1.2.5 Data sheets

1.2.5.1 Material characteristics

Deceuninck Twinson products meet strict quality standards and are manufactured in accordance with established ISO 9000 quality management system procedures.

			prEN 15534-1	based on	specific property	unit	value
MATERIAL CHARACTERISTICS	physical properties	density	§ 6.1	ISO 1183-1/A		kg/dm³	1.41 ± 0.05
		moisture content	§ 6.2	ISO 16979		%	< 0.2
		HDT	§ 6.3	ISO 75-1/A		°C	73 ± 2
		vicat softening point	---	ISO 306/B50		°C	84 ± 2
	mechanical properties	impact resistance	§ 7.1.1	ISO 179-1fU	charpy	kJ/m²	> 5
		tensile properties	§ 7.2	ISO 527-2/1B	tensile modulus	MPa	5500 ± 10%
					tensile strength	MPa	> 35
					strain at break	%	1 ± 10%
		flexural properties	§ 7.3.1	ISO 178	flexural modulus	MPa	6300 ± 10%
					bending strength	MPa	> 55
					bending at break	%	1 .3 ± 10%
		creep behaviour (9MPa/30°C/20 days)	§ 7.4.1	ISO 899-2	elongation	%	< 0.3
		resistance to indentation	§ 7.5	EN 1534	1 kN	MPa	> 100
					3 kN	MPa	> 120
		nail and screw withdrawal	§ 7.6	EN 13446		MPa	> 50
	durability	artificial weathering (300 hours WOM)	§ 8.1.1	ISO 4892-2	discoloration	dE	< 20
					impact retention	%	< 20
		moisture resistance (28 days)	§ 8.3.1	EN 317	mass increase	%	< 8
					length increase	%	< 0.6
					width increase	%	< 1.5
					thickness increase	%	< 4
		resistance to termites	§ 8.4.2	EN 117		class	1
		resistance against basidiomycetes	§ 8.4.3.2	ENV 12038		class	1
		resistance against soil inhabiting soft rotting micro-fungi	§ 8.4.3.3	CEN/TS 15083-2		class	1
	thermal properties	linear thermal expansion (-20 °C ... +60°C)	§ 9.1	ISO 11359-2	length direction	10-6 K-1	20 - 25
					width direction	10-6 K-1	45 - 50
					thickness	10-6 K-1	80 - 90
		thermal conductivity	---	ISO/CD 22007-2	room temperature	W/m.K	0.2 - 0.3
	burning behaviour	oxygen index	§ 10.1	ISO 4589-2		%	> 20
		epiradiator	---	NF P92-501		class	M4
			---	NBN S21-203		class	A4
		kleinbrenner	--	DIN 4102-1		class	B2

1.2.5.2 Quality labels

· VHI:

We are proud to inform you that the Twinson Terrace(+) system has been granted the German "VHI" quality label. The German wood industry has created a quality label for WPC (Wood Polymer Composites) terrace planks.

Twinson Terrace(+) meets all the test criteria. These values have been tested by the official test institute SKZ (Süddeutsches Kunststoffzentrum).

The following product related characteristics are measured: (see data sheets)

- Flexural properties (EN 310)
- Boiling test (EN 1087-1)
- Slip resistance (Floor slider 2000 EN 13893)
- Creep behaviour (ISO 899-2)
- Cyclic conditions (EN 321)
- Linear thermal expansion (DIN 53752)

Terrace: Deceuninck, Twinson - QG/2009/Z12, PVC
Terrace+: Deceuninck, Twinson - QG/2008/Z06, PVC

· LNE:

We are proud to inform you that Twinson Terrace(+) has been granted the French "LNE" quality label.
The LNE provides an independent audit service of both our production process and our after sales market. These are the different tests that the Terrace(+) plank is subjected to:

- Coefficient of dynamic friction
- Dimensional variations and waterabsorption
- Colour verification
- Linear mass
- Impact resistance
- Flexural properties
- Durability

The tests are based on :

- XP CEN/TS 15534-1 (2007)
- XP CEN/TS 15534-2 (2007)
- XP CEN/TS 15534-3 (2007)

