



A 7 Heat-Release Decoration

Ferro offers a complete product range for Heat-release decoration (HR). This method of decoration allows high-quality screen printing decors to be transferred quickly and precisely.

The decors for heat-release decoration (HR) are printed on paper coated with wax compounds.

For the indirect HR method (pad application) the inks are printed true to side on wax compound paper.

Finally, an HR covercoat is applied and, in many cases, an additional thin print of antiblock paste (80 2032).

The wax compound coat causes the decals to adhere to the object being decorated when transferred.

For the direct HR method (reel to reel) the decorative decal is printed laterally inverted, i.e. the first printing cycle is a covercoat (83 894), on to which the individual inks are then screen-printed. These decors are finished with a special covercoat (80 2023) which can be activated by heat. Both sheets and reels are printed according to this method.

With the paper used for these methods, the wax compound coat does not assume any adhesive function. On the contrary, the wax compound coat for the direct HR method is to release the decal completely at temperatures which are as low as possible.

The paper for the indirect HR method and that for the direct HR method differ to a great extent as regards the composition of the paper coating.

Paper manufacturers for heat-release decorative printing

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Application

In principle, a distinction is made between:

- pad application (indirect HR method) and
- reel application (direct HR method; reel to reel)

Pad-Application

- The mechanically cut decorative decals are stacked in a supply cassette in the HR machine without interlaying wax paper.
- A vacuum gripper takes the decorative decal out of the supply cassette and lays it on a heated, perforated vacuum plate.
- The wax compound coat on the printed paper melts at a temperature that has been defined for the vacuum plate, allowing the decorative decal to be removed from the paper by the pre-heated pad (silicone rubber stamp).
- The heated pad together with the decal is then pressed on the cold object to be decorated.
- When the warm decal makes contact with the cold object, the wax compound solidifies immediately, thus providing for a close adhesive bond between the decorative decal and the object being decorated.
- The empty pad now takes another decal from the heated vacuum plate.

Following the same method, the individual decals can be taken by a heated reel instead of a pad, and transferred directly, true to side, on to the object to be decorated.

Reel Application (Reel to Reel)

- According to this method, the decals are transferred to the object to be decorated by a laterally inverted, printed reel.
- The reel with the printed decals is on a reel-off device and is connected up to a reel-on device.
The decal on the paper reel is directed to an object, e.g. a cylindrical mug, by a photocell-controlled device and pressed from the back of the paper on to the mug being decorated by a heated (140-160 °C) silicone rubber stamp. This decoration process can be compared to the exposure of a photographic film in a normal 35-mm camera. In this respect the exposure of the picture corresponds to the moment of application in the HR process.
- The high temperature of the pressing stamp causes the paper coating to melt on the one hand and, on the other, the coat on the decal that can be activated by heat to become tacky. The mug being decorated now takes the decal laterally inverted from the reel with the liquid wax coat, so that the decal is applied true to side on the mug after transfer.
- As the paper still carries the decal during application, this method has only limited application potential as regards the shape of the object to be decorated due to the stiffness of the paper.

With heat-release application the traditional steps such as soaking, laying on the object, removing excess water slime, drying etc. do not apply.

Examples for making heat-release decorative decals for direct and indirect application.

1. Indirect-HR (Pad) with Downcoat

| Layer | Printing note: | Medium: | Printing Screen: | Comment: |
|-------|----------------------|---------------------------|---------------------------------|---------------------|
| 4 ↑ | Antiblockpaste | 80 2032 | PET 140-31 | |
| 3 | Covercoat | 83 894 | PET 48-80 | |
| 2 | Ein-/Mehrfarbindruck | 80 820, NR.221, 803012 | Dependent on color intensity | |
| 1 | Downcoat | 80 2024 or 80 2018 | PET 180-31 | Steel less suitable |
| | Wachscompound/Papier | HR-Paper | | Sheet printing |

2. Indirect-HR (Pad) without Downcoat

| Layer | Printing note: | Medium: | Printing Screen: | Comment: |
|-------|-------------------------------|-----------------|---------------------------------|----------------|
| 3 ↑ | Antiblock paste | 80 2032 | PET 140-31 | |
| 2 | Covercoat | 83 894 | PET 48-80 | |
| 1 | One color/multicolor printing | 80 820, 80 3012 | Dependent on color intensity | |
| | Vordruck entfällt | | | |
| | Wax compound/paper | HR-Paper | | Sheet printing |

3. Indirect-HR (Pad) without downcoat

| Layer | Printing note: | Medium: | Printing Screen: | Comment: |
|-------|-------------------------------|-----------------------|---------------------------------|---------------------|
| | no Antiblock paste | | | |
| 3 ↑ | Covercoat | 83 894 | PET 48-80 | |
| 2 | One color/multicolor printing | 80 820, 80 3012 | Dependent on color intensity | |
| 1 | Downcoat | 80 2024 or 80 2018 | PET 180-31 | Steel less suitable |
| | Wax compound/paper | HR-Papier | | Sheet printing |

4. Direct-HR · reel application (Reel to Reel)

| Layer | Printing note: | Medium: | Printing Screen: | Comment: |
|-------|-------------------------------|-----------------|---------------------------------|-----------------------------|
| | no Antiblock paste | | | |
| 3 ↑ | Heat-active adhesive | 80 2023 | PET 48-80 | |
| 2 | One color/multicolor printing | 80 820, 80 3012 | Dependent on color intensity | Laterally inverted printing |
| 1 | Covercoat | 83 894 | PET 48-80 | |
| | Wax compound/paper | HR-Paper | | Roll printing or sheet |

5. Direct-HR · reel Application (Reel to Reel)

| Layer | Printing note: | Medium: | Printing Screen: | Comment: |
|-------|-------------------------------|-----------------|---------------------------------|-----------------------------|
| 4 ↑ | Heat-active adhesive | 80 2023 | PET 77-48 | |
| 3 | Insulating coat | 80 2018 | PET 110-34 | |
| 2 | One color/multicolor printing | 80 820, 80 3012 | Dependent on color intensity | Laterally inverted printing |
| 1 | Covercoat | 83 894 | PET 48-80 | |
| | Wax compound/paper | HR-Paper | | Roll printing or sheet |

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| Product-number | Viscosity [mPa*s] 1. D=50 1/s 2. D=200 1/s at 23°C, approx. | Extensibility index | nvp [%] approx. | Drying Figures TZ | Recommended dry film-thickness in µm | Decoration of |
|--|--|---------------------|--------------------|-------------------------|--------------------------------------|--|
| 83 894 Covercoat | 1. 1300 2. 1270 | 146 | 35 | TZ10 = 55 TZ90 = 692 | 10-13 | glass porcelain ceramics enamel |
| 80 2018 Downcoat | 1. 3400 2. 2900 | 458 | 14 | Heat adhesive | 3-7 | porcelain ceramics |
| 80 2023 Heat adhesive | 1. 1300 2. 700 | cannot be measured | 43 | Heat adhesive | 8-10 | porcelain ceramics |
| 80 2024 Downcoat | 1. 930 2. 890 | cannot be measured | 27 | Heat adhesive | 3-7 | porcelain ceramics |
| 80 2032 Antiblocking Printing paste | 1. 650 2. 350 | cannot be measured | 17 | Heat adhesive | 6-8 | porcelain ceramics |

The technical data sheets of the individual products can be found in the Resource Center.

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