

# Information sheet of materials used by ETS NORD



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## 1. General

This manual covers the main materials used for manufacturing the products of ETS NORD and their technical properties.

Components of ventilation systems are generally made of sheet steel. Additionally, also aluminium and copper alloys are used.

Based on the surrounding environment, the factors affecting the life of steel products are the following:

- mechanical, galvanic or organic corrosion.
- temperature fluctuations.
- UV radiation.
- thickness, structure and scratch resistance of the surface protection.
- maintenance and service intervals.

A service life requirement is defined for building services systems, which is typically 20-25 years for interchangeable building services systems. The service life is determined by the construction project builder or designer.

The service life of the product will shorten if a material unsuitable for the environment is used. Look at section 5: Corrosion and environmental classes.

The corrosion resistance of metals is different, and there are different methods to protect against corrosion such as painting, electroplating or hot-dip galvanizing.

The corrosion resistance of the surface protection is also affected by the thickness of the protection and the environmental conditions to which the metal is exposed.

## 2. Standards

Materials used by ETS NORD meet the following standards:

EN 10346	Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions
EN 10088-2	Stainless steels - Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes
EN 485-2	Aluminium and aluminium alloys - Sheet, strip and plate - Part 2: Mechanical properties
EN ISO 14713-1	Guidlines and recommendations for the protection against corrosion of iron and steel in structures – zinc coatings – Part 1: General principals of design and corrosion resistance.
EN ISO 14713-2	Guidlines and recommendations for the protection against corrosion of iron and steel in structures – Part 2: Hot dip galvanizing.
EN ISO 12944-5	Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 5: Protective paint systems

## 3. Materials

### Hot-dip galvanized sheet steel

Hot-dip galvanized sheet steel (S220GD+Z275) (DX56D+Z275) (EVS-EN 10346:2015)	Most frequently used material for manufacturing ventilation ductlines (0.5-1.2 mm). In case of hot-dip galvanized sheet steel, the amount of zinc on both sides of the sheet is at least 275 g/m <sup>2</sup> (thickness of zinc layer 19 µm). Durability of products depends on the thickness of zinc layer.
Magnelis® (DX51D+ZM310) (EVS-EN 10346:2015)	Magnelis® is a new, very good protective layer of steel plate that protects against long-term wear. Its corrosion resistance is three times better than that of galvanized steel. The composition of the Magnelis® protective layer is optimized to achieve the best possible corrosion resistance: the surface layer uses an alloy containing 3-5% aluminum and 3% magnesium in addition to zinc. A sufficiently high magnesium content is critical for surface durability. The thickness of the Magnelis® ZM310 layer is 25 µm. Magnelis® also has a self-healing feature that ensures excellent edge protection. Magnelis® is a good alternative to post-plating and aluminum or stainless steel.

### Other materials

Stainless steel (EN 1.4301, AISI 304)	Most common stainless steel, used for manufacturing kitchen equipment and for other purposes in interior premises. Also suitable for use in outdoor environment. Stainless steel includes approximately 9% of nickel, 18% of chrome and steel.
Acid resistant steel (EN 1.4404, AISI 316L)	Acid resistant steel with austenite structure. “L” in the sign indicates low carbon content. The material has high chemical durability and is (practically) non-magnetic.  It is recommended to use acid resistant steel in cases, where higher resistance to corrosion is required (e.g. coastal areas, polluted urban or industrial areas, chemical industry, food industry, etc).  Acid resistant steel contains approximately 11% of nickel, 17% of chrome, 2.7% of molybdenum and steel.
Aluminium (EN AW5754) (EN 485-2:2016)	Aluminium-magnesium alloy (AlMg3). Aluminium content in the alloy is 94.2- 97.4%. It is sea water resistant and has an average strength, high corrosion resistance.
Copper (Cu-OF-04)	Oxygen-free copper – technical copper with residual oxygen content approximately 0.03%, obtained through reduction and re-melting of oxygen-rich copper. Good thermal conductivity, good mouldability and weldability. The alloy includes minimum 99.9 % of copper. Used mainly in architectural places and design solutions due to the appearance of the material.

## Conformity to standards

Material type	EN	BS/UK	ASTM	DIN	SS
Hot-dip galvanized steel sheet	SS220+Z				
Magnelis®	DX51+ZM				
Stainless steel	1.4301		304	X5CrNi18 10	2333
Acid-proof steel	1.4404	316S11	316L	X2CrNiMo17 12 2	2348
Aluminium	AW5754			AlMg3	4125
Copper	Cu-OF			OF-Cu	5011

## 4. Paint coating

Powder coating is used to improve structure and corrosion resistance.

The steel sheet product is coated with a polyester powder paint based on TGIC-free polyester resin. The products are first coated with paint powder in an electrostatic environment and then sintered at 180-200 ° C.

