

Product Ref: (DsC38-0516)

Issue No: 01

# 1. SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/ UNDERTAKING

#### 1.1. Product identifier

Product Name: Pararapide Asphalt Primer

Type of Product: Liquid Primer

#### 1.2. Supplier Details

Langley Waterproofing Systems Limited Langley House, Lamport Drive, Heartlands Business Park, Daventry, Northants,

NN11 8YH Phone: 01327704778 Fax: 01327704845

Email: enquiries@langley.co.uk Web: www.langley.co.uk

### 2. SECTION 2: HAZARDS IDENTIFICATION

#### Hazard-determining components of labelling:

Methyl methacrylate

- Bisphenol-A-epichlorohydrin
- 2-ethylhexyl acrylate

## 2.1. Classification

## **Hazard Statements**

Flam. Liq. 2 H225 Highly flammable liquid and vapour.

Skin Irrit. 2 H315 Causes skin irritation.

Eye Irrit. 2 H319 Causes serious eye irritation.

Skin Sens. 1 H317 May cause an allergic skin reaction.

STOT SE 3 H335 May cause respiratory irritation.

#### **Precautionary Statements**

P261 Avoid breathing vapours.

P210 Keep away from heat/ sparks/ open flames/ hot surfaces. - No smoking.

P280 Wear protective gloves/ eye protection.

P312 Call a POISON CENTER/ doctor if you feel unwell.

P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. P403+P235 Store in a well-ventilated place. Keep cool.

## 2.2. Label elements

Labelling according to Regulation (EC) No 1272/2008.

The product is classified and labelled according to the CLP regulation.



Product Ref: (DsC38-0516) Issue No: 01

#### Hazard pictograms





GHS02-Flame

GHS07-Exclamation
Mark

Signal word - Danger.

## 3. SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1. Mixtures

Description: Mixture of substances listed below with non-hazardous additions.

#### 3.2. Dangerous components:

CAS: 80-62-6 EINECS: 201-297-1 Reg.nr.: 01-2119452498-28	methyl methacrylate Flam. Liq. 2, H225; Skin Irrit. 2, H315; Skin Sens.1, H317; STOT SE 3, H335	25-50%
CAS: 25068-38-6 NLP: 500-033-5	Bisphenol-A-epichlorohydrin Skin Irrit. 2, H315; Eye Irrit. 2, H319; Skin Sens.1, H317	10-<25%
CAS: 103-11-7 EINECS: 203-080-7 Reg.nr.: 01-2119453158-37	2-ethylhexyl acrylate Skin Irrit. 2, H315; Skin Sens. 1, H317; STOT SE 3, H335; Aquatic Chronic 3, H412	2.5-<10%
	Hydrocarbons, C9-C12, n-alkanes, cyclic, aromatic (2-25%) Flam. Liq. 3, H226; Asp. Tox. 1, H304; Aquatic Chronic 2, H411; STOT SE 3, H336	0.1-≤0.5%

Additional information: For the wording of the listed risk phrases refer to section 16.

## 4. SECTION 4: FIRST-AID MEASURES (ACTIONS)

## 4.1. Description of first aid measures

#### General information:

Immediately remove any clothing soiled by the product. Take affected persons out of danger area and lay down. Contact a doctor immediately.

#### After inhalation:

In case of unconsciousness place patient stably in side position for transportation.

Take affected persons into fresh air and keep quiet.

Seek medical treatment.

### After skin contact:

Immediately wash with water and soap and rinse thoroughly. If skin irritation continues, consult a doctor.

## After eye contact:

Rinse opened eye for several minutes under running water. Then consult a doctor.

#### After swallowing:

Do not induce vomiting; call for medical help immediately.



Product Ref: (DsC38-0516)

Issue No: 01

#### 4.2. Most important symptoms and effects

Headache Dizziness Skin sensitization. Irritant to skin, eyes and respiratory system.

#### 4.3. Indication of any immediate medical attention and special treatment needed

After inhalation, even in the absence of signs of disease, give inhaled corticosteroid (eg Ventolair).

