

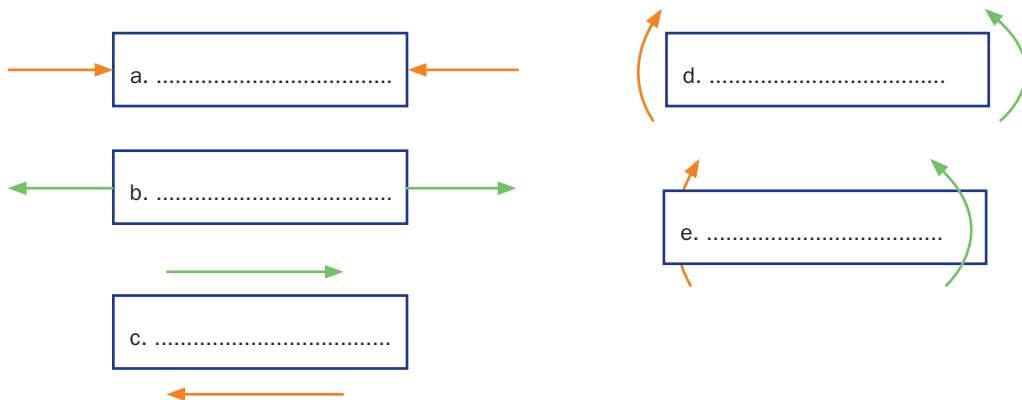
2 MATERIALS

UNIT 1 • PROPERTIES OF MATERIALS



1

What are the names of the loads/stresses illustrated below?



2

Complete the following short passage concerning the properties of materials.

The properties of materials can be classified in four groups:

1. (strength, hardness, toughness, elasticity, plasticity, brittleness, ductility and malleability);
2. (conductivity, expansion, melting point);
3. (conductivity, magnetism, resistivity);
4. (atomic volume, density, corrosion resistance, flammability).

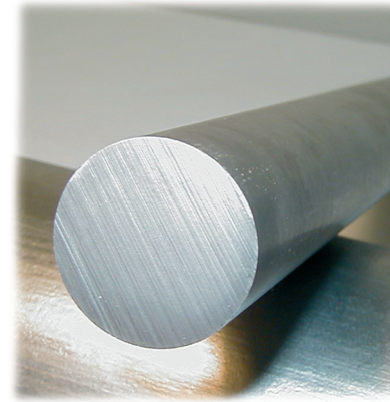
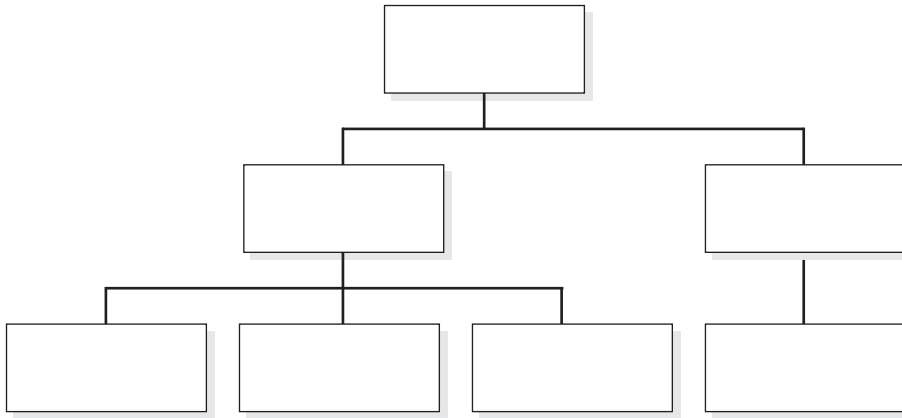
UNIT 2 • METALS



1

Refer to the texts on page 52 and page 64 of New Mechways and complete the following diagram choosing from the words in the box.

copper-based metals • ferrous metals • titanium-based metals • metals • steel •
aluminium-based metals • non-ferrous metals



2

Complete the following passage on different types of steel with the words listed below.

alloying • chemical • chromium • content • cutting • medium properties • resistant • strength • vanadium

DIFFERENT TYPES OF STEEL

According to the American Iron and Steel Institute (AISI), steels can be broadly categorized into four groups based on their (1) compositions:

1) **Carbon Steels.** They contain trace amounts of (2) elements and account for 90% of total steel production. They can be **further** categorized into three groups depending on their carbon (3)

- *Low Carbon Steels/Mild Steels* contain up to 0.3% carbon
- (4) *Carbon Steels* contain 0.3-0.6% carbon
- *High Carbon Steels* contain more than 0.6% carbon.

2) **Alloy Steels.** They contain alloying elements (e.g. manganese, silicon, nickel, titanium, copper, chromium and aluminum) in varying proportions in order to manipulate the steel's (5), such as its hardness, corrosion resistance, (6), and ductility. Applications for alloy steels include **pipelines**, auto parts, transformers, power generators and electric motors.

3) **Stainless Steels.** They generally contain between 10-20% (7) as the main alloying element and **are valued for** their high corrosion resistance. With over 11% chromium, stainless steels are about 200 times more (8) to corrosion than mild steel. ►

These steels can be divided into three groups based on their crystalline structure: austenitic, ferritic and martensitic.

- 4) **Tool Steels.** They contain tungsten, molybdenum, cobalt and (9) in varying quantities to increase heat resistance and durability, making them ideal for (10) and **drilling** equipment.

GLOSSARY



- **to be valued for:** essere stimato per
- **drilling:** perforazione
- **further:** ulteriormente
- **pipeline:** condotta.



3

Fill in the chart.

