

Technical Information

DF06

LT – Low Temperature Decals

In this technical information leaflet Ferro presents the LT – Low Temperature Colours.

Niedrigtemperatur Bilder **FERRO**[®]
Low Temperature Decals
CerDePriNT

The LT- decals can be thermally cured on almost all substrates. The application of two different protective coatings allows the curing on heat resistant substrates at 160 °C to 200 °C as well as curing on temperature sensitive substrates at room temperature.

Particularly suitable are porcelain, glass (bottles, vases, and lampshades), ceramic, stainless steel, coated aluminium, toaster covers, control knob markings on kitchen stoves, powder-coated switch cabinets or furniture.

Our LT-Low Temperature Colours are lead and cadmium free.

Application Examples

1. Firing temperatures of 550 °C to 620 °C are necessary when decorating glass lampshades and glass vases with ceramic glass decals. Depending on the shape of the object, long annealing times are necessary to prevent breakage. This problem is avoided by using LT decals.
2. Very beautiful art nouveau glass decorations may, for example, be produced when using transparent colour printing pastes such as 123502 (Cyan); 133501 (Yellow); 173503 (Magenta), and 143502 (Black).
3. The satin surface of bottles is today often obtained with organic, transparent coatings. If bottles have first been decorated with LT decals,

the bottles can be satin-glazed before the decals are thermally cured. Then the glaze and LT decal are thermally cured together.

4. The LT low-temperature products have primarily been developed to produce decals. However, by adding thinner 80 4004, these pastes can also be used as spray coats. Contact our technical service for precise information on the application procedure.

Decorating Properties

The scratch resistance of the decorated and thermally cured designs and patterns is comparable to that of varnished household objects.

The surfaces are resistant to benzene and alcohol. Even objects that cannot be cured thermally, e.g. wood or various polymers (thermosetting plastics), can be decorated with LT decals. Suitability must be tested in each case, however, when applying these decals.

Printing Paper

The well-known types of paper for producing ceramic decals are also used for producing LT decals. This kind of decal paper is coated via an underlay with water-soluble mixtures consisting of dextrin, polyvinyl alcohol (PVA) and plasticizers, e.g. polyethylene glycol (PEG). Paper with a high PVA content in the paper coating has, in practice, proved to be particularly well suitable, because PVA has a better adhesive effect than dextrin. This improved adhesive effect makes it easier to remove strippable coating 80 2039. Paper manufacturers will gladly recommend the most suitable types of paper.

Printing Pastes

The range of printing pastes comprises 15 colour pastes in various shades, incl. opaque white, additionally we offer gold and silver bronze powder, see table 3 and fig. 3. The suitable auxiliaries and media are listed in table 1. The printing medium 80 4001 is especially designed for the printing pastes and can be mixed with these in any ratio. In order to obtain more colour shades, the printing pastes may as well be mixed with each other.

The gold and silver metallic pastes must be pasted and printed with the medium 80 4002. They should not be mixed with the colour printing pastes.

All printing pastes are supplied ready for printing. Their viscosity can be reduced, if required, by adding thinner 80 890.

Printing is carried out with fine screens due to the high colour intensity of the pastes. We recommend polyester screens PET 120-34 to PET 165-31 or similar stainless steel screens.

Protective Coatings

After the colour decals have been produced and thoroughly dried, they are overprinted with protective coating 80 2019 or 80 2020. The protective coatings produce a uniform gloss on the decal surface, but also ensure that strippable coating 80 2039 can be removed.

In contrast to 80 2019, 80 2020 needs the addition of the hardener 80 4011, which provides the necessary chemical and mechanical surface resistance, although reducing the gloss slightly. When using the hardener, thermal curing is obsolete, which is particularly interesting for the decoration of thermally sensitive objects. Additionally, this system offers the advantage of a faster processing during decal production, because the thermal curing is accelerated by addition of the hardener. This allows a quick overprinting with strippable coating 80 2039.

The range of protective coatings is completed by 80 2026, a satination. The overprinting does not influence the strippability of the strippable or transfer coating 80 2039. 80 2026 causes a satinated surface on the pattern after thermal curing.

The grade of satination can be adjusted by addition of the clear protective coating 80 2019. To print the protective coatings we recommend polyester screens PET 90-48 or PET 120 - 40.

Strippable Coatings

After printing the pastes and overprinting with one of the protective coatings, the decals must be thoroughly dried before overprinting with strippable coating 80 2039. After transferring the decal to the object being decorated, the strippable coating is removed from the protective coating in a dry state.

We recommend printing strippable coating 80 2039 with a polyester screen PET 21-140 or stainless steel 80-37. A minimum dry film thickness of 28-30 µm guarantees good processing of the decals during decoration and easy removal of the strippable coating afterwards.