Polyester powder paint produces a mechanically strong and durable coating. Polyester paints are UV-resistant and weather-resistant and are therefore well suited for outdoor use.

The thickness of the paint layer is 60-80 µm. The service life of the surface protection varies from 20 to 50 years, depending on the environmental conditions to which the surface protection is exposed.

## 5. Corrosion and environmental classes

Corrosion is oxidation and corrosion of a metal due to environmental conditions. Corrosion results in rust when iron is converted to iron oxide.

The rate of corrosion of metals is affected by environmental conditions.

Environmental conditions and associated corrosion risks are described and classified in the standard EVS-EN ISO 9223.

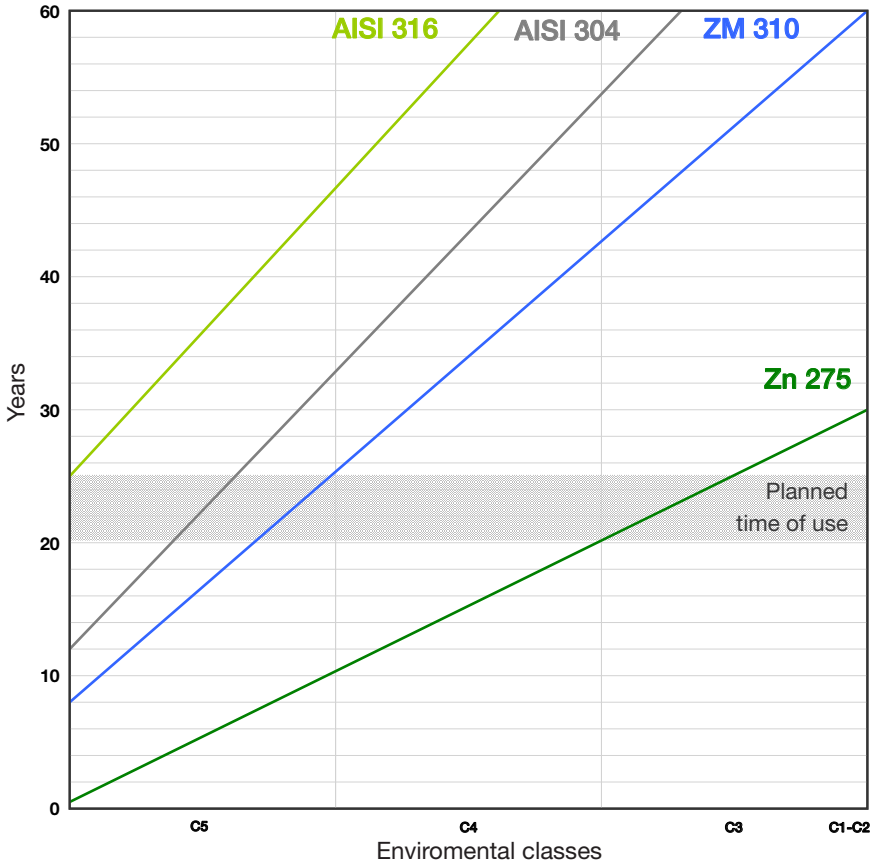


Table. Environmental classes - Materials

Description of environmental classes and associated corrosion risks (Standard EVS-EN ISO 9223)

Environmental class	Corrosion level	Internal environment	External environment
C1	Very low	Heated rooms, with low relative humidity and insignificant pollution, e.g. offices, schools, museums.	Dry or cold zone, external environments with very low pollution and very short-term humidity, e.g. certain deserts, central part of Arctic/Antarctic region.
C2	Low	Non-heated rooms, with changing temperature and relative humidity. Low condensation and low pollution, e.g. storages, sports halls.	Temperate zone, external environments with low pollution ( $\text{SO}_2 < 5 \mu\text{g}/\text{m}^3$ ), e.g. rural areas, small towns. Dry or cold zone, external environments with short-term humidity, e.g. deserts, subarctic regions.
C3	Moderate	Rooms with moderate production pollution and moderate condensation frequency, e.g. food industry, laundries, breweries, dairies.	Temperate zone, external environments with moderate pollution ( $\text{SO}_2: 5 \mu\text{g}/\text{m}^3$ to $30 \mu\text{g}/\text{m}^3$ ) or some impact of chlorides, e.g. urban areas, coastal areas with low chloride sedimentation. Subtropical and tropical zone, external environment with low pollution.
C4	High	Rooms with high industrial pollution and high condensation frequency, e.g. chemical plants, swimming pools.	Temperate zone, external environments with high pollution ( $\text{SO}_2: 30 \mu\text{g}/\text{m}^3$ to $90 \mu\text{g}/\text{m}^3$ ) or significant impact of chlorides, coastal areas without major impact of salt mist or de-icing salts. Subtropical and tropical zone, external environment with moderate pollution.
C5I	Very high (industry)	Rooms with very high condensation frequency and/or high production pollution, e.g. mines, industrial excavations, non-ventilated attics in subtropical and tropical zones.	Temperate and subtropical zone, external environments with very high pollution ( $\text{SO}_2: 90 \mu\text{g}/\text{m}^3$ to $250 \mu\text{g}/\text{m}^3$ ) or significant impact of chlorides, e.g. industrial areas, coastal areas, attics near the coast.
C5M	Very high (marine)		

