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# BLACKFAST

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ROOM TEMPERATURE BLACKING OF IRON AND STEEL

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**BLACKFAST**



## HERITAGE OF BLACK OXIDE

Throughout history, weapon manufacturers have explored different metal finishing processes to protect their carefully crafted products from oxidation. Their solution to the problem was to oxidise the metal's surface and render it inactive from further attack.

The secrets of the chemical blacking processes known to the ancient alchemists are nearly all lost. There are a few artisans who still practice some of the traditional methods of blueing. Their metal-blackening process involves dissolving copper nails in acid into which the item to be cold blacked is immersed, followed by burial in the soil for a number of weeks. The result is a deep blue black colour which when oiled has a lustrous appearance.

## THE FUTURE

With the growth in popularity of the Blackfast process during the last 10 years, and its ubiquitous use throughout Europe there has been the development of yet one more name for the process...

**BLACKFASTING!!!**

1

**BLACKING**

# INTRODUCING BLACKFAST CHEMICALS

**BLACKFAST CHEMICALS HAS BEEN ESTABLISHED FOR OVER 30 YEARS**

Blackfast Chemicals manufactures a unique product for the blacking of iron and steel at room temperature. Customers include well-known tooling manufacturers, OEMS and hundreds of smaller independent engineers around the world. Chemical blacking can be done by anyone. It is simple, fast and inexpensive.

**SIMPLE** because the solutions are designed to be topped up and not replaced when they become weak.

**FAST** because it is on-site and ready for use at any time. There is no preparation required, the tank lids are taken off and the components are blacked without delay.

**INEXPENSIVE** because the Blackfast solution coverage per litre is high and the resultant cost per unit of blacking is markedly less than the conventional method.

**VISIT OUR SAMPLE PROCESSING FACILITY/DEMO ROOM**

Blackfast Chemicals has a sample processing facility/demonstration room in Leicestershire where anyone who wishes to see the processes in operation is welcome.



# ROOM TEMPERATURE BLACKING PROCESS FOR ALUMINIUM, ZINC, IRON AND STEEL

THE BLACKFAST PROCESS IS SUITABLE FOR BOTH SMALL BLACKING LINES  
AND AUTOMATIC PRODUCTION LINES

## APPLICATIONS

- Industrial Machinery Parts
- Cutting Tools
- Tool Holders
- Chains and Sprockets
- Springs
- Machine Tools
- Clutch Drive
- Drill Bits
- Hand Tools
- Jigs and Fixtures
- Ball Screws
- Fasteners
- Gears
- Hydraulic Machinery
- Hydraulic Block
- and many more...



1

**BLACKING**

**BLACKFAST 20 LITRES**

**BLACKFAST 50 LITRES**

25 litres Blackfast 716 Degreaser

25 litres Blackfast 716 Degreaser

5 litres Blackfast 551 Conditioner

10 litres Blackfast 551 Conditioner

10 litres Blackfast 181 Blacking

25 litres Blackfast 181 Blacking

25 litres Blackfast 833 Dewatering oil

50 litres Blackfast 833 Dewatering Oil

7 Plastic tank and lids  
(442mm x 296mm x 305mm)  
2 Small heat mats

7 Plastic tank and lids  
(600mm x 425mm x 425mm)  
2 Small heat mats

1 Steel frame (in two sections)

1 Steel frame (in two sections)

2 Stainless steel baskets

2 Stainless steel baskets

# BLACKFAST OVERVIEW

## INTRODUCTION

Blackfast is a specialist finish for colouring iron and steel components black. It is a safe and easy-to-use chemical immersion process operated at room temperature. The product's unique quality is that the finish does not result in an alteration to the dimension of the component. Any manufacturer of precision engineered components requiring a decorative finish is a potential customer. These are commonly found within the tooling and machinery manufacturing industry.

## THE MARKET

Blackfast Chemicals, the UK leader and specialist in room temperature blacking, is successfully selling the Blackfast range of products to light engineering companies and machinery companies domestically and overseas. The customers of this product are companies that manufacture components from iron and steel with critical dimensions. A uniform black finish to such components is today extremely popular and adds considerably to the perceived value of that product. Blackfast Chemicals' UK customers range in size from the largest, who purchase 10,000 litres/annum, to the smallest, who purchase 25 litres/annum. The product is sold in 5 and 25 litre containers. 25% of the customers manufacture machine tool related products, 5% hydraulic blocks and components, 60% machinery including those for woodworking, metalworking, shoemaking, book binding, printing, numbering, can making etc. 5% fasteners and miscellaneous items, 5% contract plating companies and jobbers.

