RAMCO HARD WORKER

MICRO CONCRETE HW401

Free-flow, non-shrink, high-strength cementitious micro-concrete for structural repair

TECHNICAL DATA SHEET

Product Description

Hard Worker Micro Concrete HW401 is a flowable, ready-to-mix cementitious micro-concrete for the structural restoration of damaged and deteriorated reinforced concrete. Supplied as a pre-blended dry powder requiring only the site-addition of clean water and clean graded coarse aggregate for deeper sections - it compacts under its own weight without vibration, flowing readily into congested reinforcement and confined or restricted locations to produce a dense, homogeneous, high-strength concrete that bonds strongly with the parent substrate.

The formulation is based on cement, graded aggregates and fillers with a low water demand that ensures high early strength, controlled shrinkage and long-term durability.

HW401 is available in 40 MPa, 60 MPa and 80 MPa grades to suit the specified structural performance.

Uses

HW401 is intended for the economical repair and strengthening of reinforced concrete elements, particularly where access is restricted and where vibration of the placed material is difficult or impossible. Typical applications include:

- Beam and column jacketing
- Concrete encasement and section build-ups
- Restoring concrete cover over reinforcement
- Strengthening of foundations and pile caps

Advantages

- Self-compacting — placed without vibration
- Free-flowing; reaches congested reinforcement and restricted sections
- Can be poured or pumped into place
- Pre-packed to overcome site-batching variations
- Excellent bond with the parent concrete
- High compressive and flexural strength with controlled shrinkage
- Available in 40, 60 and 80 MPa grades

Design Criteria

HW401 can be placed in sections up to 100 mm deep in a single pour. For deeper sections, the mixed material should be extended with clean, graded 6–12 mm saturated surface-dry aggregate to minimise heat build-up; the quantity of aggregate depends on the nature and configuration of the repair location.

Surface Preparation

Cut back all defective or weak concrete to a sound base and mechanically roughen dense or smooth surfaces. Remove loose particles, dust, oil, grease, rust and unsound concrete by mechanical means such as grit blasting, high-pressure water jetting or breakers. Expose corroded reinforcement around its full circumference, clean it to bright metal to remove all loose scale and corrosion deposits, and protect it with a suitable anti-corrosion coating. Keep the unrestrained surface area of the repair to a minimum.

Saturate absorbent substrates with clean water several hours before placement and remove all free-standing water immediately before pouring. On dense or smooth substrates, apply a suitable bonding agent (HW Bonding Agent SBR or Epoxy) to ensure adhesion.

Mixing Instructions

Use a forced-action mixer of adequate capacity, or a high-torque slow-speed (400–500 rpm) drill fitted with a mixing paddle. Ensure that mixing capacity and labour are sufficient to allow placing or pumping to be carried out continuously.

Measure 3–3.5 litres of clean water per 25 kg bag. Add 80–90% of this water into a clean mixing drum and gradually add one 25 kg bag of HW401 while mixing continuously. Add the balance of the water and, where specified for deeper pours, 6–12 mm clean graded aggregate, then mix for at least 3 minutes until a smooth, uniform consistency is achieved. Use the material immediately after mixing and do not add extra water once mixed.

Formwork

Where the material is to be placed under formwork, the formwork must be rigid, adequately supported and slurry-tight so that it will not deform or leak under the hydraulic pressure of the fluid micro-concrete. Provide a feed hopper at the highest point and, where necessary, air vents to prevent air entrapment, and treat the formwork with a mould-release agent before fixing.

Placing

Place HW401 immediately after mixing. When poured, work continuously from one side only to displace air and avoid entrapment, maintaining a continuous concrete front until the material flows to the opposite face and slightly overflows to confirm complete filling of the section. Where the material is pumped, follow standard concrete pumping practice and prime the pump and pipeline before placing. HW401 may be placed in a single pour up to 100 mm thick; deeper sections should be extended with graded aggregate as noted above.

Working Conditions

In cold conditions, warm mixing water may be used to accelerate strength development, and normal winter precautions for cementitious materials should be adopted. In hot conditions, store the material in the shade and use cool mixing water to preserve working time.

Curing

As HW401 is a cement-based repair material, cure all exposed surfaces immediately after placing (and after stripping formwork) in accordance with good concrete practice, using continuous water curing, wet hessian or polythene sheeting, or an approved curing compound. Supplementary curing should be used in harsh drying conditions.

Technical Properties

Property	Typical Result
Colour	**Grey**
Dry Density	**1200 – 1300 kg/m³**
Water Addition	**12 – 14%**
Flow	**Slump cone method (600 mm+)**
Shrinkage (IS 1727)	**0.025 – 0.040%**
Initial Setting Time (IS 4031 Part 5)	**145 minutes**
Final Setting Time (IS 4031 Part 5)	**450 minutes**
Coefficient of Thermal Expansion (ASTM C 531)	**10×10^{-6} /°C**

Performance Parameters (by Grade, 28 days)

Property	M40	M60	M80
Compressive Strength (ASTM C 109)	**45 – 50 MPa**	**65 – 70 MPa**	**80-85 MPa**

Property	M40	M60	M80
Flexural Strength (ASTM C 580)	10 – 11 MPa	12 – 13 MPa	15 – 16 MPa
Rebar Pull-out Bond, 20 mm dia (IS 2770)	120 – 130 kN	130 – 140 kN	150 – 160 kN

All values tested under standard laboratory conditions.

Estimating and Yield

Property	Typical Result
Yield (without aggregate)	13 litres per 25 kg bag
Yield (with 30% aggregate)	15 litres per 25 kg bag

Actual yield per bag depends on the consistency of the mix and the quantity of coarse aggregate added.

Package

Available in 25 kg bags.

Shelf Life

Shelf life of 6 months from the date of manufacture in sealed, undamaged packaging. Store in dry conditions between +5°C and +50°C, protected from moisture, direct sunlight and frost. Storage in high-temperature or high-humidity conditions may reduce the shelf life.

Important Note

Do not pour in layers thicker than 100 mm without the addition of aggregate. Do not add extra water after mixing, and avoid application on unprepared or weak substrates.

Precautions and Safety

HW401 is cementitious and alkaline in nature. Avoid contact with skin and eyes, prevent inhalation of dust during mixing, and wear gloves, goggles and a dust mask and work in well-ventilated areas. In case of skin contact, wash with clean water; in case of eye contact, rinse immediately with plenty of clean water and seek medical advice. Clean tools with water before the material sets; once hardened, it can only be removed mechanically. HW401 is non-flammable.

Additional Information

The Hard Worker range includes a comprehensive selection of concrete repair and construction chemical products — repair mortars and micro-concretes, integral and surface waterproofing systems, tile adhesives and grouts, block-fixing mortars and admixtures. Separate technical data sheets are available for each product.

Technical Support

All values provided are tested under controlled laboratory conditions; performance may vary depending on site conditions and workmanship. For site-specific recommendations, technical data, or detailed guidance, contact the Hard Worker Technical Services Team at:

Toll-free number 1800 202 5700

Email customercare@ramcocements.co.in

The Ramco Cements Limited
Auras Corporate Centre, V Floor, 98-A, Dr.Radhakrishnan Salai,
Mylapore, Chennai, Tamil Nadu - 600 004