



Doc. Type	TST		
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Plastic - Pallets and Test Specification

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Changes

None

Previous Edition

Following TST will be withdrawn and transfer to this new TST:

- TST_N09801.09_000_Plastic-pallet-test-specification, ZPA-17140011, vs01, vom 2017-10-18
- TST_N09802.02-001-03_Plastic light pallet_1200x800, ZPA-17140000, vs03, vom 2017-05-30
- TST_N09802.02-002-03_Plastic heavy pallet_1200x800, ZPA-17140004, vs03, vom 2017-05-30
- TST_N09802.02-003_Platsic light pallet_CS-1_1200x800, ZPA-17140010, vs01, vom 2017-10-12
- TST_N09802.03-002_ESD-plastic heavy pallet_1200x800, ZPA-17140002, vs02, vom 2017-05-30

1 SCOPE

This standard applies to all companies within Continental Automotive as well as to their plants and functional areas and their suppliers worldwide and is proposed by department "Automotive Supply Chain Management - Customs, Transportation & Packaging".

2 REFERENCES

TST N 00155.50-000	Design standard brand „Continental“ on products created in the production process
DIN 55423-5/-6	Small load carrier systems – part 5:und 6: Polyethylen pallets
IEC 61340-5-1	Protection of electronic devices from electrostatic phenomena – General requirements
EC 61340-5-3	Protection of electronic devices from electrostatic phenomena - Properties and requirements classification for packaging intended for electrostatic discharge sensitive devices
IEC 61340-2-3	Methods of test for determining the resistance and resistivity of solid planar materials used to avoid electrostatic charge accumulation
DIN 16742 TG8	Plastics moulded parts – Tolerances and acceptance conditions
ISO 8611	Pallets for materials handling -Flat pallets - Part 1: Test methods (ISO 8611-1:2011); German version EN ISO 8611-1:2012
DIN 53389	Testing of plastic, short examination of lightfastness
DIN 22244	Horizontal impact tests (Rangier shock)
DIN ISO 10531	Packaging – shipping ready – skill testing of unit loads (ISO 10531:1992)
DIN EN ISO 4892-2	Plastic – Methods of artificial irradiating weathering from totes Part2: Xenon lamps.
DIN EN ISO 8611-	Pallets for freight transport pallets- Part 1: Test methods EN ISO 8611-1:2004)

3 APPLICATION

Plastic pallets for general use and in ESD areas.
General test - specifications for plastic pallets

4 HEAVY PALLETS

4.1 Heavy Pallet H1 1200x800x160 mm

Pallet in accordance with DIN 55423-5/-6, but variations in material to be used and thereby conditional deviations in the dimensions and tolerances, enhanced pallet skid design

Norminal dimensions	1200 x 800 x 160 mm
External dimension	1192 x 798 x 166 mm
Base frame construction	3 skid - pallet Vertical entry and bottom openings for lifting devices: 100 mm on front side
Underrideability	4-way- entry pallet
Top desk construction	Broken surface (open work)
Skid design	Skids (5 mm thick, grey, new material) with plastic plates reinforced and welded
Locking	internally, peripherally interrupted on the top desk, hight 7mm
Color	RAL 7012 basalt grey (pallet body) RAL 7042 traffic grey (skid plates)
Material	HD-PE, re-granulate
Tare - weight	ca. 18 kg
Max. payload, static load	5.000 kg *
Max. payload, dynamic load	1.000 kg *
Max. payload, in high rack	850 kg * (Two point edition)

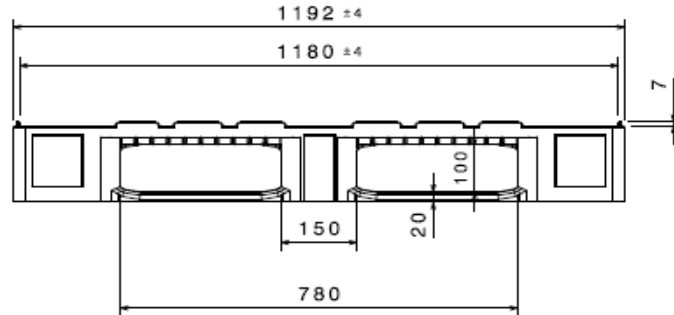
* Conditions: Evenly loaded/ large-area loading

Identification with Continental logo RAL 1028 melon yellow, respectively on the long sides, left pallet skid, according to TST N 00155.50-000, permanently marked

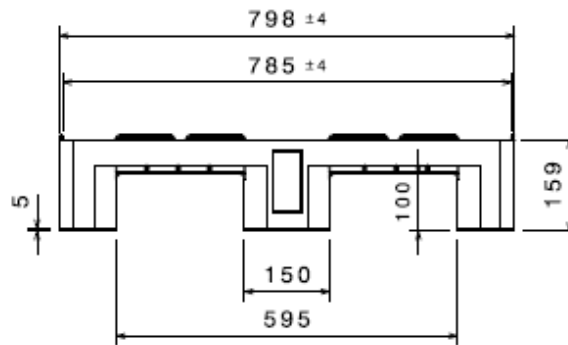
Identification with SAP-number **98-0789-1103-1-00**, RAL 1028 melon yellow, respectively on the long sides, left pallet skid below the Continental logo, permanently marked

Dimensions in millimeter [mm]
 Dimensions without tolerances, according to DIN 16742 TG8