## THE PROCESS

The Blackfast process is grouped within the category of chemical blacking (not to be confused with parkerising or phosphating processes!). The uniform black finish obtained is in the order of 0.2 to 3 microns thick and has a greater decorative than protective value. Since the process does not materially affect dimensions, and a uniform colouring is obtained over threads, blind holes etc., even when components are basketed, it is eminently suitable for small machined components. Processing entails degreasing and, if necessary, derusting before immersion in a bath at room temperature. Corrosion protection is afforded by a final immersion in a dewatering oil.

The process equipment required is a simple arrangement of polythene tanks and running water rinses and does not require expensive extraction equipment. It is usually located in or adjacent to the manufacturing line. In most cases it is operated by workers with no technical expertise in this field. The product is shown by a short demonstration using the potential customer's own steel component. Any form of steel from mild through cast, to hardened tool steel, but not stainless steel, can be blacked. At a purchase price of £12/litre of concentrated solution, the end user can expect to black, on average, one kilogram of steel for 12 pence. One litre of concentrated solution will cover between 4 and 8 square metres of steel depending upon the substrate to be blacked.

## ENVIRONMENTAL CONSIDERATION

The operator seldom finds it necessary to dispose of a working solution because during use, as the solution becomes weaker, the strength and balance of the solution is re-established by the addition of concentrated solution. In the event of a full tank being discarded, the services of an authorised waste contractor will be required. The Blackfast process is successfully operated even in countries with the most rigorous environment legislation including Scandinavia, Germany, Japan and the USA.

# 1

## BLACKING

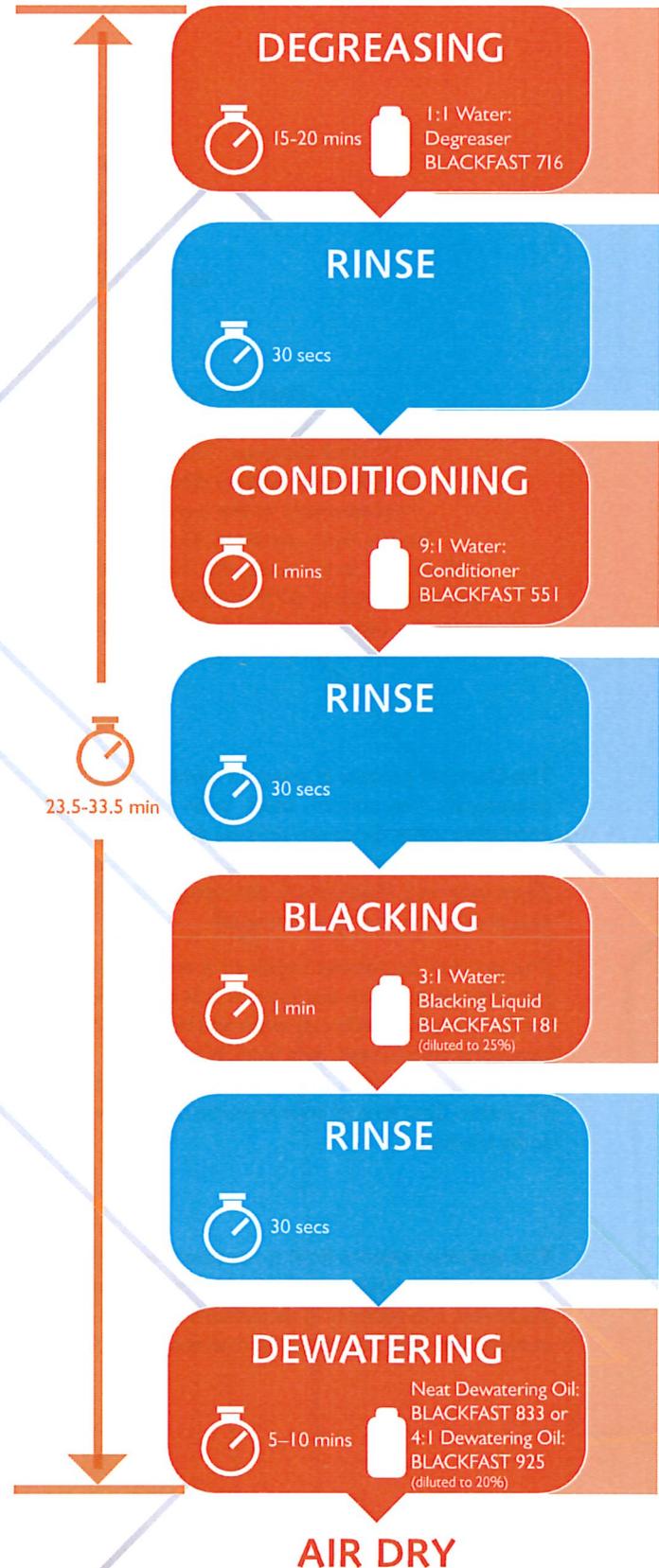
# ROOM TEMPERATURE BLACKING OF IRON AND STEEL

Blackfasts' room temperature blacking process is a simple dip operation specifically designed for use in factories.