Table 1: Media and auxiliaries

Product No.	Product Description
80 4001	Printing medium
80 4002	Medium for metallic pigments
80 890	Thinner and cleaner
80 2019	Protective coating
80 2020	Protective coating
80 2026	Protective coating - satined
80 4004	Thinner for spraying
80 4011	Curing agent for 802020
80 2039	Strippable coating
TOE8938a0	Additive for dishwasher resistance

Decoration

If the decorations have to be dishwasherproof to a high degree, the area to be decorated must be pre-treated with a 2 % hydrous solution of additive TOE8938aO before the decal is applied.

The LT decals are then soaked for a few minutes in water, just like normal ceramic decals, and applied to the object. When using the additive TOE8938a0, the surface of the pattern should be cleaned with a wet sponge or cloth before drying, otherwise a film may be visible.

Afterwards, the decorated articles are dried for 30-60 minutes at 50 °C or for 24 hours at room temperature.

After the drying process the coating on top of the decal (strippable coating 80 2039) is removed completely with a knife or sharp object.

Fig. 1 shows this procedure, Fig. 2 clarifies the layer composition of a complete LT decal.

Fig. 1: Removal of the strippable coating 80 2039



After-Treatment

When applying the decal, remains of the water-soluble paper coating and, if used, additive TOE8938aO are transferred to the object. These residues leave a visible beige film on the

substrate after firing or thermal curing. To avoid this effect we recommend wiping the decal surface with a wet sponge or cloth before thermal curing.

If no additive TOE8938aO is used, the decal surface can also be wiped after thermal curing, since the paper coat remains water-soluble, even after the curing process.

Thermal Curing

After the process described above, the decorated articles are thermally cured in a hot-air or other ventilated oven. Table 2 shows the recommended curing conditions.

Table 2: Thermal curing conditions

Curing Temperature	Curing Time
160° C	30 min.
180° C	20 min.
200° C	15 min.

Fig. 2: LT layer composition

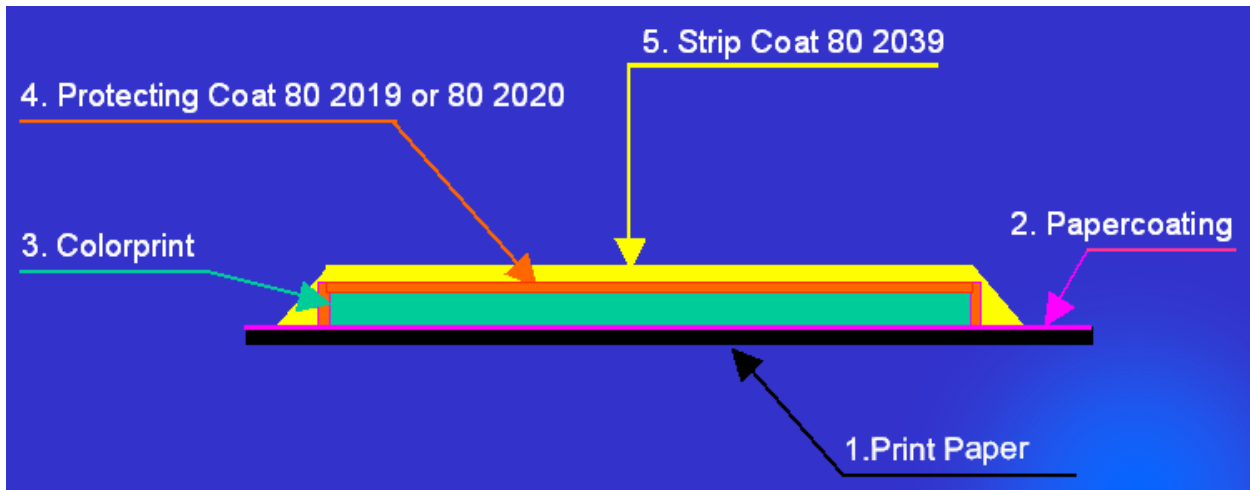


Table 3: The available LT printing pastes

Product No.	Product Description	Pantone® -Code*
11 3501	Printing Paste Olive Green	576 C
11 3502	Printing Paste Blue Green	328 C
12 3501	Printing Paste Aluminate Blue	293 C
12 3502	Printing Paste 4 Colour Cyan	Cyan C
13 3501	Printing Paste 4 Colour Yellow	Yellow C
13 3502	Printing Paste Lemon Yellow	3965 C
13 3503	Printing Paste Orange	179 C
13 3504	2-comp. Printing Paste Gold Pigment	--
14 3501	Printing Paste 4 Colour Black	Black 7C 2X
14 3502	Printing Paste Black	Black 5C
15 3501	2-comp. Printing Paste Silver Pigment	877 C
17 3501	Printing Paste Flesh	705 C
17 3502	Printing Paste Signal Red	227 C
17 3503	Printing Paste 4 Colour Magenta Red	218 C
17 3504	Printing Paste Fire Engine Red	193 C
18 3501	Printing Paste Violet-Purple	242 C
19 3501	Printing Paste White	White

* The above mentioned Pantone®-code is only a guideline for the colour shade.

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Fig. 3: Colour samples of the LT range

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