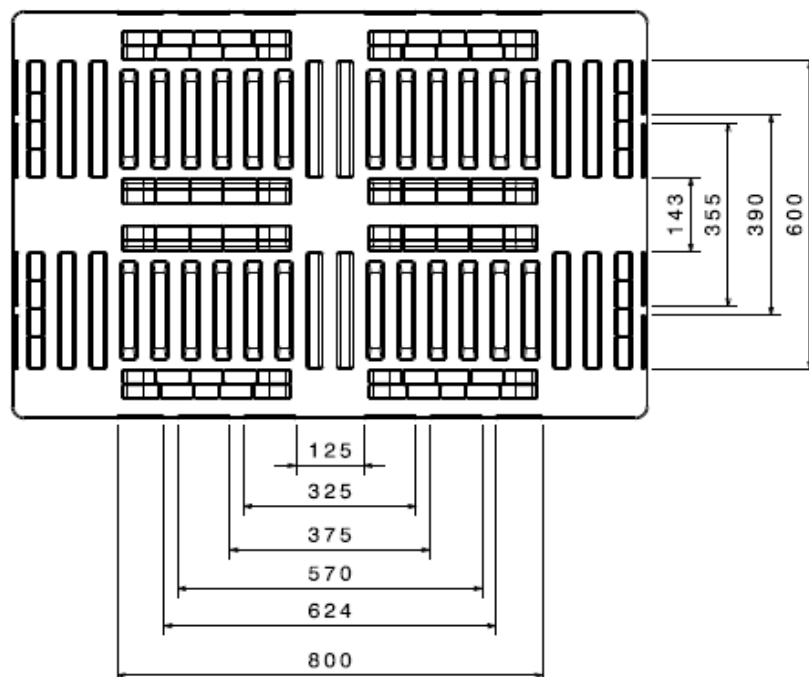
Long side:



Front side:



Top view:



4.2 Heavy Pallet H1 ESD 1200x800x160 mm

Pallet in accordance with DIN 55423-5/-6, but variations in material to be used and thereby conditional deviations in the dimensions and tolerances

Nominal dimensions	1200 x 800 x 164 mm
External dimensions	1198 x 805 x 157 mm
Base frame construction	3 skid - pallet Vertical entry and bottom openings for lifting devices: 100 mm on front side
Underrideability	4-way - entry pallet
Deck construction	Broken surface
Skid design	Open bottom, unwelded
Locking	Circumferentially interrupted on the deck, height 7 mm
Color	RAL 9005 deep black
Material	HD-PE-L ,permanent conductible (ESD)
Tare - weight	ca. 17,5 kg
Max. payload, static load	5.000 kg *
Max. payload, dynamic load	1.250 kg *
Max. payload, in high rack	800 kg * (Two point edition)

* Conditions: Evenly loaded/ large-area loading

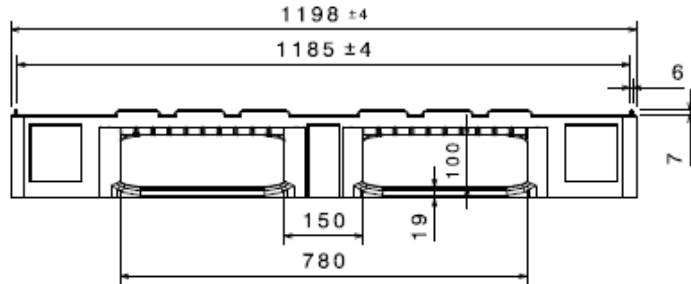
ESD- compliancy according to IEC 61340-5-1

Identification with ESD- symbol	RAL 1016 sulfur yellow, respectively on the long sides, right pallet skid permanently marked
Identification with Continental logo	RAL 1028 melon yellow, respectively on the long sides, left pallet skid, according to TST N 00155.50-000, permanently marked
Identification with SAP-Number	98-0789-1103-0-00 , RAL 1028 melon yellow, respectively on the long sides, left pallet skid, below the Continental Logos, permanently marked

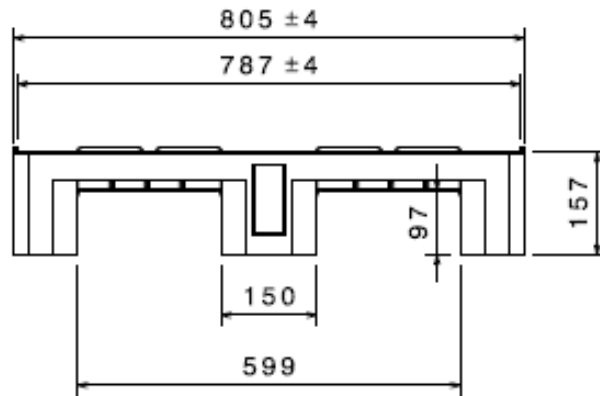
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Dimensions in millimeter [mm]
 Dimensions without tolerances according to DIN 16742 TG8