The process does not materially affect dimensions and a uniform colouring is obtained over machined surfaces, threads and blind holes. Blacking is achieved by chemical conversion of the metal surface. The process entails degreasing, immersion in a surface conditioner, and blacking solution. Corrosion protection is afforded by a final immersion in a dewatering oil.

## THE BLACKFAST PROCEDURE

If the material surface has slight red rust, mill scale or prismatic colour distortion caused by heat treating, this should be mechanically or chemically\*\*\* removed before conditioning.



Parts should be as clean as possible, even before placing into degreaser!



> 20°C

- Load the "oil free" basket, jig or hook (Rack) with component(s) and place in tub
- Agitate the rack periodically to ensure even contact
- Leave 15- 20 minutes until cleaned (Leave longer for heavily soiled parts)
- Lift rack out, DRAIN WELL to prevent carryover contamination and product wastage
- Place rack in rinse tub

1

Rinse - Clean Running Tap Water

- Leave for one minute with gentle agitation or aeration
- Lift rack out, DRAIN WELL to prevent carryover

2

**Note:** For EN3B, O1, A2, I020-I021, 4140, I018, High Speed Steel, Ground Surfaces or Hard Metals Omit Step 3.

- Place rack in Conditioner tub
- Soak for 15 – 30 seconds (NO LONGER)  
Note: Tank label says 1–2 minutes; this time would be required only when the solution is old and weak
- Agitate the rack to ensure even contact with liquid
- Lift rack out, DRAIN WELL to prevent carryover and product wastage
- Place rack in rinse tub

3

Rinse - Clean Running Tap Water

- Leave for one minute with gentle agitation or aeration
- Lift rack out, DRAIN WELL to prevent carryover

4

Blacken – Blackfast 181 Blackener



> 20°C

- Place rack in Blackener tub
- Soak for 10 seconds, remove and examine for even colour change \*
- Agitate the rack gently to ensure even blackening
- Soak for another 5 – 50 seconds until blackening is complete (NO LONGER)\*\*
- Lift rack out immediately, DRAIN WELL to prevent carryover and product wastage
- Place rack in rinse tub

5

Rinse - Clean Running Tap Water

- Leave for 1 minute with gentle agitation or aeration
- Lift rack out, DRAIN WELL to prevent carryover

6

- Place rack in dewatering tub
- Soak for 10 minutes
- Lift rack out, DRAIN WELL, place on draining rack
- Allow to air dry for 45 minutes before handling

7

## MAINTENANCE

- Keep levels of the four main products topped up with fresh diluted working solution
- Skim oil & scum from top of Degreasing tub number 1 if visible
- Filter the 181 Blackening solutions upon notice of grey deposit in bottom of tub, either through a paper coffee filter (small system) or by pumping through a 50-micron filter cartridge with a fountain pump

### NOTES

\* If colour change is patchy, rinse and return to tub 1 for further degreasing. A patchy black is usually due to oil contamination, solution not up to temperature or contaminated rinse water.

\*\* Items left in 181 too long will smut. If smutting has occurred, wipe excess smut off with a rag after rinsing then rinse again in step 6.

\*\*\* Procedure for chemically removing rust, mill scale or heat caused colour distortion is: Soak parts for 5 – 10 minutes in a 15% Hydrochloric (Muriatic) Acid Bath. Mechanical removal of above would involve sandblasting, wire brush, or other slight abrasive.

# ACCELERATED CORROSION TESTS

## (SOLVENT/MINERAL OIL CORROSION PREVENTATIVE)

Standard test procedure

**Salt spray - ASTM B117** (days to 5% rust by area)

**Humidity Cabinet DIN 50017 SK** (days to 4 rust spots or any rust spot > 1mm diameter)

Steel panels were dipped in Blackfast 833 and 841 and left to dry naturally overnight.

**Test 1** Salt Spray Cabinet ASTM B117 (5% NaCl @ 35 °C)

Sample 1 - Blackfast 181 and 833 oil showed slight edge corrosion after 48 hours and a marked increase in corrosion after 72 hours.

Sample 2 - Blackfast 181 and 841 oil showed signs of corrosion after 120 hours.

**Test 2** Humidity Cabinet Test (100% Water @ 40 °C)

Both samples showed no signs of corrosion after 400 hours.

This represents very good corrosion protection properties for components in normal storage conditions, or working environments.

# ACCELERATED CORROSION TESTS

## BLACKFAST 925

### Standard test procedure

**Salt spray - ASTM B117** (days to 5% rust by area)

**Humidity Cabinet DIN 50017 SK** (days to 4 rust spots or any rust spot > 1 mm diameter)

Steel panels were dipped in Blackfast 925 and left to dry naturally overnight.

**Test 1** The solution was operated at a 13.8% strength and at a working temperature of 50 °C  
Tests in a humidity cabinet showed no rust after 144 hours (6 days) when it was completed.