1.2.5.3 Product related characteristics P9555:

			prEN 15534-1	based on	specific property	unit	value
PRODUCT RELATED CHARACTERISTICS	physical properties	slip resistance	§ 6.4	DIN 51097	bare foot ramp test	class	C
			—	EN 13893	Floor slider 2000	—	> 0.4
			—	CEN/TS 15676	pendulum	USRV	> 36
			—	DIN 51130	rubber sole ramp test	class	R12
	mechanical properties	impact resistance	§ 7.1.2.1	EN 477	falling mass	J	13
		flexural properties (Lv=50 cm)	§ 7.3.2	EN 310	flexural modulus	MPa	6000 ± 10%
					bending strength	MPa	> 40
					bending at break	mm	15 ± 2
		creep behaviour (Lv=50 cm/85kg/50°C/ 7 days)	§ 7.4.2.1	EN 310	additional bending	mm	< 10
	durability	natural weathering (1 year Bandol)	§ 8.2	ISO 877-2	discoloration	dE	< 20
					impact retention	%	< 20
					bending strength retention	%	< 20
		cyclic conditions (Lv=50 cm)	§ 8.3.2	EN 321	bending strength retention	%	< 20
		boiling test	§ 8.3.3	ISO 1087-1	mass increase	%	< 8
					length increase	%	< 0.6
					width increase	%	< 1.5
					thickness increase	%	< 4
	thermal properties	heat reversion	§ 9.2	EN 479		%	< 0.2
		heat build-up	§ 9.3	ASTM D4083		°C	< 45
	burning behaviour	single flame source	§ 10.2.1	ISO 11925-2		pass	OK
		radiant heat source	§ 10.2.3	ISO 9239-1		class	Efl s2
		hot metal nut test	—	BS 4790		radius	< 35

1.2.5.4 Data sheet explanation

Physical properties:

A. Slip resistance:

Twinson Terrace(+) has a very high slip resistance, even in wet conditions. According to the standard DIN 51097 and DIN 51130, Twinson reaches the highest and most safe classification.

These values of slip resistance are measured by a ramp and are ideal for comparative testing of floor covering materials. Floor coverings are tested by fitting them to the surface of the ramp. An operator then moves or walks forwards and backwards, as per specified test method, whilst simultaneously tilting the table at a set speed, using a remote controller. During the tilting process the operator cannot see the readout which depicts the angle of the table. When slip occurs and the operator looses his or her grip on the floor covering, a reading of the inclined angle is taken. The operator uses special footwear with a specific sole material during each test, this is to prevent the footwear from being a variable factor in the experiment. The operator's safety is assured by wearing a safety harness attached to an overhead gantry. Consistency of the operator is checked at intervals using specially made calibration floor plates.

- Shoe Shod Test DIN 51130:
  This test is used for testing a surfaces slip resistance using a specific treaded boot worn by an operator on a lubricated ramp. This test is most useful for assessing profiles surfaces where there is a high risk of contamination. The test is carried out by an operator standing shoe shod on a ramp.
  The test itself is done by slowly tipping the ramp and measuring the angle (in degrees) the moment the operator begins to slip. Each R value includes a certain range of degrees. The idea is that the surface is tested in the most extreme of conditions.

R VALUE		DEGREES
R9 =	extremely unsafe	6° - 10°
R10 =	unsafe	10° - 19°
R11 =	average	19° - 27°
R12 =	safe	27° - 35°
R13 =	extremely safe	35°+

- Barefoot Ramp Test DIN 51097:
  This test is used for floor tiles or profile surfaces under wet and barefoot conditions. The tiles or profiled surfaces are fixed on a ramp which is made wet and a test operator walks on them with the ramp set at a succession of increasing angles until the person slips. The angle at which they slip is recorded.
  Tiles or profiled surfaces are classified into one of three groups. A, B, C, as an indication of their level of slip resistance.

VALUE	DEGREES
A = unsafe	12° - 18°
B = average	18° - 24°
C = extremely safe	24° +

- Floor slider 2000 EN13893:
  This test is measured with a device (Floor Slide Control 2000) that measures the dynamic coefficient of friction of floor coverings. The normal load is 24N and the speed is 0.20 m/s. The test is done with 3 different types of stamps (sliders): standard rubber, leather and synthetic in dry and wet conditions.
  A frictional resistance of 0 is the lowest result and a frictional resistance of 1 is the maximum result.

- Pendulum test CEN/TS 15676:
  This test measures the friction characteristics of each specimen by determining the wet dynamic friction between the specimen and the slider of a pendulum swinging in a vertical plane. The Pendulum Slip Tester has proved to give good correlation between its readings and the incidence of pedestrian slipping accidents and also produces the same hydraulic uplift characteristics that occur when a person slips.
  The criterion for judging the results of slip resistance tests is based on the work of the Building Research Station in the 1960s, supported by the experience of investigators and bodies such as the former GLC over the last 40 years. This work suggested that for unencumbered, reasonably active pedestrians aged between 18 and 60 a PTV level of 36 or above represented an acceptably low risk of slipping when walking in a straight line on a level surface.