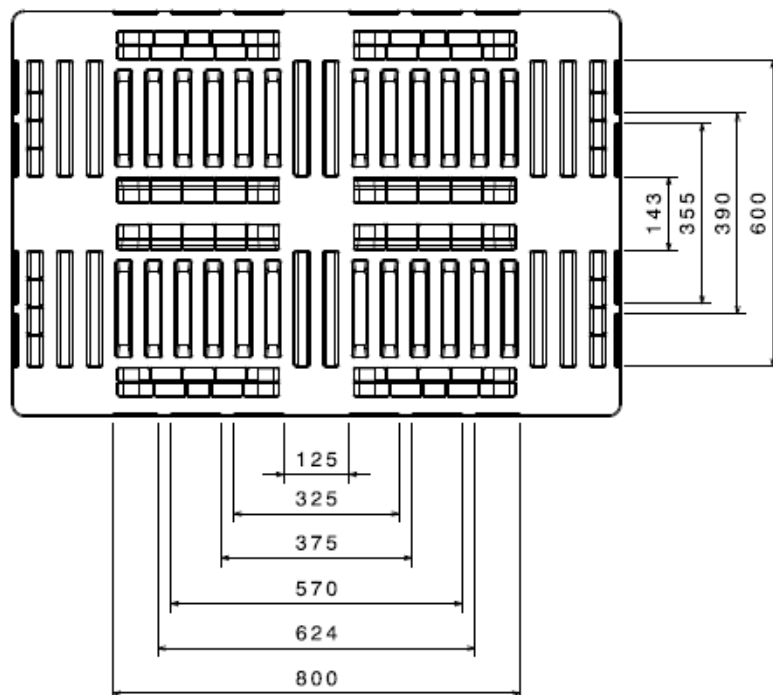
Long side:



Front side:



Top view:



4.3 Extra Heavy Pallet CR1 1200x800x160 mm

Pallet in accordance with DIN 55423-5/-6, but variations in material to be used and thereby conditional deviations in the dimensions and tolerances

Nominal dimensions	1200 x 800 x 160 mm
External dimensions	1192 x 798 x 166 mm
Base frame construction	3 skid - pallet Vertical entry and bottom openings for lifting devices: 100 mm on front side
Underrideability	4-way - entry pallet
Deck construction	Broken surface with 3 metall profiles reinforced
Skid design	Open skids, unwelded
Locking	Welded anti slip PE-plate in blue
Color	RAL 7012 basalt grey (pallet body)
Material	HD-PE, re-granulate
Tare - weight	ca. 21,5 kg
Max. payload, static load	7.500 kg *
Max. payload, dynamic load	1.750 kg *
Max. payload, in high rack	1.750 kg * (Two point edition)

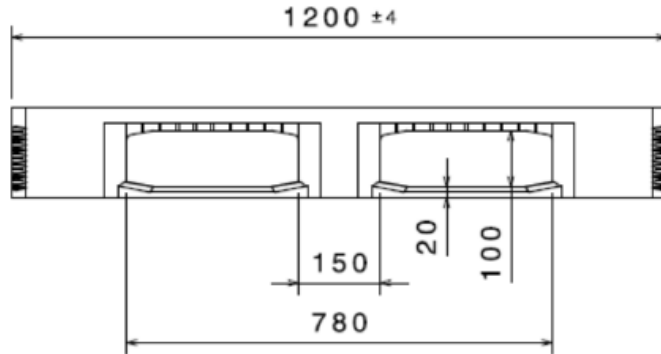
* Conditions: Evenly loaded/ large-area loading

Identification with Continental logo RAL 1028 melon yellow, respectively on the long sides, left pallet skid, according to TST N 00155.50-000, permanently marked

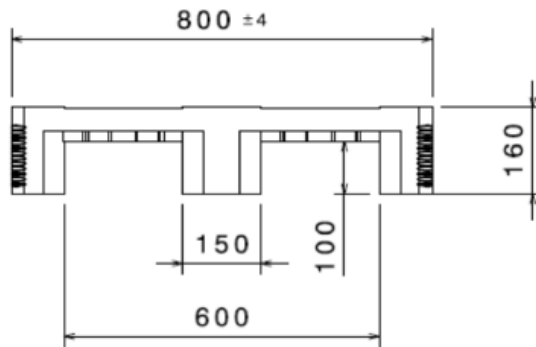
Identification with SAP-number **98-6000-0287-3-00**, RAL 1028 melon yellow, respectively on the long sides, left pallet skid below the Continental logo, permanently marked

Dimensions in millimeter [mm]
Dimensions without tolerances, according to DIN 16742 TG8

Long side:



Front side:



Top view:

5 LIGHT PALLETS

5.1 Light Pallet D1 **1200x800x150 mm**

Pallet in accordance with DIN 55423-5/-6, but variations in material to be used and thereby conditional deviations in the dimensions and tolerances

Nominal dimensions	1200 x 800 x 150 mm
External dimensions	1210 x 810 x 172 mm
Base frame construction	3 skid - pallet Vertical entry and bottom openings for lifting devices: 100 mm on front side
Underrideability	4-way - entry pallet
Top desk construction	Broken surface (open work)
Skid design	Open bottom, unwelded
Locking	Outboard, side at the deck, circumferentially interrupted, height 22mm, material thickness 5 mm
Color	RAL 7012 basalt grey
Material	HD-PE, re-granulate
Tare - weight	ca. 12 kg
Max. payload, static load	5.000 kg *
Max. payload, dynamic load	1.000 kg *
Max. payload, in high rack	400 kg * (two point support)