**Test 2** Tests were conducted operating the solution at 20% strength and the panels were placed in both a humidity and salt spray cabinet.

Humidity cabinet tests averaged 244 hours (10 days).

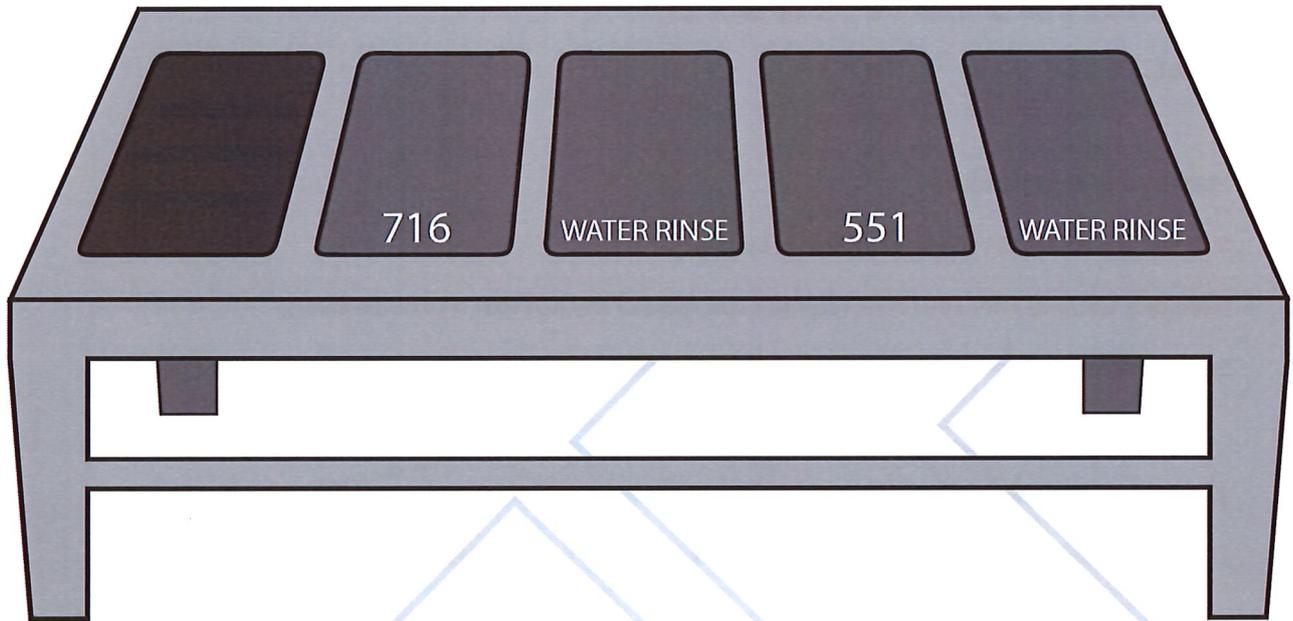
Salt spray test averaged 24 hours.

This represents very good corrosion protection properties for components in normal storage conditions, or working environments. It should also be noted that even better corrosion protection can be achieved if components are dried quickly at elevated temperatures.

