

**PRODUCTS RELEVANT TO THE ESSENTIAL REQUIREMENT
"MECHANICAL RESISTANCE AND STABILITY"**

1. PRODUCTS FOR MASONRY

| PRODUCTS | RELEVANT CHARACTERISTICS |
|--|--|
| <p>Masonry units made of different materials e.g.:</p> <ul style="list-style-type: none"> clay calcium silicate concrete (<i>normal and lightweight</i>) autoclaved aerated concrete stone <p><u>Note:</u> Masonry units may have different geometries e.g.: solid, perforated, hollow, frogged</p> <p>Premixed and prebatched mortars based on e.g.:</p> <ul style="list-style-type: none"> cement lime resin | <p>Tolerances on sizes ⁽⁵⁾ (<i>only for labelling purposes</i>)</p> <p>Shape/size/position of voids in hollow masonry units</p> <p>Density</p> <p>Water suction properties</p> <p>Dimensional stability:</p> <ul style="list-style-type: none"> . moisture <p>Compressive strength</p> <p>Tensile strength (<i>only for special justified cases</i>)</p> <p>Impact resistance of external shells</p> <p>Durability (<i>with respect to the values of the above characteristics and under the following actions</i>):</p> <ul style="list-style-type: none"> . freezing and thawing <p>- <i>After set and hardening:</i></p> <p>Density</p> <p>Dimensional stability:</p> <ul style="list-style-type: none"> . moisture <p>Tensile and compressive strength</p> <p>Bond strength on relevant masonry units</p> <p>Durability (<i>with respect to the values of the above characteristics and under the following actions</i>):</p> <ul style="list-style-type: none"> . freezing and thawing . chlorides . sulphates |

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Mortar constituents

- For lime, characteristics affecting the above mortar characteristics are to be considered.
- For other constituents see section 3 of this list

Bed joint reinforcement

The reinforcement may be placed in the mortar bed joints or in special grooves and may e.g. be in the form of bars, wires or meshwork (expanded metal plate, welded wire, woven wire, wire ladder)

Bond strength in relevant mortar
Tensile strength

Durability (*with respect to the values of the above characteristics and under the following actions*):
. corrosion agents

Ties

Ties may e.g. be ordinary wall ties, slip ties or shear ties (*symmetrical or asymmetrical*) and be made of e.g. plastics, or metals (steel, stainless steel, phosphate bronze, copper, aluminium)

Compressive strength
Tensile strength
Bending stiffness
also (*except wall ties*)
- Shear resistance
- Shear stiffness

Durability (*with respect to the values of the above characteristics and under the following actions*):
. corrosion agents

Ancillary components

e.g. straps, joist hangers, support angles and brackets

Strength and stiffness under relevant actions

Durability (*with respect to the values of the above characteristics and under the following actions*):
. corrosion agents

2. TIMBER PRODUCTS FOR STRUCTURAL USE

| PRODUCTS | RELEVANT CHARACTERISTICS |
|---|--|
| <p>Solid structural timber</p> <p>Timber may be round or sawn, planed or otherwise processed and endjointed (glue). Timber may be untreated or impregnated to increase durability or fire resistance</p> | <p>Strength and modulus of elasticity in:</p> <ul style="list-style-type: none"> . bending . compression . tension . shear <p>Durability (<i>with respect to the values of the above characteristics and under the following actions</i>):</p> <ul style="list-style-type: none"> . biological attack from wood-destroying fungi, insects and marine borers |
| <p>Glued laminated timber</p> <p>Horizontally or vertically laminated, straight and curved etc.</p> | <p>As for solid structural timber, and additionally</p> <p>Bond integrity</p> <ul style="list-style-type: none"> - glue-line shear strength - delamination resistance |
| <p>Other glued timber products</p> | <p>Bond integrity as above</p> |
| <p>Timber poles for transmission lines</p> | <p>Strength and stiffness under prescribed actions</p> <p>Durability (<i>with respect to the values of the above characteristics and under the following actions</i>):</p> <ul style="list-style-type: none"> . biological attack from wood-destroying fungi and insects |
| <p>Wood based boards</p> <p>e.g. plywood, particle board, fibreboard, oriented strand board, cement-bonded board</p> | <p>Dimensional stability under varying moisture conditions</p> <p>Strength and stiffness under different moisture conditions in:</p> <ul style="list-style-type: none"> . bending . compression . tension . shear <p>in different directions; in plane and perpendicular to the plane of the panel</p> |

Adhesives (*for in-situ use*)

e.g. phenolic, aminoplastic and casein

Durability (*with respect to the values of the above characteristics and under the following actions*):

- . biological attack from wood-destroying fungi and insects
- . moisture

Bond integrity

- glue-line shear strength
- delamination resistance

Bond integrity:

- delamination resistance
- effect of shrinkage
- interaction with wood (acid damage)

Durability (*with respect to the values of the above characteristics*)

Mechanical and dowel type fasteners

e.g. nails, staples, dowels, bolts and screws

Tensile strength

Bending strength

Bending stiffness

Joint strength in shear

Durability (*with respect to the values of the above characteristics and under the following actions*):

- . corrosion agents

Connector and punched metal plate fasteners

e.g. nail plates, toothed plate connectors, split ring, shear plates

Joint strength in shear

Stiffness in shear

Behaviour under cyclic actions

Durability (*with respect to the values of the above characteristics and under the following actions*):

- . corrosion agents

3. CONCRETE AND PRODUCTS FOR CONCRETE (PLAIN-REINFORCED- PRESTRESSED) PRODUCTS

| PRODUCTS | RELEVANT CHARACTERISTICS |
|---|---|
| Concrete constituents | |
| CEMENT (<i>for in-situ use</i>) | |
| including ordinary Portland, Portland-composite, blast furnace, pozzolanic, composite, low heat of hydration, rapid hardening, sulphate resisting, etc. | Those directly affecting the characteristics of hardened concrete listed below and those of mortars - reactivity with sulphate - alkali content |
| AGGREGATES (<i>for in-situ use</i>) | |
| e.g. gravel, sand, crushed rock, blast furnace slag, lightweight aggregates, recycled aggregates | Those affecting the characteristics of hardened concrete (<i>see below</i>) and mortars (<i>see Mortar constituents</i>) - alkali/aggregate reaction - grading - cleanliness |
| Concrete | <p><i>For fresh concrete</i> workability</p> <p><i>For hardened concrete</i> characteristics of hardened concrete at conventional ages and rate of testing: density compressive strength tensile strength modulus of elasticity max. compressive strain shrinkage coefficient final creep coefficient</p> <p>Durability (<i>with respect to the values of the above characteristics and under the following actions</i>): . freeze-thaw . abrasion . sulphate</p> <p><i>For high strength concrete additionally</i> energy absorbing properties (with regard to brittleness) fracture energy behaviour under cyclic loading</p> |

Other concrete constituents e.g.:**ADDITIONS** (*for in-situ use*)

e.g. microsilica, fly ash, blastfurnace slag

Those affecting the characteristics of hardened concrete e.g.:

- . fineness
- . silica content
- . sulphates
- . chlorides
- . carbon content

ADMIXTURES (*for in-situ use*)

As above and absence of deleterious interactions with other components

Reinforcing steel e.g.:

ordinary steel
stainless steel
galvanised steel
epoxy coated rebar
bars - ribbed, plane, smooth
coiled rods
welded fabric

Tolerances on size (5) (*only for labelling purposes*)

Weldability

Tensile ultimate strength

Tensile yield strength

Fatigue strength-low cycle fatigue

Ductility

Modulus of elasticity

Elongation at maximum load

Bond strength (with concrete)

Durability (*with respect to the values of the above characteristics and under the following actions*):

- . corrosion agents

ANCILLARY COMPONENTS

e.g. fasteners, couplers

Strength and stiffness under relevant actions

Prestressing steel

wires
bars
strands

As for "reinforcing steel" and, additionally,
Relaxation losses

Durability (*with respect to the values of the above characteristics and under the following actions*):

- . stress corrosion
- . corrosion agents

PRESTRESSING DEVICES *For post-tensioning*

Anchorage
Couplers

Failure strength
Elongation at failure and at service load
Fatigue strength
Load transfer to concrete

Durability (*with respect to the values of the above characteristics and under the following actions*):

. corrosion agents

DUCTS AND SHEATHS

Factor of flexural behaviour
Lateral load resistance
Tensile load resistance
Watertightness

Durability (*with respect to the values of the above characteristics*)

GROUTS

Fluidity and cohesion
Resistance to water penetration
Bond strength
Compression strength
Shrinkage deformation on hardening

Durability (*with respect to the values of the above characteristics and under the following actions*):