* Conditions: Evenly loaded/ large-area loading

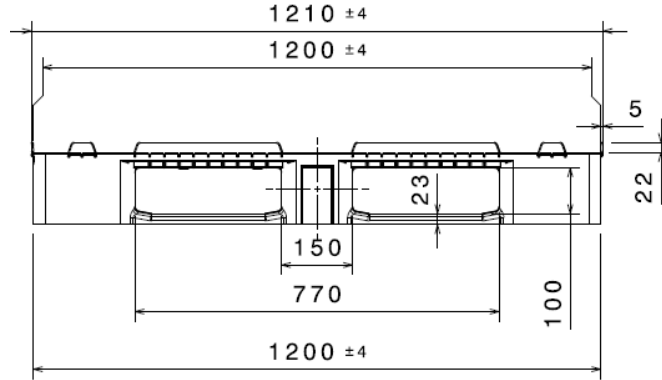
Identification with Continental logo RAL 1028 melon yellow, respectively on the long sides, left pallet skid, according to TST N 00155.50-000, permanently marked

Identification with SAP-number **98-0348-1285-0-00**, RAL 1028 melon yellow, respectively on the long sides, left pallet skid below the Continental logo, permanently marked

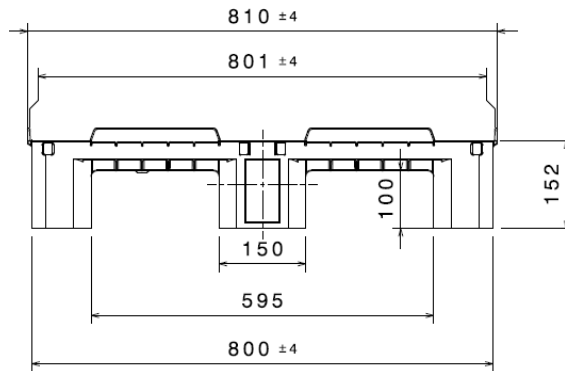
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Dimensions in millimeter [mm]
 Dimensions without tolerances, according to DIN 16742 TG8

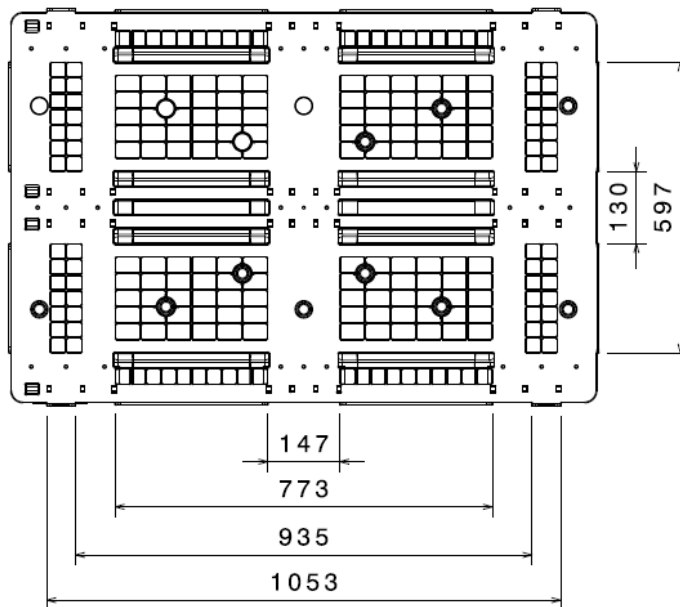
Long side:



Front side:



Top view:



5.2 Light Pallet CS1 1200x800x150 mm

Pallet in accordance with DIN 55423-5/-6, but variations in material to be used and thereby conditional deviations in the dimensions and tolerances, enhanced pallet skid design

Nominal dimensions	1200 x 800 x 150 mm
External dimensions	1209 x 815 x 172 mm
Base frame construction	3 skid - pallet Vertical entry and bottom openings for lifting devices: 100 mm on front side
Underrideability	4-way - entry pallet
Top desk construction	Broken surface (open work)
Skid design	Skids with plastic sheets (5 mm thick, grey, new material), reinforced and welded
Locking	Outboard, side at the deck, circumferentially interrupted, height 22mm, material thickness 5 mm
Color	RAL 7012, basalt grey (pallet- body) RAL 7042, traffic grey (skid plates)
Material	HD-PE, re-granulate
Tare - weight	ca. 14,5 kg
Max. payload, static load	5.000 kg *
Max. payload, dynamic load	1.000 kg *
Max. payload, in high rack	800 kg * (Two point edition)

* Conditions: Evenly loaded/ large-area loading

Identification with Continental logo RAL 1028 melon yellow, respectively on the long sides, left pallet skid, according to TST N 00155.50-000, permanently marked

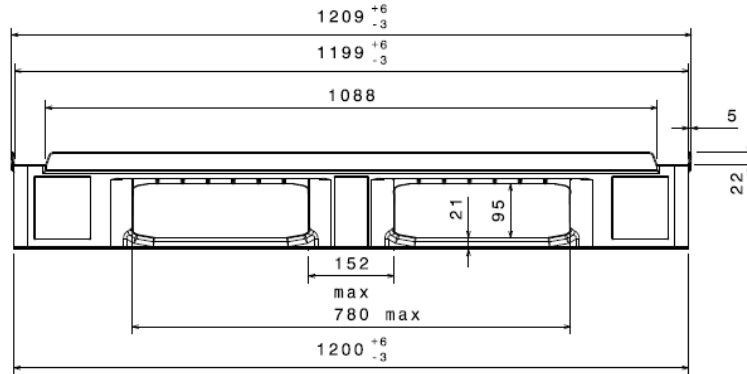
Identification with SAP-number **98-6000-0191-5-00**, RAL 1028 melon yellow, respectively on the long sides, left pallet skid below the Continental logo, permanently marked

