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Taps and Mixers – their Making and their Certification from a factory visit observation in China

Introduction

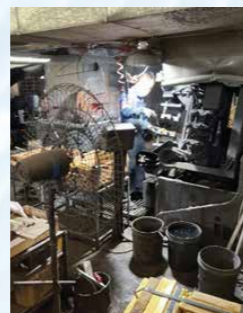
On 7 April 2023 a visit to a sanitary fitment plant in Mainland China has been introduced to join by our Institution. The delegation included 80 practitioners of the plumbing and drainage industry in Hong Kong. The products that we saw were common plumbing products but the process of production was spectacular and is worthy of introduction as a record. Together with a seminar organized for a Hong Kong expert in taps and mixers explaining about certification and testing, visitors are able to widen their horizon, judge and compare the standard and quality of the products from this plant.

The first* manufacturer is Hongshida Plumbing Products Co. Ltd., (鴻士達衛浴實業有限公司) which is located in Kaiping (開平) Guangdong Province. This manufacturer has celebrated her 60th anniversary. The town is Shuikou (水口) which is famous as a major center of sanitary ware and fitment manufacturing in China. The number of brands and factories in that cluster area is plenty, big enough to warrant the establishment of the Kaiping Shuikou Sanitary Ware Industry Association, similar if not larger than the HKSWPA in Hong Kong.

Factory Walk

We have been arranged to look around in every production unit of the plant to view the complete process of manufacturing. The products in the production line are mainly basin & shower faucets. We are grateful for the generosity of the host to allowing visitors to see every minute steps and procedures of the whole line. Practically speaking we are allowed to view the complete process of manufacturing until packing in a candid and open manner.

The large compound has been walked around including the products' forming, moulding, casting, machining, polishing, electro-plating, assembling, water pressure testing, drying, quality checking, packing, etc. The plant uses low-lead copper alloy blocks for casting the tap and mixer components.



Casting of faucet component using low-lead brass blocks. Copper alloy ingots (yellow in the front) are melted to feed the mold



Cooling down after components are casted and formed



Water pressure applied to the faucet to check for leakage and strength of the correct pressure reading



Electro-plating quality check. Any products found with a warping image will be ringed in red and rejected for a redo. They undergo at least 3 rounds of check

As a legacy of the past, the plumbers who visited frequently asked about water contamination by the heavy metal lead. We were told in the factory that the

lead content of the copper ingot and casting used was no more than 2.50 per cent which is claimed to be a safe threshold.

We actually saw the copper alloy ingots being melted and casted to form the parts of the taps and mixers, by then they appeared in reddish brown in color.

Having checked with the literature, it is noted that in accordance with the standard BS EN 1982:2008 Copper and Copper Alloy – Ingots and Castings they appear thus:

BS EN 1982:2008 **Table 23b** CuSn5Zn5Pb5-C (CC491K)

Metal	Maximum Percentage %	Over 2.50% of Lead
Cu	87.00	
Ni	2.00	
P	0.10	
Lead Pb	6.00	Over 2.50%
Sn	6.00	
Zn	6.00	

Copper alloy ingots and castings will probably not pass if they were following Table 23b, or else Table 7 for Table of copper-zinc alloys (zinc removal-resistance 抗脫鋅) might be an alternative to this as follows:

BS EN 1982:2008 **Table 7** CuZn39Pb1Al-C (CC754S)

Metal	Maximum Percentage %	Over 2.50% of Lead
Al	0.80	
Cu	63.00	
Ni	1.00	
Lead Pb	2.50	Not Over 2.50%
Sn	1.00	
Zn	Remainder	

It is most comforting to find that the copper alloy used is well under the 2.50% threshold for which it passes.

Seminar

As the visit is part of the Voluntary Continuous Professional Development Scheme of the WSD, it was also augmented by a seminar organized after the factory walk. The lecture was timely for the topic of testing taps and mixers. We have been introduced through by Dr Stephen Lee of CASTCO Testing Centre Limited.