## Suitability of materials in different environmental classes

Environmental class	Hot-dip galvanized steel sheet	Magnelis®	Aluminium	Stainless steel
C1	Z275	ZM310	Al	AISI304 AISI316L
C2	Z275	ZM310	Al	AISI304 AISI316L
C3	Z275	ZM310	Al	AISI304 AISI316L
C4	Z275+ powder paint PE80/1  Wet paint according to ISO12944-5	ZM310	Al	AISI304 AISI316L
C5	Z275+ wet paint according to ISO12944-5	ZM310+ wet paint according to ISO 12944-5	Al + paint EP120/1(2)	AISI316L

## 6. Fields of use for materials

Zn Z275	Used in places, where no special requirements are set to surface cover. Parts of ventilation ductline, fastening elements for indoor use. Structural steel.
Magnelis® ZM 310	Magnelis has top level corrosion resistance in an environment containing chlorides and ammonium. Architecture and construction: <ul style="list-style-type: none"> <li>- insulation cover plates in external environment.</li> <li>- structural steel.</li> <li>- doors.</li> <li>- parts of ventilation ductline, fastening elements (C4-C5 environmental conditions).</li> </ul>
Al	Aluminium is widely used in shipping and off-shore installations due to its light weight and high resistance to corrosion in marine environment.
AISI 304	The most common fields of use are large kitchens, kitchen equipment, domestic appliances, interior premises. Also suitable for outdoors use.
AISI 316L	Acid resistant steel is recommended in cases, where higher resistance to corrosion is required (e.g. coastal areas, polluted urban or industrial areas). Used for manufacturing corrosion resistant vessels, ducts, equipment etc. for chemical industry and food industry, etc.



Product group	Zn Z275	Magnelis® ZM 310	Al	AISI 304	AISI 316L	Cu
NORDduct	x	x	x		x	
NORDrect	x	x			x	
NORDsmoke	x				x	
NORDfire	x				x	
NORDdoor	x	x			x	
NORDdamper	x	x			x	
NORDsilencer	x	x			x	
NORDroof		x			x	
NORDexternal	x	x	x		x	x
NORDgrille			x			
NORDdiffuser	x		x			
NORDcanopy				x		
NORDfilter	x	x			x	
NORDaccessories	x	x			x	
NORDcoil	x	x	x		x	

## 7. Compatibility of fastening materials with the main material

Environmental class	Sheet metal	Material of fastening elements				
		Aluminium	Hot-dip galvanized steel; zinc layer $\geq 7\mu\text{m}$ (A3K)	Hot galvanized steel (a); zinc layer $\geq 45\mu\text{m}$	Stainless steel, hardened depending on the situation (martensite), 1.4006b (C1) AISI410	Stainless steel, 1.4301b (A2) AISI304 1.4436b (A4) AISI316
C1	Al, Steel, Z275,	X	X	X	X	X
	Z275+P, AISI304/AISI316L	X	X	X	X	X
C2	Al	X	-	X	X	X
	Z275, Z275+P, ZM310	X	-	X	X	X
	AISI304/AISI316L	X	-	X	X	X
C3	Al	X	-	X	-	X
	Z275, ZM310	X	-	X	(X) <sup>c</sup>	(X) <sup>c</sup>
	Z275+P	X	-	X	-	(X) <sup>c</sup>
	AISI304/AISI316L	-	-	X	X	X
C4	Al	X	-	(X) <sup>c</sup>	-	(X) <sup>c</sup>
	Z275+P	-	-	X	-	(X) <sup>c</sup>
	ZM310	X	-	X	-	(X) <sup>c</sup>
	AISI304/AISI316L	-	-	X	-	X
C5	Al	X	-	-	-	(X) <sup>c</sup>
	Z275+P *)	-	-	X	-	(X) <sup>c</sup>
	AISI304/AISI316L	-	-	-	-	X

Sign	Description
Al	All aluminium alloys, not depending on surface quality
Z275	Hot-dip galvanized sheet steel
Z275+P	Hot-dip galvanized sheet steel + paint
ZM310	Magnelis®
AISI304/AISI316	Stainless sheet steel
X	Recommended material type for corrosion protection
(X) <sup>c</sup>	Recommended material type for corrosion protection, only in given conditions
-	Non-recommended material type
*)	Thickness of surface cover shall be checked with the supplier
a	Refers only to bolts and nuts
b	Stainless steel according to the standard EN 10088
c	Insulated washer made of anti-aging material between metal sheet and fastening element





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