Two crescent-shaped openings on the deck, e.g. for the insertion of RFID tags

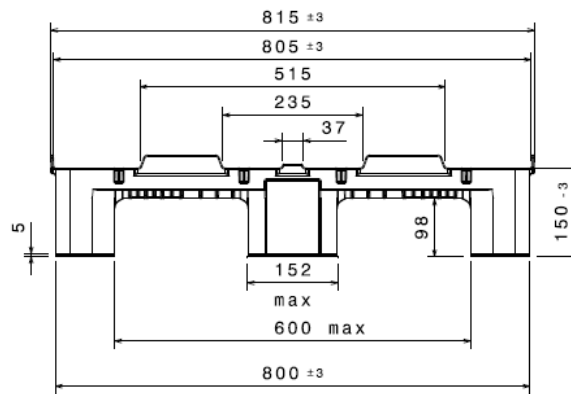
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Dimensions in millimeter [mm]
 Dimensions without tolerances, according to DIN 16742 TG8

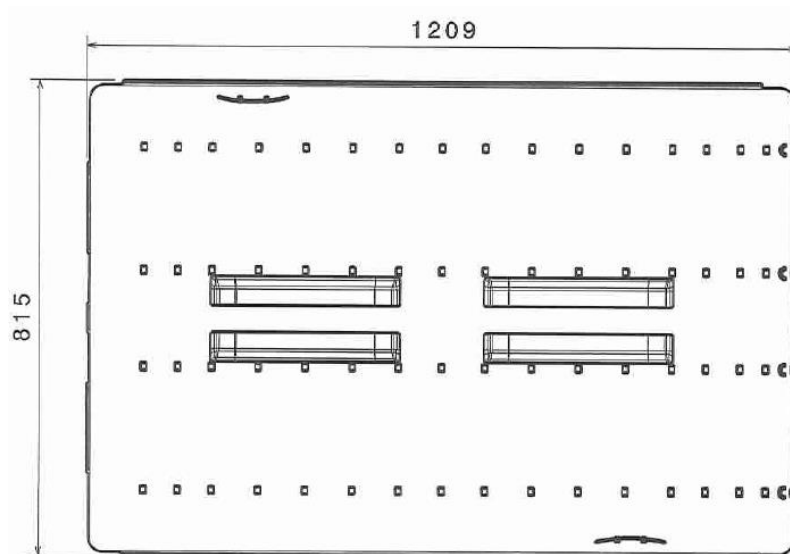
Long side:



Front side:



Top view:



5.3 Light Pallet CS3 1200x1000x150 mm

Pallet in accordance with DIN 55423-5/-6, but variations in material to be used and thereby conditional deviations in the dimensions and tolerances, enhanced pallet skid design

Nominal dimensions	1200 x 1000 x 150 mm
External dimensions	1210 x 1010 x 172mm
Base frame construction	3 skid - pallet
Underrideability	Vertical entry and bottom openings for lifting devices:
Top desk construction	100 mm on front side
Skid design	Oberfläche durchbrochen
Locking	Skids with plastic sheets (5 mm thick, grey, new material), reinforced and welded
Color	Outboard, side at the deck, circumferentially interrupted, height 22mm, material thickness 5 mm
Material	RAL 7012, basalt grey (pallet- body)
Tare - weight	RAL 7042, traffic grey (skid plates)
Max. payload, static load	HD-PE, re-granulate
Max. payload, dynamic load	ca. 18 kg
Max. payload, in high rack	5.000 kg *
	1.000 kg *
	800 kg * (Two point edition)

* Conditions: Evenly loaded/ large-area loading

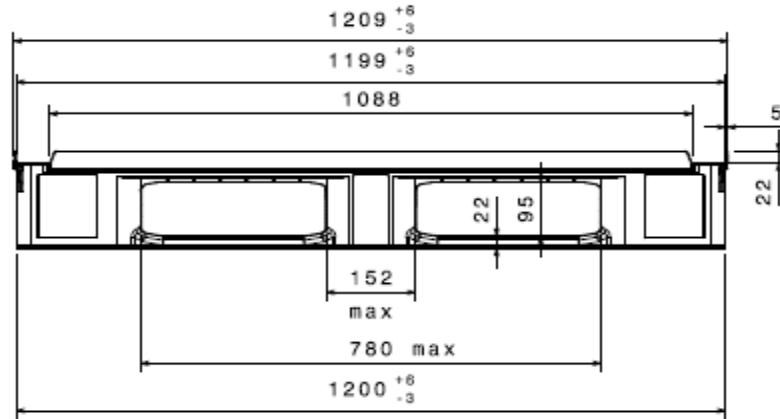
Identification with Continental logo	RAL 1028 melon yellow, respectively on the long sides, left pallet skid, according to TST N 00155.50-000, permanently marked
Identification with SAP-number	98-6000-0351-5-00 , RAL 1028 melon yellow, respectively on the long sides, left pallet skid below the Continental logo, permanently marked

Two crescent-shaped openings on the deck, e.g. for the insertion of RFID tags

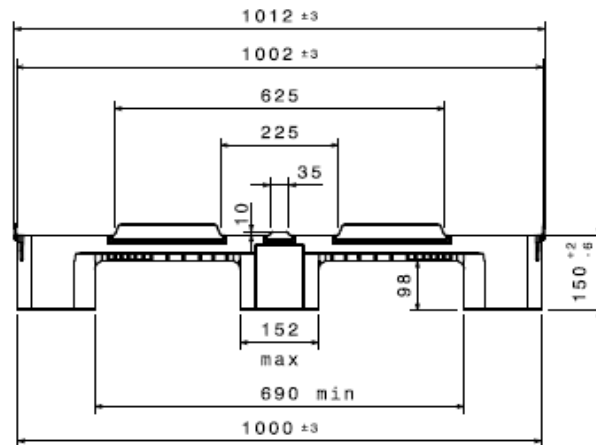
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Dimensions in millimeter [mm]
 Dimensions without tolerances, according to DIN 16742 TG8