. frost

Absence of deleterious interactions with other components

4. PRODUCTS FOR METAL CONSTRUCTIONS

| PRODUCTS | RELEVANT CHARACTERISTICS |
|---|--|
| <p>Steel and aluminium alloys sections</p> <p>Hot rolled, cold formed or otherwise produced sections with different shape - plate, bar, T, L, H, channels angle, hollow</p> <p>- of different materials - ordinary steel, corrosion resistant steel, aluminium</p> <p>- unprotected or protected against corrosion by coating with paint, zinc, epoxy, anodizing</p> <p>Included are also piles and sheet piling</p> | <p>Tolerances on geometry</p> <p>Yield strength</p> <p>Ultimate tensile strength</p> <p>Fatigue resistance - Low cycle fatigue</p> <p>Fracture toughness (related to lowest service temperature)</p> <p>Modulus of elasticity</p> <p>Ductility</p> <p>Ultimate strain</p> <p>Weldability</p> <p>Durability (<i>with respect to the values of the above characteristics and under the following actions</i>):</p> <p>. corrosion agents</p> |
| <p>Structural connectors</p> <p>e.g. rivets, bolts (nuts and washers), studs, screws, etc.</p> | <p>Tolerances on geometry</p> <p>Yield strength</p> <p>Ultimate strength</p> <p>Fatigue resistance</p> <p>Weldability</p> <p>Durability (<i>with respect to the values of the above characteristics and under the following actions</i>):</p> <p>. corrosion agents</p> |
| <p>Welding materials (<i>for in-situ uses</i>)</p> | <p>Strength and stiffness of relevant welded joints</p> |

5. OTHER PRODUCTS

| PRODUCTS | RELEVANT CHARACTERISTICS |
|--|--|
| A) Products for general geotechnical use | |
| SOIL REINFORCEMENT e.g. geotextiles, geogrids and filaments | Tensile strength Stiffness Durability (<i>with respect to the values of the above characteristics and under the following actions</i>): <ul style="list-style-type: none"> . various agents active in soils . ultraviolet light |
| SOIL STABILISATION Various products, e.g. for pressure grouting | Fluidity and cohesion Compatibility with soil components Durability (<i>with respect to the values of the above characteristics</i>) |
| GROUND ANCHORS e.g. rock bolts, soil pins | Tensile strength Shear strength Durability (<i>with respect to the values of the above characteristics and under the following actions</i>): <ul style="list-style-type: none"> . corrosion agents |
| B) Prefabricated products | |
| SYSTEMS FOR WATER AND GAS SUPPLY AND SEWERS e.g. tubes, pipes and fittings, gutters and shafts made of concrete (reinforced or unreinforced), plastics, steel, cast iron | Tolerances on geometry ⁽⁶⁾ (<i>only for labelling uses</i>) Internal pressure strength External pressure strength Longitudinal bending strength Crushing resistance Durability (<i>with respect to the values of the above characteristics and under the following actions</i>): <ul style="list-style-type: none"> . various agents in soil or in the transported agents |

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PREFABRICATED LOAD-BEARING COMPONENTS OR PANELS

e.g. Floor units, roof units, columns, wall units, diaphragm walls, ground beams, piles, culverts, lintels (including those in composite action with masonry), retaining walls, railways sleepers

As appropriate:

Bending strength

Tension strength

Compression strength

Shear strength

Torsion strength

Punching shear strength

Bending stiffness

Compression stiffness

Impact resistance (*for special uses for walls and floors*)

Durability (*with respect to the values of the above characteristics as appropriate to use and materials*)

PREFABRICATED CONCRETE MEMBER CONNECTORS

As above and additionally
. friction coefficient

METAL COMPONENTS

e.g. stairs, galleries and walkways, fixed ladders, façades

Tolerances on geometry ⁽⁶⁾ (*only for labelling purposes*)

Strength, stiffness as appropriate to use

Durability (*with respect to the values of the above characteristics and under the following actions*):

. corrosion

STRUCTURAL BEARINGS

Compressive strength

Shear strength

Combined compression/shear strength

Compressive stiffness

Shear stiffness

Durability (*with respect to the values of the above characteristics and under the following actions*)

. oxidation

. temperature

. fatigue

VIBRATION ISOLATORS AND DAMPERS

e.g. rubber bearings, energy absorbing systems, friction couplers

As for structural bearings and especially: energy absorbing properties (e.g. hysteresis loop shape and stability)

C) Products for road construction

AGGREGATES FOR ROAD USES

Grading
Cleanliness
Resistance to fragmentation

Durability (*with respect to the values of the above characteristics and with regard to*):
. resistance to attrition

BITUMEN

Density
Softening point
Hardness
Resistance to oxidation at high temperature

Durability (*with respect to the values of the above characteristics and under the following agents*):
. climate conditions
. chemicals

HYDRAULIC BINDERS

e.g. fly ash, blast furnace slag

Grading
Chemical composition
Mechanical properties *after set and hardening* (compressive strength, modulus of elasticity)
Durability (*with respect to the values of the above characteristics*)

BITUMINOUS MIXTURES

Bituminous binder content

Aggregates grading

Adhesion of binder to aggregates

After compacting and hardening

- . Compaction

- . Bending stiffness

- . Resistance to rutting

Bond strength binder to aggregates

Durability (*with respect to the values of the above characteristics and under the following actions*):

- . fatigue

- . water

- . chemicals (for special uses)