## 5. SECTION 5: FIRE-FIGHTING MEASURES

## 5.1. Extinguishing media

## Suitable extinguishing agents:

CO<sub>2</sub>, sand, extinguishing powder, foam.

#### For safety reasons unsuitable extinguishing agents:

Water with full jet.

#### 5.2. Special hazards arising from the substance or mixture

Can form explosive gas-air mixtures.

Formation of toxic gases is possible during heating or in case of fire.

In case of fire, the following can be released:

Carbon monoxide (CO)

Nitrogen oxides (NOx)

Vapours are heavier than air and may travel along the floor and accumulate in the bottom of containers.

Vapours may be ignited by a spark, a hot surface or an ember.

## 5.3. Advice for firefighters

#### Protective equipment:

Wear fully protective suit.

Wear self-contained respiratory protective device.

#### Additional information:

Cool endangered receptacles with water spray.

Collect contaminated water separately. It must not enter the sewage system.

### 6. SECTION 6: ACCIDENTAL RELEASE MEASURES

## 6.1. Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation.

Keep away from ignition sources.

Use respiratory protective device against the effects of fumes/dust/aerosol.

Wear protective equipment. Keep unprotected persons away.

#### 6.2. Environmental precautions

Do not allow to enter sewers/ surface or ground water.

Inform respective authorities in case of seepage in to water course or sewage system.



Product Ref: (DsC38-0516) Issue No: 01

#### 6.3. Methods and material for containment and cleaning up

Do not flush with water or aqueous cleansing agents.

Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).

#### 6.4. Reference to other sections

See Section 7 for information on safe handling. See Section 8 for information on personal protection equipment. See Section 13 for disposal information.

#### 7. SECTION 7: HANDLING AND STORAGE

#### 7.1. Precautions for safe handling

Avoid heat.

Keep cool polymerisation may occur if container is heated.

Protect closed containers against pressure rise from heating.

Do not refill residue into storage receptacles.

Ensure good ventilation/exhaustion at the workplace, at least 7 air changes prevent formation of aerosols.

### Information about fire - and explosion protection:

Highly volatile, flammable constituents are released during processing.

Keep ignition sources away - Do not smoke.

Fumes can combine with air to form an explosive mixture.

Only use with explosion-proof equipment.

Protect against electrostatic charges.

Protect from heat.

## 7.2. Conditions for safe storage, including any incompatibilities

#### Storage:

#### Requirements to be met by storerooms and receptacles:

Store only in the original receptacle.

Store in a cool location.

#### Information about storage in one common storage facility:

Store away from oxidising agents.

Store away from foodstuffs.

#### Further information about storage conditions:

Store in cool, dry conditions in well-sealed receptacles.

Storage in a collecting room is required.

Store under lock and key and with access restricted to technical experts or their assistants only.

Max. Storage temperature 30 °C.

Keep container tightly sealed.

Protect from heat and direct sunlight.

## 7.3. Specific end use(s) Building coating or sealing.



Product Ref: (DsC38-0516) Issue No: 01

## 8. SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Additional information about design of technical facilities: No further data; see item 7.

### 8.1. Control parameters

Ingredients with limit values that requi	re monitoring at the	workplace:
80-62-6 methyl methacrylate (25-50%)		workplace.
WEL (Great Britain)		Short-term value: 416 mg/m³, 100ppm Long-term value: 208 mg/m³, 50 ppm
MAK (Switzerland)		Short-term value: 420 mg/m³, 100 ppm Long-term value: 210 mg/m³, 50 ppm S SSc;
103-11-7 2-ethylhexyl acrylate (2.5-<1	0%)	
MAK (Switzerland)		Short-term value: 38 mg/m³, 5 ppm Long-term value: 38 mg/m³, 5 ppm S SSc;
DNELs		
80-62-6 methyl methacrylate		
Inhalative	DNEL (population)	74.3 mg/m³ (Long-term - systemic effects) 105 mg/m³ (Long-term - local effects)
	DNEL (worker)	210 mg/m³ (Long-term - local effects) 210 mg/m³ (Long-term - systemic effects) Long-term
103-11-7 2-ethylhexyl acrylate		
Dermal	DNEL	242 μg/cm² (Employee / Industrial / Commercial) Long-term and short-term
Inhalative	DNEL	37.5 mg/m³ (Employee / Industrial / Commercial) (Langzeit)
PNECs		
80-62-6 methyl methacrylate		
PNEC		< 0.94 mg/l (water)
PNEC sediment		1.47 mg/kg dw (ground) 5.74 mg/kg dw (freshwater)
103-11-7 2-ethylhexyl acrylate		
Boden		2.3 mg/l (Soil microorganisms) 1 mg/l (ground)
PNEC		0.0023 mg/kg (oral intake)
Water		0.126 mg/l (sediment) 0.002727 mg/l (freshwater)