1

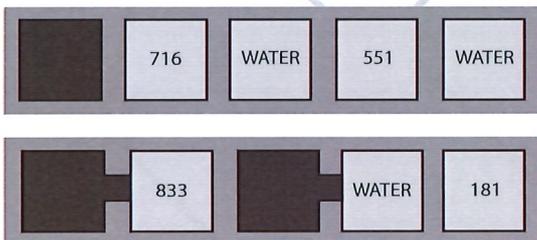
BLACKING

## 20 LITRE BLACKFAST BLACKING LINE

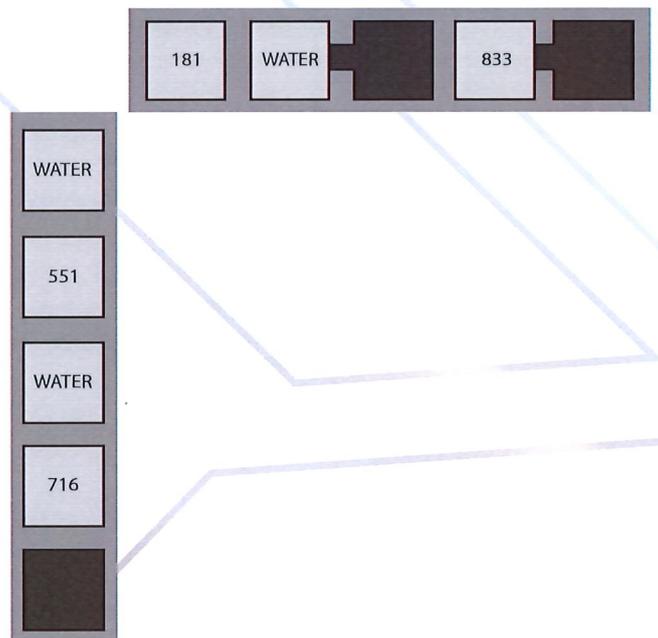


### LAYOUT OPTIONS

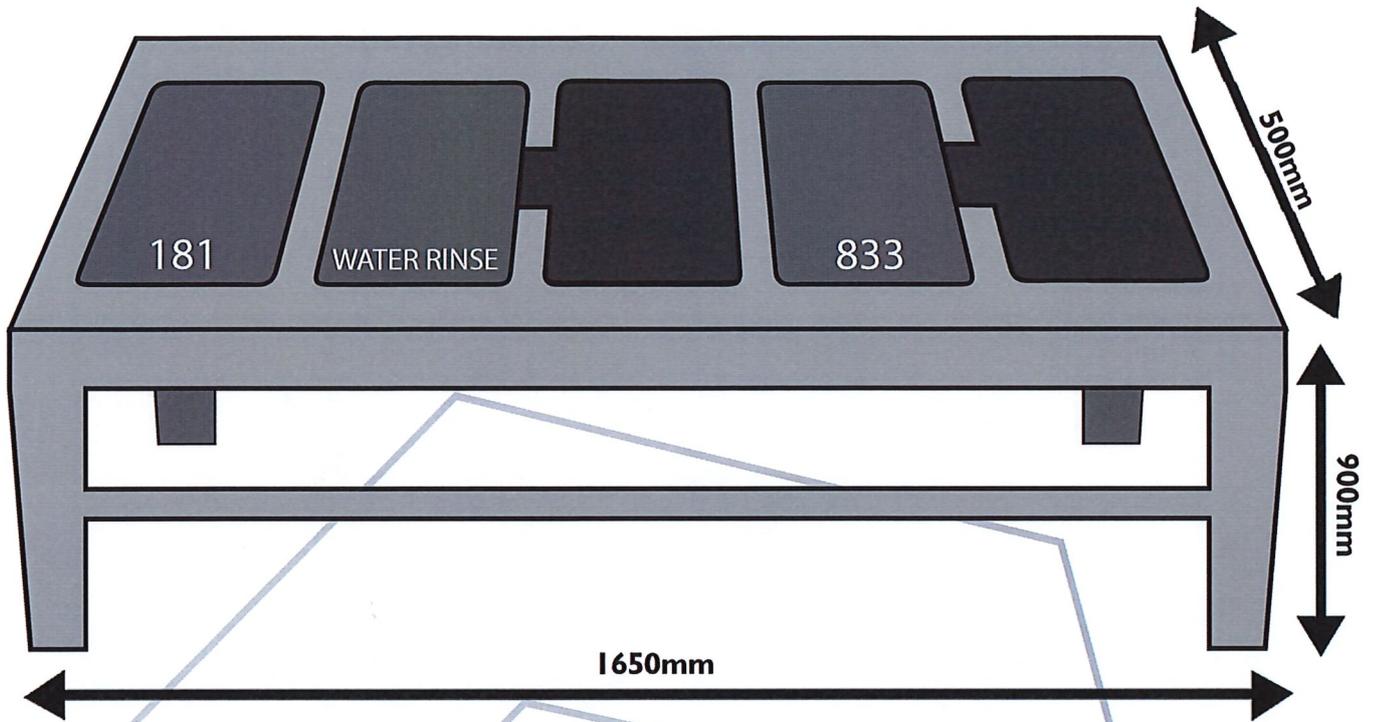
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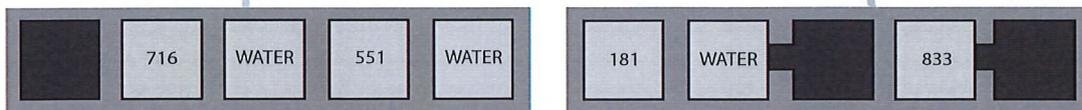
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## FRAMES AVAILABLE FROM STOCK



