cases and yoghurt pots
High density polythene (HDPE)	Stiff, strong, lightweight	Lightweight and flexible, can be recycled well, used for washing baskets, pipes and chairs
Polypropylene (PP) ★	Easily <u>coloured</u> , available in sheets	Tough and flexible, used for plastic chairs and casings
Polyvinyl chloride (PVC)	Cheap, can be matt or high gloss	Brittle but durable, can be extruded or in flat sheets, used in blister packs and window frames
Polyethylene terephthalate (PET)	Clear, smooth finish	Light, strong and tough, used for clothing and drinks bottles

Thermosetting polymers

Thermosetting polymers are **brittle** and can only be formed once. They are hard to recycle. They are good **insulators** and are resistant to heat and chemicals.

Thermosetting polymer	Characteristics and properties	Further properties and uses
Epoxy resin (ER)	Supplied as two parts, one resin and one hardener (see image) - the resin and hardener combine to create an extra-strong adhesive.	Rigid and durable, strong, expensive and heat resistant, used to bond materials, waterproof coatings and lamination
Melamine formaldehyde (MF)	Hard, brittle	Food safe, printable surface, used for picnic wear
Phenol formaldehyde (PF)	Rigid and brittle	Easily injection <u>moulded</u> , good insulator, used for snooker balls and bottle caps
Polyester resin (PR)	A resin and a hardener, sets clear and smooth	Strong, heat resistant and good insulator, used as waterproofing and for encapsulating items
Urea formaldehyde (UF)	Smooth finish, available in limited <u>colours</u>	Heat resistant, hard, brittle and easily injection <u>moulded</u> , used for electrical fittings

Material Properties

Physical properties: What a material is like before it is used.

Working/mechanical properties: How a material behaves when it is being used.