Product Ref: (DsC38-0516) Issue No: 01

#### 8.2. Exposure controls

#### Personal protective equipment:

#### General protective and hygienic measures:

Avoid contact with the eyes and skin.

Immediately remove all soiled and contaminated clothing.

Wash hands before breaks and at the end of work.

Keep away from foodstuffs, beverages and feed.

Do not inhale gases / fumes / aerosols.

#### Respiratory protection:

Ensure good ventilation.

In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use self-contained respiratory protective device.

The use of respiratory protective hood is recommended because time limitations apply without the correct use of PPE.

#### Protection of hands:

Preventive skin protection by use of skin-protecting agents is recommended.

#### Protective gloves:

Check condition of protective gloves prior to each use.

The glove material has to be impermeable and resistant to the product/substance/preparation.

In selecting the glove material consideration should be given to the penetration times, rates of diffusion and the degradation. After gloves have been removed wash hands with an industrial hand cleaner.

## Material of gloves

The selection of the suitable gloves depends not only on the material, but also on further marks of quality and can vary from manufacturer to manufacturer. As the product is a combination of several substances, the resistance of the glove material cannot be calculated in advance and will need to be checked prior to use.

Protective gloves according EN 374.

Suitable material: nitrile.

### Penetration time of glove material

This recommendation is mainly on a one-time use as a short-term protection against liquid splashes. For other applications, you should contact a glove manufacturer.

The exact break through time has to be found out by the manufacturer of the protective gloves and must be observed.

For permanent contact in work areas without heightened risk of injury (e.g. Laboratory) gloves made of the following material are suitable: Butyl rubber, BR.

For permanent contact gloves made of the following materials are suitable:

Butyl rubber, BR.

Not suitable are gloves made of the following materials:

Leather gloves.

## Eye protection:

Tightly sealed goggles. EN-Standard: EN 166.

## **Body protection:**

Protective work clothing.



Product Ref: (DsC38-0516)

Issue No: 01

#### 9. SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

## 9.1. Information on basic physical and chemical properties

General Information:

Appearance:

Form: Fluid.
Colour: Colourless
Odour: Ester-like.
Odour threshold: Not determined.
PH-value: Not determined.

Change in condition:

Melting point/Melting range: Undetermined. Boiling point/Boiling range: 101 °C (MMA)

Flash point:  $17 \, ^{\circ}\text{C} \, (\text{DIN EN ISO } 3680)$ 

Flammability (solid, gaseous): Not applicable. Ignition temperature: 252 °C (2-EHA)

**Self-igniting:** Product is not self-igniting.

Danger of explosion: Product is not explosive. However, formation of explosive air/vapour mixtures are

possible.

**Explosion limits:** 

Lower: 1.7 Vol % (MMA)
Upper: 12.5 Vol % (MMA)
Vapour pressure at 20 °C: 38.7 hPa (MMA)

Density at 20 °C: 1.03 g/cm<sup>3</sup> (EN ISO 2811-1)

**Evaporation rate:** Not determined.

Solubility in / Miscibility with water: Not miscible or difficult to mix.

Partition coefficient (n-octanol/water): log Pow: 4.29 (2-EHA); (25°C, OCED 107)

Log Pow: 1.38 (MMA)

Viscosity:

**Dynamic at 20 °C:** 600 mPas (EN ISO 2555)

Solvent content:

Organic solvents: 0.0 %VOC (EC) 0.0 %Solids content: 56.0 %

### 10. SECTION 10: STABILITY AND REACTIVITY

## 10.1. Reactivity

See Section 10.2.