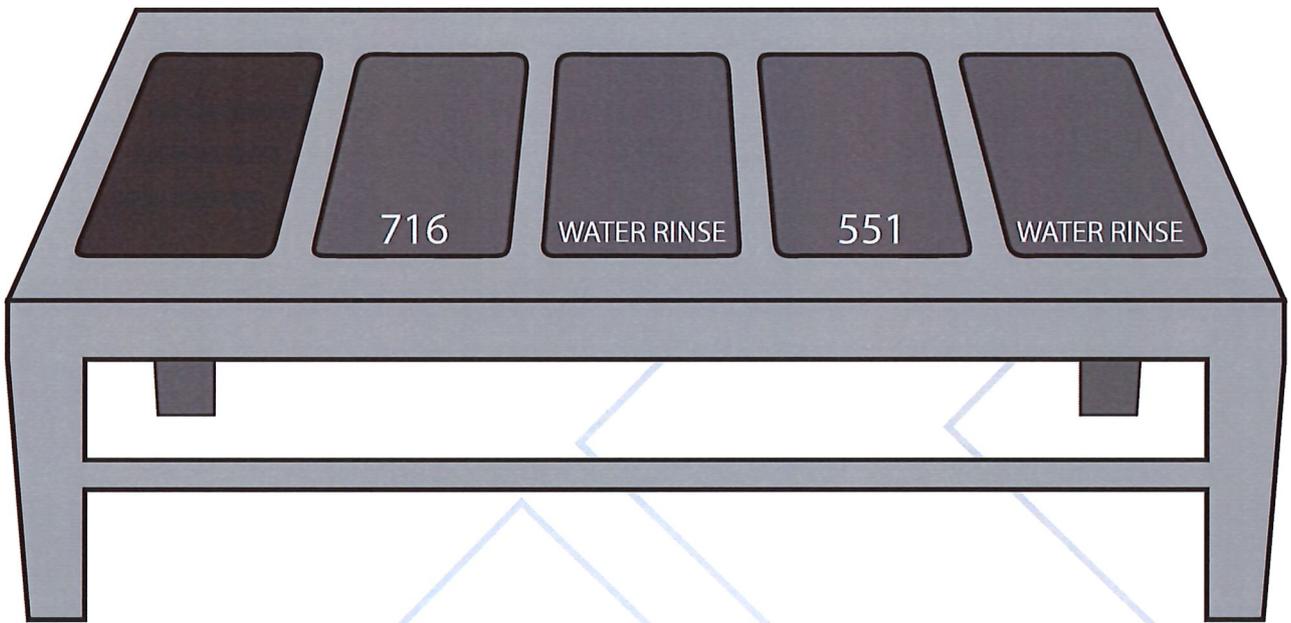
**3**



1

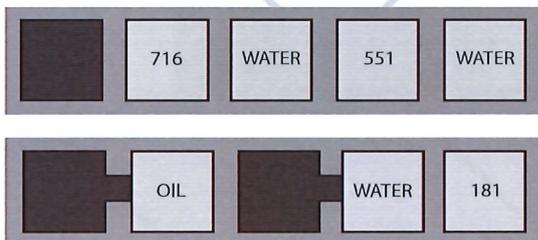
BLACKING

# 50-100 LITRE BLACKFAST BLACKING LINE

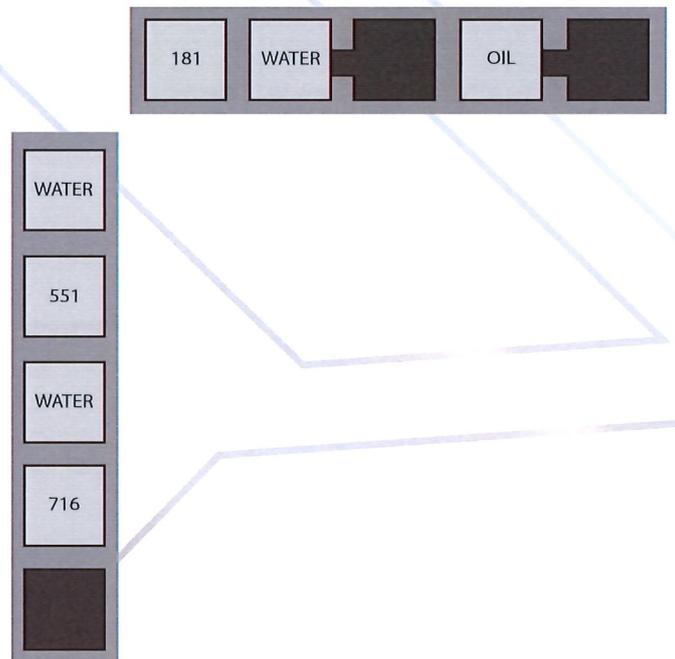


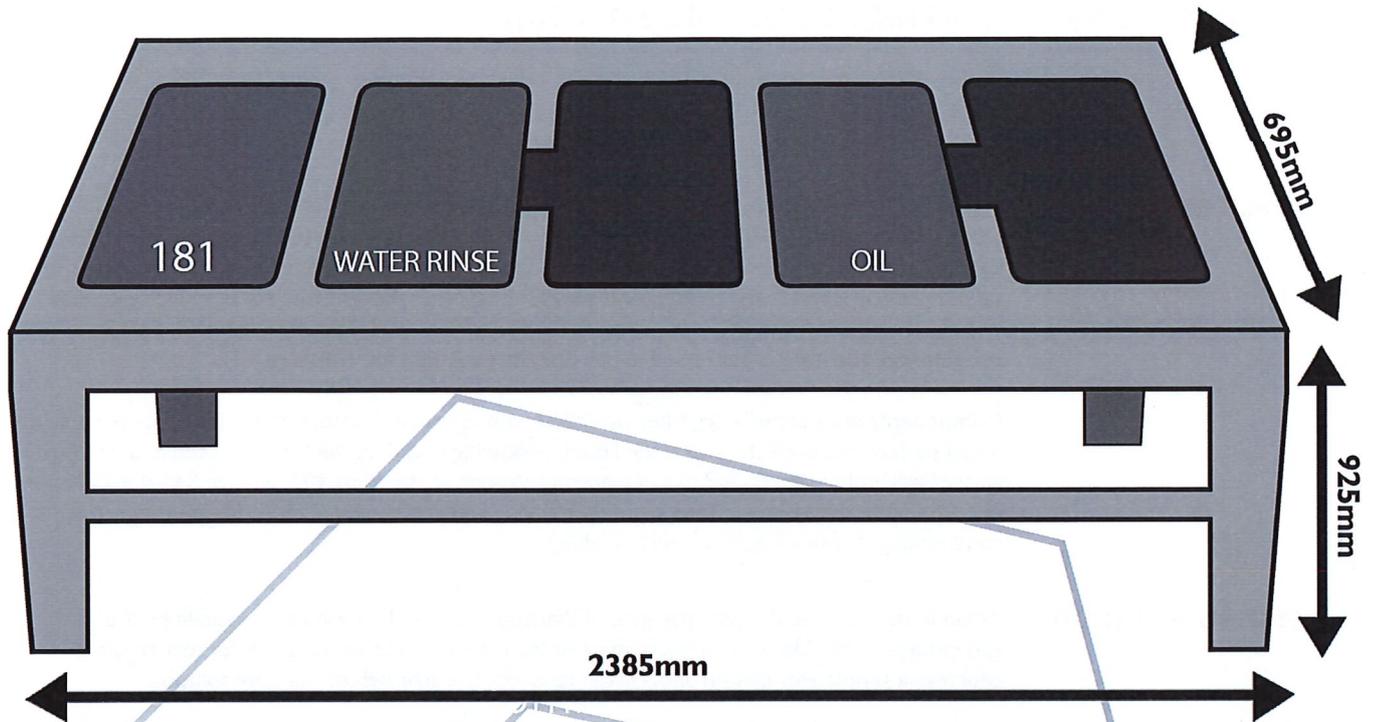
## LAYOUT OPTIONS

1



2





**3**



**1****BLACKING**

# APPLICATION DATA SHEET

## BLACKFAST 181 IRON/STEEL BLACKING SOLUTION

**USE** 25% solution in water.

**APPLICATION** Blackfast 181 will chemically black cast iron and steels containing 12% chromium or less at room temperature (20 °C). Blacking performance may be adversely affected by temperatures lower than 16 °C. Preparation of the surface of the item to be blacked is carried out using one or more steps involving degreasing, pickling and conditioning using the appropriate Blackfast products with intermediate flowing water rinses. Once the surface is chemically clean and, if necessary, conditioned, the item is immersed in the Blackfast solution for 1 minute.

Components are normally jigged or barrelled with agitation if necessary to ensure all parts of the metal surface are in contact with the liquid. Following blacking, the item is rinsed in a flowing water bath and finally dipped in a dewatering oil such as Blackfast 925, 833 or 841 depending on the type of finish required. Thus a typical blacking line can involve 7 tanks (degreasing - rinse - conditioning - rinse - blacking - rinse - oiling).