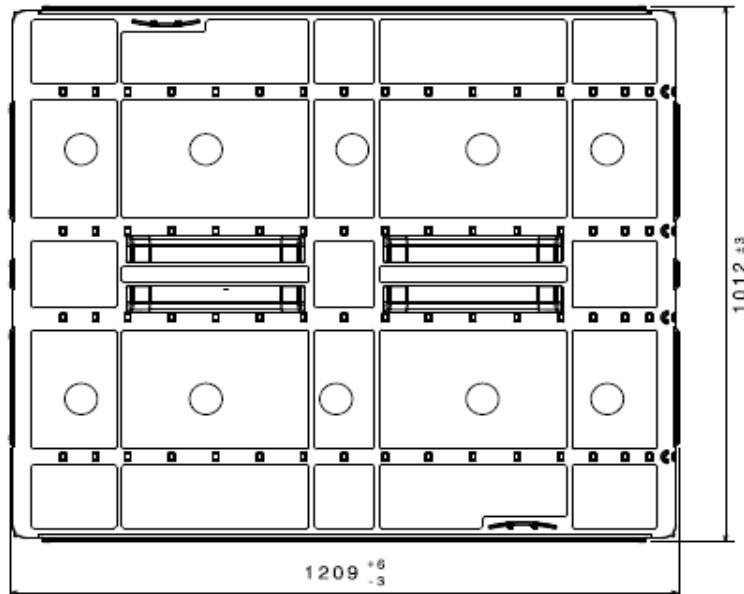
Long side:



Front side:



Top view:



6 BENDING DATA

The deflection of a plastic pallet under load is normal.
However, they must not be exceeded 21 mm (ISO 8611-2).

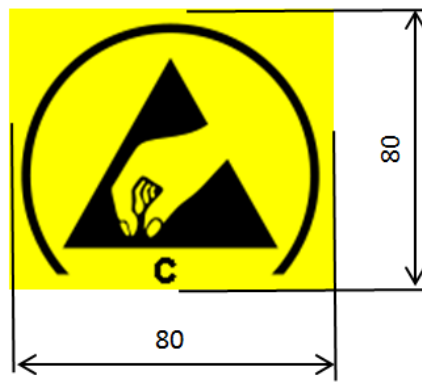
6.1 Test precondition

Pallet name	Material	Weight [kg]	Check weight [kg]	Duration test [hours]	Construction
Heavy H1	HD-PE, regranulat	18	850	100	skids welded
Heavy H1 ESD	HD-PE- L (ESD)	17,5	800	100	skids open
Extreme heavy CR1	HD-PE, regranulat	21,5	850	100	skids welded
Light D1	HD-PE, regranulat	12	400	24	skids open
Light CS1	HD-PE, regranulat	14,5	800	100	skids welded
Light CS3	HD-PE, regranulat	18	800	100	skids welded

7 IDENTIFICATION

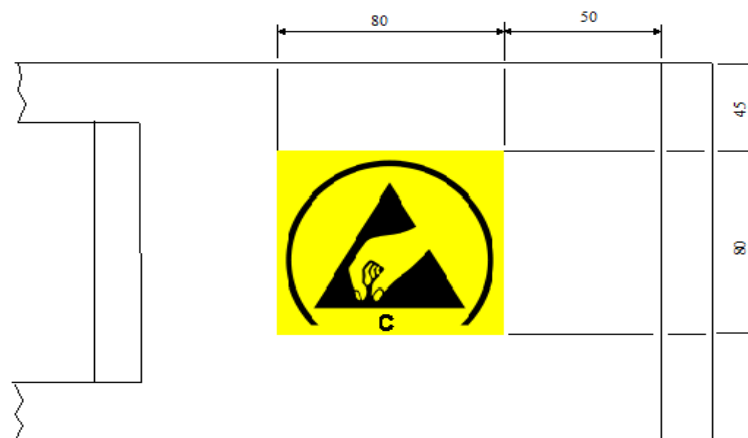
Pallet name	SAP no	Dimension [mm]	ESD	Conti Logo
Heavy H1	98-0789-1103-1-00	1200 x 800 x 160		X
Heavy H1 ESD	98-0789-1103-0-00	1200 x 800 x 160	X	X
Extreme Heavy CR1	98-6000-0287-3-00	1200 x 800 x 160		X
Light D1	98-0348-1285-0-00	1200 x 800 x 150		X
Light CS1	98-6000-0191-5-00	1200 x 800 x 150		X
Light CS3	98-6000-0351-5-00	1200 x 1000 x 150		X