#### 10.2. Chemical Stability

Conditions to avoid: No decomposition if used according to specifications.

## 10.3. Possibility of hazardous reactions

Exothermic reaction.

Reacts with peroxides and other radical forming substances.

A hazardous polymerization may occur after the exhaustion of the inhibitor.



Product Ref: (DsC38-0516) Issue No: 01

#### 10.4. Conditions to avoid

Avoid heat. Avoid direct sunlight.

## 10.5. Incompatible materials:

Violent reaction with peroxides and other reducing agents.

#### 10.6. Hazardous decomposition products:

No dangerous decomposition products when used according to specifications.

#### Additional information:

Emergency procedures will vary depending on individual circumstances. A contingency plan should be in place.

## 11. SECTION 11: TOXICOLOGICAL INFORMATION

### 11.1. Information on toxicological effects

There were no toxicological effects found.

## 11.2. Acute toxicity

LD/LC50 values relevant for classification:		
80-62-6 methyl methacrylate		
Oral	LD50	> 5000 mg/kg (rat) (OECD 401)
	NOAEL	2000 ppm (rat) n drinking water, 6-2000 ppm Findings: No toxic effects
Dermal	LC50	> 5000 mg/kg (rabbit)
Inhalative	NOAEL	29.8 mg/l (rat) 25 ppm (rat) 25 - 400 ppm Findings: Damage to mucous membranes in the nose at 400 ppm

Aromatisches Urethanacrylharz		
Oral	LD50	>2000 mg/kg (rat)
Inhalative	LC50	>2000 mg/kg (rabbit)

25068-38-6 Bisphenol-A-epichlorohydrin		
Oral	LD50	>5000 mg/kg (rat)

103-11-7 2-ethylhexyl acrylate		
Oral	LD50	4435 mg/kg (rat) (BASF-Test)
Dermal	LD50	7520 mg/kg (hare)



Product Ref: (DsC38-0516) Issue No: 01

Primary irritant effect:

Skin corrosion/irritation: Causes skin irritation.

Serious eye damage/irritation: Causes serious eye irritation.

Respiratory or skin sensitisation: May cause an allergic skin reaction.

Other information (about experimental toxicology): Due to the high vapour pressure a harmful concentration in the air can be

quickly reached. At high concentrations narcotic effects can occur.

Subacute to chronic toxicity: not tested.

Toxicokinetics, metabolism and distribution: The drug is metabolized rapidly (MMA).

Repeated dose toxicity: no data available.

CMR effects (carcinogenity, mutagenicity and toxicity for reproduction): not tested. Germ cell mutagenicity: Based on available data, the classification criteria are not met.

Carcinogenicity: Based on available data, the classification criteria are not met.

Reproductive toxicity: Based on available data, the classification criteria are not met.

STOT-single exposure: May cause respiratory irritation.

STOT-repeated exposure: Based on available data, the classification criteria are not met.

Aspiration hazard: Based on available data, the classification criteria are not met.

## 12. SECTION 12: ECOLOGICAL INFORMATION

### 12.1. Toxicity

80-62-6 methyl methacrylate	
EC3/16h	100 mg/l (Pseudomonas putida) (Zellvermehrun, gshemmtest, Bringmann-Kühn)

#### Aquatic toxicity:

80-62-6 methyl methacrylate	
EC50/48h	69 mg/l (daphnia magna) (OECD 202)
EC50/72h	> 110 mg/l (Selenastrum capricornutum) (OECD 201)
ErC50/72h	> 110 mg/l (Pseudokirchneriella subcapitata) (OECD 201)
LC50/96h	> 79 mg/l (Rainbow trout) (OECD 203)
NOEC	9.4 mg/l (Danio rerio) (OECD 210)
	fish early life stage test, 35 days
	37 mg/l (daphnia magna) (OECD 211)
	21 days
NOEC/72h	> 110 mg/l (Selenastrum capricornutum) (OECD 201)