**TESTING & CONTROL** When in regular use, the performance of Blackfast 181 can be monitored readily by the appearance of the blacked components and the time taken to achieve the correct result. In addition, a simple test can be undertaken to check the strength of the tank solution.

10ml of tank solution is placed in a transparent conical flask and a few drops of bromocresol green indicator added. The contents of the flask are titrated with a test solution (N/25 NaOH) until the original green colour has changed to blue. Consumption of 20ml of the test solution indicates a tank of the correct strength. For each 1ml shortfall from the reading of 20ml, it is necessary to add 1.25% Blackfast 181 (i.e. for a 100 litre bath add 1.25 litres of Blackfast 181).

**TANK MATERIAL** Tanks should be of plastic, rubber-lined steel or stainless steel.

**PRODUCT SAFETY DATA SHEET** A safety data sheet is available.

Blackfast 181 is part of the Blackfast range of products for the treatment of iron, steel and aluminium at low temperatures.

Blackfast Chemicals continues to improve the quality and performance of its range of products and reserves the right to modify product formulations without prior notice.

# APPLICATION DATA SHEET

## BLACKFAST 551 CONDITIONER

**USE** 10% solution in water.

**APPLICATION** Hardened steels and cast iron may not require conditioning but for the majority, and especially mild steels, the use of Blackfast 551 results in a homogenous surface ready for blacking. After degreasing (and pickling if necessary) steels are clean but usually exhibit surface variations which, if not treated, can result in uneven blacked surfaces. Immersion for 1-2 minutes in a 10% solution of Blackfast 551 in water, prepares the surface so that consistent blacking is achieved.