Mechanical properties:

A. Impact resistance:

EN 477 describes a test method for determining the impact resistance of profile. The profile is subject to an impact from a known height, on the sight surface, at a mid-way point between two supporting internal webs, at a specific fixed temperature. Presently there are no specifications for impact resistance on European level, so any impact value is accepted. The falling mass must be more than 10J; this is equivalent to a 1 kg weight falling from 1m height without showing any sign of damage.

B. Flexural resistance:

EN 310 specifies a method of determining the apparent modulus of elasticity in horizontal bending and bending strength. The test method consists of applying, at a given speed, a force by means of a loading edge in an axial direction to the faces of the test specimen, which is placed on two supporting positions.
The test specimen is a full size product, the width shall be the actual width of the profile. The full length of the specimen is defined as being 20 times its thickness plus 50 mm up to a maximum of 1050 mm.
The calculated value is the apparent modulus of elasticity, because of the shear forces induced in the specimen. The bending strength is the maximum stress calculated from the maximum force recorded during the bending procedure.
The Terrace(+) plank is placed onto 2 supports at a distance of 600 mm, whilst in position the bending machine applies a force until the deflection reaches 3 mm. The total force is expressed as a flexural modus and a bending strength, the result indicates the stiffness of the profile.
The bending machine then applies an increasing force until the profile breaks, the distance of deflection at the point of breaking is measured in millimetres.

C. Creep behaviour:

The same test profiles are tested for creep with a force of 85kg at 50°C for 7 days and the additional bending is registered. Determination in a constant climate of the load duration factor (loss in strength with time under load) and the creep factor (ratio of increase in deflection with time to the initial elastic deflection) in bending by applying and sustaining a constant moment over the central region of the test piece; both the time to failure, and the increase in deflection with time are measured.

Durability:

A. Natural weathering:

The profiles are exposed for 1 year in the Bandol official test centre for checking the natural weathering. The discoloration, the impact retention and the bending strength retention is measured.
EN ISO 877 specifies methods of exposing plastics to solar radiation, either by direct exposure to natural weathering (Method A), to indirect solar radiation by modification of its spectral distribution using glass to simulate ageing of plastics located behind glazing in buildings or cars (Method B), or to solar radiation intensified by the use of Fresnel mirrors to achieve acceleration of the weathering processes (Method C).
The ageing of the wood plastic composite (WPC) products may be assessed by:

- the variation of the Charpy impact strength according to EN ISO 179-1 type 1fU
- the degree of chalking according to prEN ISO 4628-6
- the difference of colour determined in terms of the grey scale according to EN 20105-A03 or the difference of colour, ΔL^*, Δa^*, Δb^*, ΔE^*, determined in according to ISO 7724-1, ISO 7724-2 and ISO 7724-3.

B. Cyclic conditions EN 321:

The profiles are exposed to a cyclic test:

- 28 days under water at 20°C, then 24hours at -25°C and then 3 days at 70°C
- 3 days under water at 20°C, then 24hours at -25°C and then 3 days at 70°C
- 3 days under water at 20°C, then 24hours at -25°C and then 3 days at 70°C

After this test the bending strength retention is measured.

C. Boiling test ISO 1087-1:

The profile is exposed to a boiling test for 5 hours and after this period the mass increase, length increase, width increase and thickness increase is measured.

D. Resistance against biological agents:

EN 350-1: This part of EN 350 gives guidance on methods for the determination of the natural durability of untreated solid wood to attack by - wood-destroying fungi - insects (beetles and termites) - marine organisms and the principles of classification of the wood species based on the test methods.

Thermal properties:

A. Heat reversion:

This Standard EN 479 establishes a percent of linear shrinkage of profiles at elevated temperature.
Dimensional stability is an excellent indicator of any internal or residual stresses in the profile that may have resulted from the extrusion process. In use shrinkage can lead to distortion of profiles.
It consists of placing a test piece of a specified length in an oven at 100 °C for 1 h. A marked length of this test piece is measured under identical conditions, before and after heating in the oven. The heat reversion is calculated as the percentage change of the final length relative to the initial length per pair of marks.