25068-38-6 Bisphenol-A-epichlorohydrin	
EC50/48h (static)	1.7 mg/l (daphnia magna) (OECD 202, Acute Immobilisation Test)
EC50/72h (static)	9.4 mg/l (Alge (Desmodesmus subspicatus))
LC50/96h (static)	1.5 mg/l (fish) (OECD 203, Acute T oxicity Test)
NOEC/21d	0.3 mg/l (daphnia magna) (OECD 211, Reproduction Test)



Product Ref: (DsC38-0516) Issue No: 01

103-11-7 2-ethylhexyl acrylate	
EC50/48h (static)	1.3 mg/l (daphnia magna) (OECD 202, Part 1)
ErC50/72h (static)	1.71 mg/l (scenedesmus subspicatus) (OECD 201)
	The details of the toxic effect relates to the analytically determined concentration.
LC50/96h (static)	1.81 mg/l (Rainbow trout) (OECD 203)
NOEC/21d	0.19 mg/l (daphnia magna)
	The details of the toxic effect relates to the analytically determined concentration. The product
	has not been tested. The statement has been derived from products of a similar structure or
	composition.
other (28d)	> 1000 mg/kg (Soil microorganisms) (OECD 217)

#### 12.2. Persistence and degradability

The product is easily biodegradable.

#### 12.3. Bioaccumulative potential

**2-EHA:** Can be accumulated in organisms.

**Bioconcentration Factor: 282.4 (calculated)** 

12.4. Mobility in soil

MMA: A binding to the solid phase of soil, sediment and sewage sludge is not expected. From the

water surface the substance is slowly evaporated into the atmosphere. If the substance is released into the environment it will remain within the location into which it was

released.

**2-EHA:** The product floats on water and does not dissolve. Adsorption on soil is not likely.

#### 12.5. Additional ecological information

COD-value: 2-EHA: Theoretical oxygen demand (TOD) = 5.6 g/g B

OD5-value: 0.14 g/g (MMA)

#### General notes:

Water hazard class 2 (German Regulation) (Self-assessment): hazardous for water.

Danger to drinking water if even small quantities leak into the ground.

#### 12.6. Results of PBT and vPvB assessment

**PBT:** Does not meet the PBT-criteria of Annex XIII of REACH (self assessment). **vPvB:** Does not meet the vPvB-criteria of Annex XIII of REACH (self assessment).

## 13. SECTION 13: DISPOSAL CONSIDERATIONS

## 13.1. Waste treatment methods

Hazardous waste according to Waste Catalogue (EWC).

If recycling is not possible, waste must be in compliance with local regulations to be removed.

### Recommendation

Uncured product residues are special waste. Cured product residues are not hazardous waste.



Product Ref: (DsC38-0516)

Issue No: 01

Must not be disposed together with household garbage. Do not allow product to reach sewage system.

#### Waste disposal key:

The following Waste Codes of the European Waste Catalogue (EWC), are considered a recommendation. The disposal must be coordinated with the local waste disposal company.

#### Liquid product:

 $08\dot{0}111$  \* paint and varnish containing organic solvents or other dangerous substances. 080199 waste nec.

#### Cured product residues:

080112 paint and varnish wastes other than those mentioned in 080111. 080410 adhesive waste adhesives and sealants other than those mentioned in 080409.

European waste catalogue 080111 \* (recommended).

Uncleaned packaging:

#### Recommendation:

This material and its container must be disposed of as hazardous waste. Disposal must be made according to official regulations.

### 14. SECTION 14: TRANSPORT INFORMATION

#### 14.1. UN-Number

ADR, IMDG, IATA: UN1263

#### 14.2. UN proper shipping name

ADR: 1263 PAINT, special provision 640H

IMDG, IATA: PAINT

## 14.3. Transport hazard class

ADR, ADN, IMDG:



Class: 3 Flammable liquids.

Label: 3

#### 14.4. Packing group

ADR, IMDG, IATA:

#### 14.5. Environmental hazards

Marine pollutant: No



Product Ref: (DsC38-0516) Issue No: 01

14.6. Special precautions for user

Warning: Flammable liquids.

33 Danger code (Kemler): **EMS Number:** F-E,S-E

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

Not applicable.