Water taps are classified as taps, mixers, sensor taps / mixers, and self-closing taps. Various tests were conducted for their physical dimension, chemical composition, water pressure and water flow; moreover, non-metallic cartridge and electro-plating will also be examined. Those components not integral part of the tap or mixer will be examined, like spout (goose-neck) or the diverter, which will be separately analyzed. It is interesting to note that non-metallic cartridges are placed in boiling water for five minutes in order to allow the checking of heavy metal leached out into the solution.



Dr Lee told us that The taps and mixers have 2 routes (HKWA, 2021) to obtain general acceptance by the Water Authority. Either way they have certification / test reports from the BS Kitemark, Water Regulations Advisory Scheme of the United Kingdom, or accredited laboratories acceptable to the WA.

In accordance with the Hong Kong Drinking Water Standards (HKDWS 2011 – a derived standard from the World Health Organization’s Guideline) the maximum allowable concentration of heavy metals of the extracts shall be (in millionth gram per litre µg/L) as follows:

Metal	Maximum Concentration, µg/L
Antimony (Sb)	≤ 20
Arsenic (As)	≤ 10
Barium (Ba)	≤ 700
Boron (B)	≤ 2400
Cadmium (Cd)	≤ 3
Chromium (Cr)	≤ 50
Copper (Cu)	≤ 2000
Lead (Pb)	≤ 10
Mercury (Hg)	≤ 6
Nickel (Ni)	≤ 70
Selenium (Se)	≤ 40
Uranium (U)	≤ 30

(Source: Leaching Test for General Acceptance GA Application of Taps and Mixers dated 13 April 2020, Circular Letter No. 3/2021, Hong Kong: HK Water Supplies Department)

Comparison

Lead’s content is being monitored both in the manufacturer’s plant and in the laboratories. The lead solutions are independent of each other - the 2.50% of lead content in the molten solution from the copper alloy ingot and the 10µg/L maximum lead concentration in drinking water, they will not physically affect each

other unless the lead leaches into the water. Therefore the Water Authority will have to conduct water sample tests to watch out for warning as a key performance indicator.

Intelligent Tool

The visitors also discovered one great tip for helping the fixing and installation of mixers on partition walls. On site pipe work and wall appear at different times according to the programme. Walls will normally be made only after the concealed piping and mixers have been fixed, as such the work to align, position and level the mixer becomes a difficult task. The mixer producer prepared an easy-fix (bury) box for this work. Such a box includes a spirit and a bubble indicator which tells if the future mixer is upright or level enough. It is a simple device with some thoughts put in which is going to be a welcome gift for many plumbers who have a large number of mixers to install.



An easy-fix (bury) box for mixer alignment and levelling. A spirit level is equipped to guide the accurate positioning of the fitment

Part of the box (top in the photo) will remain in the supporting wall after installation

Difficult positioning of mixer can be solved using the easy-fix (bury) box with a levelling bubble

Conclusion

The Institutions in Hong Kong were very glad to return to visit plants in China after the COVID-19 pandemic. It was a consolation to see the surviving plants and factories operating although we know that many couldn’t survive and have closed down during the lock-

down in the last three years. The products we saw were for exporting to Australia and to Russia. It is also encouraging to see the persisting effort of small enterprises to struggle on, to make improvements in product quality, to adhere closely to systematic management and to keep the prices competitive. Like the easy-built (bury) box we mentioned above, it was certainly a product directly answering feedback obtained. This is not just about product improvement in the factory, it helps with installation on site as well. This effort is what is needed in the industry. This observation in improvement is very clearly seen in Hong Kong to have found many new brands entering the market which are produced from China with highly improved quality, design and appearance whilst prices are kept low and lowering.

Acknowledgements

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References

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BSI (1991) BS 5154: 1991 Copper alloy globe, globe stop and check, check and gate valves, Brussels: European Committee for Standardization, ISBN 0 580 196194

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Kaiping Shuikou Sanitary Ware Industry Association (2023) Company Directory and Publication, Shuikou, China: KSSWIA

NOTE:

*The second manufacturer is Ducky Pipe Fitting and the third one is the Matrix Living Prefabricated Construction. The remaining two factories are to be introduced in the monthly bulletin Lang Fa 25.05.23