B. Heat build-up:

External PVC products are susceptible to distortion due to heat build-up from exposure to the sun. A products colour, its emissivity and its reflectance levels can all affect heat build-up. Generally, the darker the colour, the more energy is absorbed. However, even products with the same apparent colour can exhibit varying levels of heat build-up, this is due to the actual colour pigment.
The greatest heat build-up occurs in the black colours containing carbon black pigment. The black control sample used in this test method contains 2.5 parts of furnace black per 100 parts of PVC suspension resin.
For a surface at 45° or on a horizontal plain where the sun is perpendicular, the maximum temperature rise above ambient temperature for this black is 90°F (50°C) and 74°F (41°C) for a vertical surface, this is assuming the measurements were taken on a cloudless day with no wind and without heavy insulation on the back of the specimen. Using a specific type of heat lamp to imitate the suns energy, this test method measures the temperature rise relative to that of a known black surface reference, from this a predicted heat build-up is made. The test method also predicts the heat build-up of various colours or pigment systems, or both. This test method provides a relative heat build-up compared to black under certain defined severe conditions, but it does not predict actual application temperatures of the product as this can depend on; air temperature, angle of the sun, cloud concentration, wind speed, insulation or if the installation is positioned behind glass, etc.

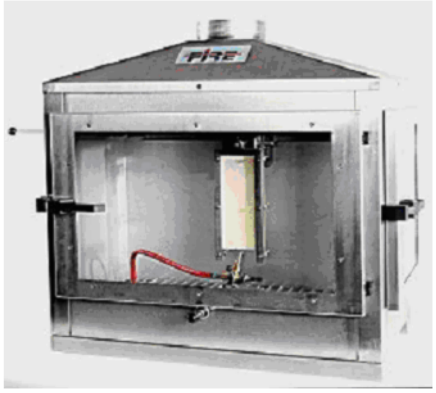
The determination of the predicted heat build-up test method described in ASTM D4803-2002 and prCEN/TS 15534 annex F covers the prediction of the increase in temperature above that of ambient air due to the amount of energy absorbed by a specimen from the sun, relatively to a black reference.

The predicted maximum heat build-up is calculated by multiplying an experimental reference temperature rise under real solar exposure by the ratio of the temperature rise of the specimen and the temperature rise of the black control sample, measured under a IR lamp of 250W.

Burning behaviour:

A. Single flame source ISO 11925-2:

The test determines the possibility of ignition of a vertically assembled test piece by exposure to a small flame, on the edge and/or the surface of the test piece. The ignition source consists of a small flame (0,8 kW) which is put under an angle of 45° across the test piece. The ignition source is placed on a sliding platform, so the flame can be brought in and drawn off by a smooth movement. Underneath the product that has to be tested, a small basket is placed with two layers of filter paper to collect possible burning and/or non-burning droplets or particles determining the time to ignition of the filter paper.
The dimensions of the test specimen are 250 mm x 90 mm. For each flame application, 6 test specimens have to be tested.
The flame application duration is 15 sec or 30 sec, dependent on the expected Euroclass classification. During and after the flame application it is observed whether the flame spread reaches the reference mark of 150 mm within a duration of 20 sec or 60 sec after flame application.



B. Radiant heat source:

EN ISO 9239-1 specifies a method for assessing the wind-opposed burning behaviour and spread of flame of horizontally mounted floorings exposed to a heat flux radiant gradient in a test chamber, when ignited with pilot flames.
EN ISO 9239-1 is applicable to the measurement and description of the properties of floorings in response to heat and flame under controlled laboratory conditions. The test specimens shall be representative of the flooring, in its end use. At 10 min intervals from the start of the test and at the flame-out time, the distances between the flame front and the zero point are measured. Any significant phenomena such as transitory flaming, melting, blistering, time and location of glowing combustion after flameout, penetration of the flame through to the substrate are observed and recorded.

C. Hot metal nut test BS 4790:

A heated stainless steel nut is placed on the sight-surface of the material to be tested. The times of flaming and of afterglow and the greatest radius of the effect of ignition from the point of application of the nut are measured. Three stainless steel nuts are tested weighing 30 + 2g to 900 +20°C and the nut is removed from the Terrace(+) plank after 30 + 2s.
The flame extinction time, after-glow/smouldering time or time to reach the outer clamping ring is measured. The radius of effects of ignition on both use surface under the side of the specimen is recorded.

Radius of tested area:

- Up to 35 mm: Low radius of effects of ignition
- 40 mm to 75 mm: Medium radius of effects of ignition
- 80 mm and over: High radius of effects of ignition