14.8. Transport/Additional information

**ADR** 

Limited quantities (LQ): 5L

Excepted quantities (EQ): Code: E1

Maximum net quantity per inner packaging: 30 ml.

Maximum net quantity per outer packaging: 1000 ml.

Transport category: Tunnel restriction code: D/E

Remarks: Classification according to viscosity clause (2.2.3.1.4)

IMDG Limited quantities (LQ):

Excepted quantities (EQ): Code: E1

> Maximum net quantity per inner packaging: 30 ml. Maximum net quantity per outer packaging: 1000 ml. Classification according to viscosity clause (2.3.2.3)

UN 1263 PAINT, SPECIAL PROVISION 640H, 3, III UN "Model Regulation":

## 15. SECTION 15: REGULATORY INFORMATION

### 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Directive 2012/18/EU

Remarks:

Named dangerous substances - ANNEX I: None of the ingredients is listed.

National regulations:

Information about limitation of use:

Employment restrictions under the Maternity Protection Directive (94/33/EC).

Employment restrictions for maternity Directive (92/85/EEC) for expectant and nursing mothers.

## 15.2. Chemical safety assessment:

A Chemical Safety Assessment has not been carried out.



Product Ref: (DsC38-0516)

Issue No: 01

#### 16. SECTION 16: OTHER INFORMATION

This information relates to the product as delivered.

#### Sector of Use:

#### Relevant identified uses of the mixture.

SU3 Industrial uses: Uses of substances as such or in preparations at industrial sites.

SU19 Building and construction work.

SU22 Professional uses: Public domain (administration, education, entertainment, services, craftsmen).

#### Uses advised against:

SU21 Consumer uses: Private households / general public / consumers.

#### Relevant phrases:

H225 Highly flammable liquid and vapour.

H226 Flammable liquid and vapour.

H304 May be fatal if swallowed and enters airways.

H315 Causes skin irritation.

H317 May cause an allergic skin reaction.

H319 Causes serious eye irritation.

H335 May cause respiratory irritation.

H336 May cause drowsiness or dizziness.

H411 Toxic to aquatic life with long lasting effects.

H412 Harmful to aquatic life with long lasting effects

#### Training hints:

Instruction must take place before the start of employment and at least annually thereafter.

## Department issuing MSDS:

Division product safety.

#### Abbreviations and acronyms:

**RID:** Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail).

ICAO: International Civil Aviation Organisation.

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road).

IMDG: International Maritime Code for Dangerous Goods.

IATA: International Air Transport Association.

GHS: Globally Harmonised System of Classification and Labelling of Chemicals.

**EINECS:** European Inventory of Existing Commercial Chemical Substances.

**ELINCS:** European List of Notified Chemical Substances.

CAS: Chemical Abstracts Service (division of the American Chemical Society).

VOC: Volatile Organic Compounds (USA, EU).

DNEL: Derived No-Effect Level (REACH).

PNEC: Predicted No-Effect Concentration (REACH).

LC50: Lethal concentration, 50 percent.

LD50: Lethal dose, 50 percent.

PBT: Persistent, Bioaccumulative and Toxic.

vPvB: very Persistent and very Bioaccumulative.

Flam. Liq. 2: Flammable liquids, Hazard Category 2.

Flam. Liq. 3: Flammable liquids, Hazard Category 3.

Skin Irrit. 2: Skin corrosion/irritation, Hazard Category 2.

Eye Irrit. 2: Serious eye damage/eye irritation, Hazard Category 2.



Product Ref: (DsC38-0516)

Issue No: 01

Skin Sens. 1: Sensitisation - Skin, Hazard Category 1.

STOT SE 3: Specific target organ toxicity - Single exposure, Hazard Category 3.

Asp. Tox. 1: Aspiration hazard, Hazard Category 1.

**Aquatic Chronic 2:** Hazardous to the aquatic environment - Chronic Hazard, Category 2. **Aquatic Chronic 3:** Hazardous to the aquatic environment - Chronic Hazard, Category 3.

This document is only a guide.

Langley Waterproofing Systems Ltd reserves the right to change the composition and fixing recommendations of products as a result of the evolution of knowledge and technology.