7.1 ESD- Logo



Color: RAL 1016 sulfur yellow original- design

7.2 Positioning of the printing of the right pallet skid



Position: Long side, right pallet skid, both sides

7.3 Continental Logo



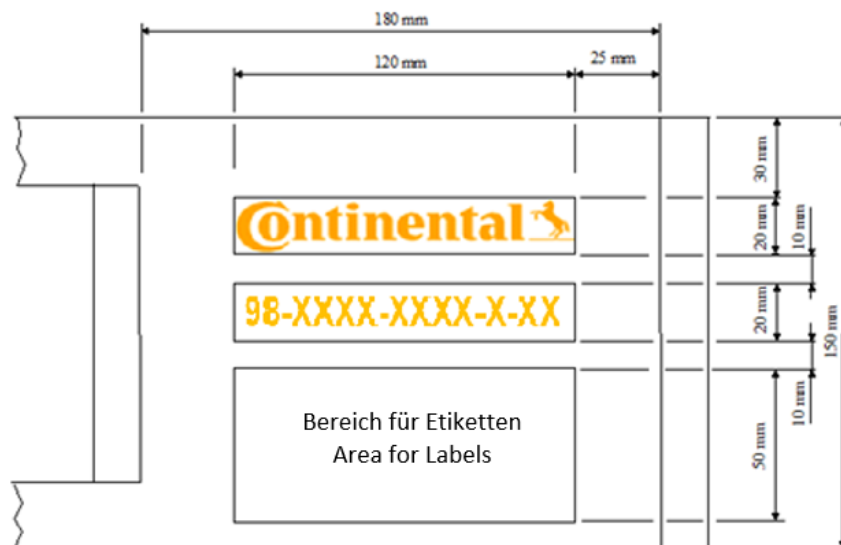
Color: RAL 1028 melon yellow
 Logo-print: according to TST N 00155.50

7.4 SAP-Packmittel-Sachnummer



Color: RAL 1028 melon yellow
 Font: Arial

7.5 Positioning of the printing on the left pallet skid



Position: Long side, left pallet skid, both sides

8 TEST – SPECIFICATION

8.1 GENERAL

The tests are carried out at 23°C ($\pm 2^\circ\text{C}$), unless other temperatures are explicitly mentioned in the individual test specification.

The tests may be carried out at the earliest 72 hours after preparation of the pallets. The pallets should be stored up that time at room temperature.

1 Q = Test load = in pallets datasheet specified load

8.1.1 Deformation Resistance and Dimensional Stability

The dimensions L x B x H are checked at least three test samples.

The specified tolerances must be observed.

Subsequently, the test samples are heated up within a temperature cycle of 24 h to + 60°C , measured, cooled down to room temperature within 24 h, measured, further cooled down to - 30°C within 24 h and measured and again heated up within 24 h to room temperature and measured again.

The dimensions L x W x H may not vary by more than 0.5% compared to the delivery condition at room temperature.

8.1.2 Static Tests

For this purpose, the test loads are applied to the pallet in a practical manner without load unit fuse. Care must be taken to ensure that the test load is achieved.

Alternatively, the load may be controlled by appropriate devices such as, e.g. a tensile, pressure testing machine.

For reproducibility, at least one complete layer of loaded bins must be located on the test pallet.

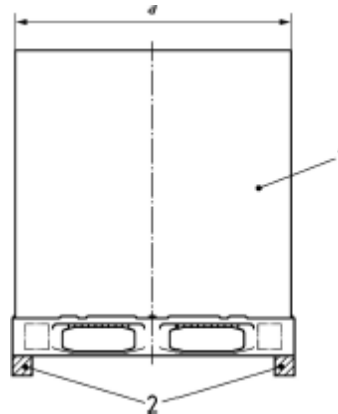
8.1.3 Ground Stacking

The pallet will be loaded with a test load (1 Q) for 30 minutes. The skids of the test pallet must not break or have cracks.

8.1.4 Stacking in Storage Rack

The pallet is loaded with a test load (1 Q), while the bottom plate or the skids resting on each 50 mm wide racks, which are flush with the outer edge of the pallet and shall not have sharp edges. They must be torsion-resistant in such a way that they do not affect the test results. Under these conditions, the pallet is loaded, while a deflection of 21 mm must not be exceeded on the 1200 mm long side

All test specifications see table (chap. "Test Specifications")



Picture: stacking in storage rack

1 – Test load
2 – Skids support

8.1.5 Pressure Test

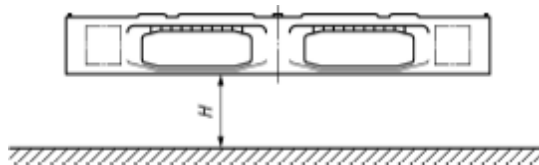
The pallet is loaded with a defined weight, where in the skids rest on a stable and horizontal ground level

- All test specifications see table (chap. "Test Specifications")
- Cracks or visible breaks are not permitted.

8.2 DYNAMIC TESTS

8.2.1 Drop Test

The pallet is hanged up horizontal in 1 m height (**H**) and drops twice on the upper deck and twice on the skids. The test has to be carried out on three test pallets. It must arise neither fractures, chipping or cracks, nor deformations that affect the function

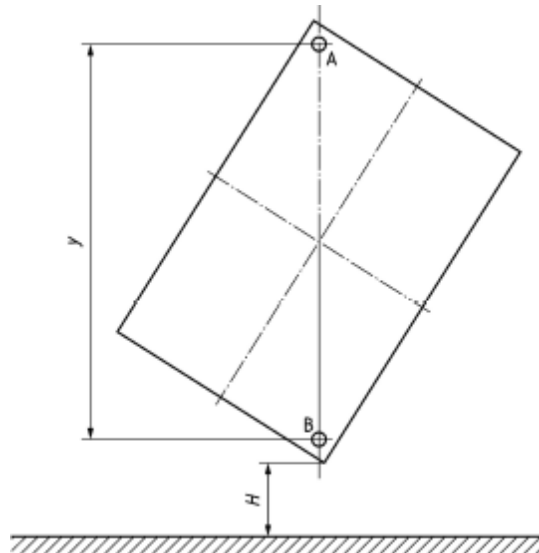


Picture: Drop Test

8.2.2 Corner Edge Drop Test

Tests have to be performed according to 8.9 in DIN EN ISO 8611-1 (2004-05) on the corner edge, with drop height (**H**). Three drop tests have to be performed per pallet