Immersion for a longer period is not recommended since over-conditioning leads to inconsistent blacking and patchy results.

**TANK MATERIAL** Tanks should be made of a suitable polypropylene.

**PRODUCTS SAFETY DATA SHEET** A safety data sheet is available.

Blackfast 551 is part of the Blackfast range of products for the treatment of iron, steel and aluminium at low temperatures.

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**1****BLACKING**

# APPLICATION DATA SHEET

## BLACKFAST 716 LIGHT ALKALINE DEGREASER

**USE**

As supplied or 50% solution in water.

**APPLICATION**

Blackfast 716 is a light alkaline degreaser used in the preparation of clean metal surfaces prior to the blacking process. Used in a dilution of 50% in water for 15-20 minutes, Blackfast 716 will degrease iron and steels at room temperature. However, immersion times will vary according to the condition of the component. More heavily oiled and greased parts can be treated first using Blackfast 250, a solvent degreaser, and finished off effectively with Blackfast 716.

**TANK MAINTENANCE**

It is important to maintain the strength of Blackfast 716 by removing 10% of the tank content every 1-2 weeks and replenishing with fresh material. The effectiveness of a Blackfast 716 tank can be checked regularly by examining the water rinsed components after degreasing. If water rinse drains unevenly showing dry patches, the surface is still contaminated with oil or grease and requires further degreasing through a fresh Blackfast 716 tank.

**TANK MATERIAL**

Tanks should be made of mild steel or suitable grade of polypropylene.

**PRODUCT SAFETY  
DATA SHEET**

A safety data sheet is available.

Blackfast 716 is part of the Blackfast range of products for the treatment of iron, steel and aluminium at low temperatures.

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# APPLICATION DATA SHEET

## BLACKFAST 833 DEWATERING OIL MEDIUM

**USE** Use as supplied

**APPLICATION** Following the water rinse immediately after the blacking operation, the blacked component is immersed in a tank of dewatering oil for 10 minutes. Remove and allow 45 minutes to air dry. This procedure ensures that the water is removed from the surface of the component and establishes a protective anticorrosive layer within the black coating. Ensure that the immersed component is suspended above any water which may accumulate in the bottom of the tank. This water should be drained periodically. Components, particularly those with blind holes, threads or porous surfaces should be rotated or agitated within the dewatering oil to ensure all the water is displaced and removed. Larger flat surfaces must be suspended vertically to facilitate run off of water.

**TANK MAINTENANCE** To ensure that the dewatering oil is maintaining its efficiency, check treated components for streaks, discolouration or rust development all of which indicate that the product requires replenishment.

Keep the tank covered when not in use to prevent evaporation of white spirit. A tank in continuous use will require vapour extraction.

**PRODUCT SAFETY DATA SHEET** A safety data sheet is available.

Blackfast 833 is part of the Blackfast range of products for the treatment of iron, steel and aluminium at low temperatures.

Blackfast Chemicals continues to improve the quality and performance of its range of products and reserves the right to modify product formulations without prior notice.

**1****BLACKING**

# APPLICATION DATA SHEET

## BLACKFAST 925 WATER-BASED CORROSION PREVENTATIVE - MEDIUM

### USE

Operate at a dilution of 15 - 20% depending upon the degree of corrosion protection required. Fill the mild/stainless steel tank 3/4 full with warm water and add Blackfast 925 slowly whilst mixing vigorously.

### APPLICATION

Following the water rinse immediately after the blacking operation, the components are immersed in the tank of Blackfast 925 either in a basket or suspended individually for 5 minutes. Agitate small items and rotate those with complicated shapes. They are then placed on a draining board.

To accelerate the drying time and improve the quality of the corrosion preventative film, operate the bath at 35 - 40 °C. Allow 45 minutes drying time before handling the components.

The solution should be agitated during use.

### TANK MAINTENANCE

The bath level needs to be topped up every day to replace water losses due to evaporation. In hard water areas the life of the bath will be extended by using demineralised water. Viscous scum will need to be removed regularly.

The operating life of the bath will be determined by the amount of work processed and can be dramatically shortened if a quantity of blacking solution is carried over into the bath.

Addition of new Blackfast 925 should be made by pre-mixing a concentrated solution of equal parts of 925 and warm water. This emulsion is added to the tank whilst mixing.

Shelf life of the concentrate solution at ambient temperature: 1 year.

### PRODUCT SAFETY DATA SHEET

A safety data sheet is available.

Blackfast 925 is part of the Blackfast range of products for the treatment of iron, steel and aluminium at low temperatures.

Blackfast Chemicals continues to improve the quality and performance of its range of products and reserves the right to modify product formulations without prior notice.