MATERIAL	PROPERTIES	APPLICATIONS
CAST IRON		
COPPER		
ALUMINIUM		
PLASTIC		
CERAMIC		
COMPOSITE	<i>light, strong and corrosion-resistant materials /strength and stiffness combined with lightness</i>	<i>composites are used for aerospace, automotive, recreational applications such as sporting goods and they replace metals in damaged bones</i>

UNIT 3 • NON-METALS



1

Read the text and match the English terms to the corresponding Italian words.



RECYCLING NUMBERS

Not every type of plastic can be recycled and in any area. The most common recyclable plastics have been organized into seven groups with a numeric code written inside a triangle made of three arrows pointing to one another. This identifying number is usually written on the bottom or back of the plastic item. It allows customers or community recycling centres to distinguish different types of plastic and sort their trash accordingly, in order to reduce plastic waste in landfills and reduce the amount of raw materials needed for manufacturing.

RECYCLING CODES	RECYCLABLE PLASTICS	RECYCLED PLASTIC PRODUCTS
1	PET (Polyethylene Terephthalate) <ul style="list-style-type: none"> expensive to produce, easy to recycle, accepted by most recycling facilities use: drink bottles, food packaging, vegetable oil containers, microwavable meal trays 	<ul style="list-style-type: none"> new water bottles, automotive parts, plastic straps, in fibre used for insulating stuffing for ski jackets and sleeping bags
2	HDPE (High-density polyethylene) <ul style="list-style-type: none"> commonly accepted by recycling facilities use: opaque milk or detergent bottles, grocery bags, trash bags, pipes, wire and cable coverings 	<ul style="list-style-type: none"> new bottles and plastic bags, oil containers, drainage pipes, lawn and garden products, film and sheet plastic, plastic lumber
3	PVC (Polyvinyl chloride) <ul style="list-style-type: none"> accepted by few recycling centres use: wire insulation, pipes, window frames, vegetable oil container, detergent bottles, food trays, hinged carryout food containers 	<ul style="list-style-type: none"> flooring and mats, packaging, panelling, garden hoses, cables
4	LDPE (Low-density polyethylene) <ul style="list-style-type: none"> rarely recycled use: clear plastic films, grocery and trash bags, squeezable bottles 	<ul style="list-style-type: none"> trash bins, floor tiles, furniture, plastic lumber, panelling, film and sheet
5	PP (Polypropylene) <ul style="list-style-type: none"> low demand for recycling use: medicine bottles, margarine and yogurt containers, drinking straws, ropes, automobile parts, microwavable meal trays 	<ul style="list-style-type: none"> automotive battery cases, battery cables, automobile signal lights, brooms, bicycle tracks, trays and bins
6	PS (Polystyrene) <ul style="list-style-type: none"> rarely recycled use: hard form, CD cases, plastic utensils foam state: disposable plates and cups 	<ul style="list-style-type: none"> egg cartons, thermal insulation, foam packaging, light switch covers, new foam plates and cups, rulers, license plate frames
7	Other almost never recycled plastics <ul style="list-style-type: none"> various applications: water bottles, sunglasses, DVDs, computer cases, packaging 	<ul style="list-style-type: none"> plastic lumber, new bottles

a. accordingly	<input type="checkbox"/>	1. <i>legname</i>
b. brooms	<input type="checkbox"/>	2. <i>comprimibile</i>
c. drainage pipes	<input type="checkbox"/>	3. <i>tubazioni da giardino</i>
d. facilities	<input type="checkbox"/>	4. <i>stuoie, tappetini</i>
e. garden hoses	<input type="checkbox"/>	5. <i>separare</i>
f. grocery	<input type="checkbox"/>	6. <i>piastrelle</i>
g. hinged	<input type="checkbox"/>	7. <i>scope</i>
h. landfills	<input type="checkbox"/>	8. <i>cannucce</i>
i. lawn	<input type="checkbox"/>	9. <i>discariche</i>
j. license plate frames	<input type="checkbox"/>	10. <i>vassoio, vaschetta</i>
k. lumber	<input type="checkbox"/>	11. <i>di conseguenza</i>
l. mats	<input type="checkbox"/>	12. <i>tubi di drenaggio</i>
m. raw materials	<input type="checkbox"/>	13. <i>impianti</i>
n. to sort	<input type="checkbox"/>	14. <i>generi alimentari</i>
o. squeezable	<input type="checkbox"/>	15. <i>a cerniera</i>
p. straws	<input type="checkbox"/>	16. <i>prato</i>
q. stuffing	<input type="checkbox"/>	17. <i>cornici della targa</i>
r. tiles	<input type="checkbox"/>	18. <i>materie prime</i>
s. trash	<input type="checkbox"/>	19. <i>imbottitura</i>
t. tray	<input type="checkbox"/>	20. <i>spazzatura</i>



2

Match each word with the correct definition.

a. matrix	<input type="checkbox"/>	e. thermoplastic	<input type="checkbox"/>
b. reinforcement	<input type="checkbox"/>	f. resin	<input type="checkbox"/>
c. alloy	<input type="checkbox"/>	g. polymer	<input type="checkbox"/>
d. thermosetting	<input type="checkbox"/>	h. mould	<input type="checkbox"/>

1. A metal made by combining and melting two or more materials.
2. A substance made of giant molecules formed by the union of simple molecules (monomers).
3. A cluster of fibres or fragments of a much stronger material.
4. A shaped container into which you pour a liquid that then becomes solid in the shape of the container.
5. Material which surrounds and binds together the reinforcement.
6. Plastic which is hard at low temperatures but softens when heated.
7. Plastic which is liquid when prepared but hardens and becomes rigid when heated.
8. Thermosetting or thermosoftening plastic.