ADITYA BIRLA
HINDALCO

23rd August, 2024

To
The DG BIS, MTD8
Bureau of Indian Standards (BIS)

Subject: Concerns Regarding the Inclusion of FRHC in IS 12444 standards

Dear Sir,

Hindalco Industries, Birla Copper is second largest producer of Copper Rods in the World (Excluding China), having a capacity of ~5.4 lac mt of copper rods and ~90 kt of copper wires.

This letter is in response to the meeting held at MTD8, BIS on 5th August'24 on potential inclusion of FRHC rods in the Indian standard IS 12444, which we are writing to express our concerns on:

Indian standard IS 12444 is for Copper Wire Rods for Electrical Applications. The concerns regarding the inclusion of so called "FRHC" in India are as below:

1. Secondary rods/remelted rods (FRHC) produced in India are made from unrefined scrap with conventional/manual methods that are not capable of removing the impurities to enhance the purity to that needed for electrical applications.
2. Further, FRHC process as followed in India includes addition of high amount of pure Lead (to remove high impurities such as Bi, Zn, Sb and Sn, present in unrefined copper scrap which is used as raw material by FRHC producers). Lead has a much lower melting point as compared to copper and is used to skim away impurities present in the scrap. However, the Lead along with these impurities stays in the molten Copper (as the removing of the molten Lead is done manually through skimming) and adversely impacts the mechanical and electrical properties of copper rods produced. This can lead to conductor/cable failure in any electrical system given the high and varying impurity of the rods.
    a. High Bi and Zn lead to lower electrical conductivity (typically <100%)
    b. High Lead concentration reduces the mechanical strength
    c. Sb in presence of Lead forms Cu3Sb and negatively impacts both the electrical conductivity and mechanical strength of the rods.
3. Given the varying Copper content and impurities in the input scrap, and the manual process for FRHC, the products produced from this process are not consistent in terms of impurities and other desired properties which are required for efficiency, conductivity and safety requirements from electrical products made from these rods (such as House Wires, Power Cables, Consumer Durables and Auto Wire harness).

4. These FRHC Rods (Remelted/Secondary rods) are primarily being used in India due to the difference in the commercials across primary vs secondary due to higher discounts for scrap (because of the higher impurities) and scrap buying still largely being in the informal economy (not paying GST on par/at all). While the higher discounts for scrap procurement due to higher impurities is fine, the processing required to produce Electrical Grade Copper needs to be more than just Fire Refining (and will need a mix of a pyro/smelting process and electro-refining) which is at present not being done.

Therefore, as the FRHC process with the current form in which scrap is being used and with no standards in place to monitor and segregate the same, we believe that the **inclusion of FRHC in IS12444 will have significant negative implications for the downstream producers of electrical products and the end consumers.** Shared below are some of the key implications:

1. **Quality and Performance Concerns**: Electrical application requires high purity of Copper (99.99%) and minimum impurities (such as Arsenic, lead, Iron, Bismuth, Zinc and Antimony) which is aligned to current IS 12444 specifications. ETP Copper, given its robust pyro processing (smelting) and electro-refining meets the quality criteria for Electrical Applications.

   India today doesn't have right scrap gradation standards and appropriate recycling technology to produce Electrical Grade Copper from inconsistent scrap. And as shared above, the current FRHC process of remelting followed by adding Lead and skimming of impurities and without electro-refining will be detrimental to the Indian Electrical ecosystem, both in terms of efficiency and safety of products made from these rods.

2. **Global Benchmarking:** FRHC produced in Europe complies to both ASTM and EU standards, in tandem. **Further, there is a check of input material and mid-stream processes by their authorities to consistently monitor input and output of the product. (Evidence attached).** The output produced by global manufacturers (details attached), have conductivity of 100.5 – 101.3 IACS, Oxygen 150-200 ppm, Elongation 38-43, Lead < 50 ppm and other impurities like Arsenic, Iron and others are also within the specifications of these standards. We cannot be selective on taking only part of the standard for output on a sample basis unless there are appropriate standards on input material and the process also.

3. **Voice of Customers/Downstream Manufacturers:** Standards are made to ensure the reliability of the product and ensure trust of the downstream industry & the consumers. These standards emphasize quality and performance, and products falling short of these criteria are typically not included.

   During MTD8 meeting on 5th August'24, the downstream industry using these products have clearly communicated their significant concerns on inclusion of FRHC in IS 12444. The downstream makers require consistent adherence to established quality benchmarks. Without strong control on input to FRHC mills (as they can't refine to the required purity required for Electrical applications) will lead to poor quality material flowing in the market, compromising on Efficiency and Safety of end consumers.

The incorporation of FRHC into IS 12444 may inadvertently signal endorsement of a subpar product, potentially leading to dissatisfaction and undermining consumer confidence in products that meet higher standards.

4. **Potential market disruption:** In light of these concerns, we respectfully request that BIS not consider the inclusion of FRHC in the IS 12444 standards, until we have the right product through FRHC process with the appropriate refining process, better process control, and checks and standards for the input scrap. It is crucial that the standards we adhere to reflect the highest quality and performance expectations of our consumers. While some samples from FRHC may just about meet the specifications, but consistently achieving this standard is not possible due to the inconsistent impurities in scrap material, the addition of high levels of lead, and the difficulty in controlling sensitive impurities required for electrical applications.

   However, we do understand the need to bring secondary producers into a structured system of standards and hence we request you to form a new standard for FRHC, which shall serve the purpose instead of diluting the IS 12444.

We hope for a decision that supports both industry integrity and consumer satisfaction.

Evidence :

1. Lafarga :
   Copper Scrap, with copper content greater than or equal to 96%, the product quality of the copper rod produced by fire refining, continuous casting and rolling is tested by the National Wire and Cable Testing Centre.

	Name	Material	Code	Regulation	Diameter (mm)	Conductivity (% IACS)
Maximum Conductivity	**Frod**	Cu-FRHC	CW005A UNS C11020	EN 1977 ASTM B-49	8; 10; 12; 17; 20; 23	≥ 100
	Multirod	Cu-FRHC	CW005A UNS C11020	EN 1977 ASTM B-49	8; 10; 12; 17; 20; 23	≥ 100.6
	Premiumrod	Cu-ETP1	CW003A UNS C11040	EN 1977 ASTM B-49	8; 10; 12	≥ 101

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PROPERZI'S FRHC CU ROD CHARACTERISTICS:

Parameter	Reference	Value
Chemical composition	Cu+Ag %	>99.90
Oxygen	Ppm	150 ÷ 250
Elongation	A_{200} %	38 ÷ 43
Tensile strength	Kg/mm²	22.8 ÷ 23.5
Conductivity	IACS %	100.5 ÷ 101.3
Twist test to failure	Number	43 ÷ 50
Best drawability	mm	0.25
POPS test – surface oxides	Ångstrom	100 – 200
Re-crystallization temperature	°C	280

With best regards
Thanking you

RPathak

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