All test specifications see table (chap. "Test Specifications")

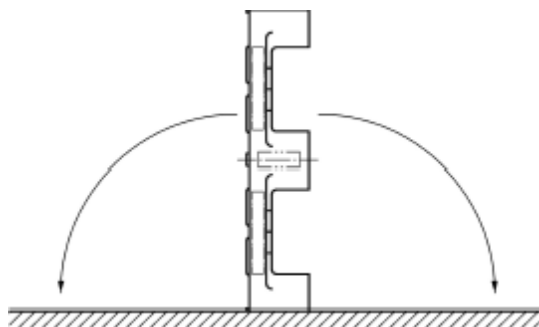


Picture: Corner edges drop test

Measurements of the diagonal y have to be taken before the first and after the third drop test. The change in length in the impact diagonals must be $\leq 3.5\%$. Local deformations in the distance up to 100 mm around the place of impact are permitted. Cracks in the pallet or the welding lines are not permitted

8.2.3 Tilting Test

Pallet has to be cooled down to -25°C and is placed on edge and will be overturned in both directions. It must arise neither fractures, chipping or cracks, nor deformations that affect the function.



Picture: Tilting test

8.2.4 Impact Test (inclined plane)

It is carried out a horizontal impact of the loaded pallet on a wooden beam with a defined impact speed with an acceleration of -0.8 till -1.0 g of at least 150 milliseconds duration.
The functionality of the pallet has to be conserved, there must not arise cracks or fractures.

8.2.5 Roller Conveyor Long Term Test

A loading unit with 1 Q is moved on a powered roller conveyor in reverse 60 h. The distance between the roles of the conveyor must not exceed 210 mm.

Visual inspection:

Abrasion and mobility will be described and evaluated.

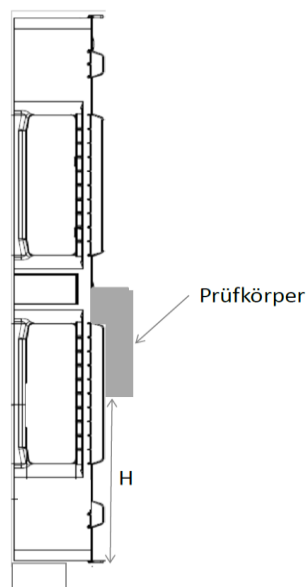
Permanent deformation of the skids under 10 mm are acceptable.

Cracks or breaks are not permitted.

8.2.6 Impact Test on the outer Edge

The pallet is positioned vertically on a wooden beam, so that the outer edges are free. A steel test specimens (Prüfkörper) of the dimensions 70 x 70 x 200 mm, all the edges provided with an radius R4, is dropped from a height H with the end face on the inside of the outer edges.
Cracks or breaks are not permitted.

All test specifications see table (chap. "Test Specifications")



Picture : Impact test on the outer edges

8.3 MATERIAL TEST

8.3.1 Internal Pressure Test (only when pallets have closed skids)

The weld strength is performed at five already tested pallets as well as a range of one untested. It is respectively from a range of the following test:

1. Self stacking
2. Drop test
3. Corner edge drop test
4. Shock drop test
5. Static test

The skids are drilled at 10 preloaded points. Subsequently, a pressure gauge is fitted with compressed air connection.

Two tests are provided:

- In the chambers, a pressure of 2 bar is introduced, it must be held for 10 minutes without appreciable pressure loss.
- In parallel, by appropriate means to check the tightness of the welds, leaks are not permitted.

8.3.2 Wetting Agent Bath Test

To test the material resistance to frequent cleaning, a new palette will be charged as a contribution to network bath.

Following the pallet is examined by visual inspection for possible superficially visible changes or damage.

Permitted are superficial, to 10 mm long and simply branched surface cracks.

Longer, widely ramified or continuous cracks are not permitted.

8.4 HANDLING

8.4.1 Forklift Transportation

After DIN ISO 10531

Additional $R < 2$ m to overturn ($R=1$ m)

Cracks and functional impairment deformations are not permitted

8.4.2 Drop Test of Forklift Fork

After DIN ISO 10531,

but 15 cm drop high (chap. "Test Specifications")

8.4.3 Test Specifications

Below is the table to be used for the above-mentioned test procedures:

Pallet name	SAP no	Stacking in Storage Rack [Q in kg]	Pressure Test	Corner Edge Drop Test [H in mm]	Impact Test on the outer Edge [H in mm]	Drop Test of Forklift Fork [H in mm]
Heavy H1	98-0789-1103-1-00	850	7 Q	2000		2000
Heavy H1 ESD	98-0789-1103-0-00	800	7 Q	1500		2000
Extrem heavy CR1	98-6000-0287-3-00	1750	7 Q	2000		2000
Light D1	98-0348-1285-0-00	400	5 Q	2000	300	2000
Light CS1	98-6000-0191-5-00	800	6 Q	2000	400	2000
Light CS3	98-6000-0351-5-00	800	6 Q	2000	400	2000