

# Hot-dip Galvanized Steel For Hvac Ductwork

空调通风管道专用热镀锌板

[www.baosteel.com](http://www.baosteel.com)



宝山钢铁股份有限公司（简称“宝钢股份”）是中国最大、最现代化的钢铁联合企业、世界五百强企业（2012年排名第197位）。宝钢股份以其诚信、人才、创新、管理、技术诸方面综合优势，奠定了在国际钢铁市场上世界级钢铁联合企业的地位。《世界钢铁业指南》评定宝钢股份在世界钢铁行业的综合竞争力为前三名，认为也是未来最具发展潜力的钢铁企业。

公司专业生产高技术含量、高附加值的钢铁产品。在汽车用钢、造船用钢、油气开采和输送用钢、家电用钢、电工器材用钢及高等级建筑用钢等领域，宝钢股份在成为中国市场主要钢材供应商的同时，产品出口日本、韩国、欧美等四十多个国家和地区。

公司采用国际先进的质量管理，主要产品均获得国际权威机构认可。通过了BSI英国标准协会ISO9001认证和复审，获得了美国API会标、日本JIS认可证书，通过了BSI公司QS9000和ISO/TS16949标准认证，得到了中国、法国、美国、英国、德国、挪威、意大利等七国船级社认可。

Baosteel is China's largest and most modern steelmaker, and made its way into the Fortune Global 500 for the ninth consecutive time and ranked 197th in 2012. Baosteel is among the world's top three steelmakers, and is considered to have the most potential for development in the industry.

Baosteel specializes in the production of high tech, high value-added steel products. In automotive, shipbuilding, oil and gas, white goods, electrical equipment and construction, Baosteel has become the main supplier of steel in the Chinese market. Our steel products are exported as raw steel and as manufactured products to Japan, Korea, Europe, USA, and the rest of the world.

Baosteel has adopted the ISO 9000 family of quality management systems. Our main products are accredited by international standards and certification authorities. Baosteel has passed BSI ISO 9001 certification and review, has qualified for the API Monogram, JIS certificate, has been certified by BSI for implementation of QS 9000 and ISO/TS16949. Baosteel has accreditation from classification societies in China, France, the United States of America, Britain, Germany, Norway, and Italy.

|          |  |    |
|----------|--|----|
| <b>1</b> | 热镀锌板的产品特性——执行BS EN 10346:2009<br>Product features of Hot-dip galvanized material—According to BS EN 10346:2009 | 03 |
| <b>2</b> | 热镀锌材的表面处理介绍<br>Introduction of the surface treatment of Hot-dip galvanized material                            | 06 |
| <b>3</b> | 在暖通行业的应用<br>Application in the field of HVAC industry  | 07 |
| <b>4</b> | 热镀锌产品合规性声明<br>Hot-dip galvanized products declaration of compliacne  | 09 |

热镀锌板以其优质的锌层和钝化膜特性，具备了优异的裸用耐腐蚀性能，广泛应用于空调、制冷、暖通行业。宝钢生产热镀锌板均为小锌花锌层，不含环境污染因素铅；钝化膜采用无铬涂料，不使用铬酸盐，不含环境污染因素六价铬。铅和六价铬受欧盟指令规范，已在家电行业中严格限制，而预测未来，这一趋势必将逐步推广至建筑等其他行业。

Hot-dip galvanized steel strip which is widely used in the HVAC industry comprises a high-quality zinc layer and passivation treatment, possessing excellent corrosion resistance. Baosteel's Hot-dip galvanized steel strip with minimized spangle does not contain lead nor any other environmentally harmful substance. Similarly, the passivation treatment does not contain any chromium, and therefore our product is in compliance with EU directives which apply to the household appliance industry. This trend for a greener product will be gradually extended to the construction and other industries in the near future.



\* 欧盟指令[ WEEE & RoHS ]

#### 1. WEEE ( Waste Electrical and Electronic Equipment )

欧盟会议通过法案，规定就所有电机、电子产品的废品回收及处理承担义务。

EU directive 2002/96/EC on waste electrical and electronic equipment waste electrical (WEEE), together with the RoHS Directive 2002/95/EC, became European Law in February 2003. The WEEE Directive set collection, recycling and recovery targets for all types of electrical goods, with a minimum rate of 4 kilograms per head of population per annum recovered for recycling by 2009.

#### 2. RoHS ( Restriction of Use of Certain Hazardous Substances in Electrical and Electronic Equipment )

就WEEE通过法案，禁止使用铅、汞、镉、六价铬、溴系难燃材料。

RoHS, also known as Lead-Free, stands for Restriction of Hazardous Substances. RoHS, also known as Directive 2002/95/EC, originated in the European Union and restricts the use of six hazardous materials found in electrical and electronic products. All applicable products in the EU market after July 1, 2006 must pass RoHS compliance. RoHS impacts the entire electronics industry and many electrical products as well.

据观察，迟早这2个指令将会在建筑行业强制实施。

In our view, it is only a matter of time before these two directives will be enforced in the construction industry.

**Table 1 - Delivery standard**

| Content               |                              | EN 10346                   |         |
|-----------------------|------------------------------|----------------------------|---------|
| Steel grade           |                              | DX51D+Z                    |         |
|                       |                              | Minimized Spangle (M)      |         |
|                       |                              | Chemically Passivated (C)  |         |
|                       |                              | Not Oiled                  |         |
|                       |                              | Z275                       |         |
| Mechanical properties |                              | Tensile strength ≥ 270N/mm |         |
|                       |                              | Elongation ≥ 22%           |         |
| Bend                  |                              | 180°                       |         |
| Thickness tolerances  | Normal thickness tolerances  | 0.40 < thickness ≤ 0.60    | ± 0.060 |
|                       |                              | 0.60 < thickness ≤ 0.80    | ± 0.070 |
|                       |                              | 0.80 < thickness ≤ 1.00    | ± 0.080 |
|                       |                              | 1.00 < thickness ≤ 1.20    | ± 0.090 |
|                       | Special thickness tolerances | 0.40 < thickness ≤ 0.60    | ± 0.045 |
|                       |                              | 0.60 < thickness ≤ 0.80    | ± 0.050 |
|                       |                              | 0.80 < thickness ≤ 1.00    | ± 0.060 |
|                       |                              | 1.00 < thickness ≤ 1.20    | ± 0.070 |
| Width tolerances      | Normal width tolerances      | 600 ≤ width ≤ 1200         | 5 ~ 0   |
|                       |                              | 1200 < width ≤ 1500        | 6 ~ 0   |
|                       | Special width tolerances     | 600 ≤ width ≤ 1200         | 2 ~ 0   |
|                       |                              | 1200 < width ≤ 1500        | 2 ~ 0   |

**Table 2 - Chemical composition**

| Designation |   | Chemical composition % by mass max. |      |      |      |       |      |
|-------------|---|-------------------------------------|------|------|------|-------|------|
| Steel grade | Symbols for the types of available coatings | C                                   | Si   | Mn   | P    | S     | Ti   |
| Steel name  |   |                                     |      |      |      |       |      |
| DX51D       | +Z  | 0.18                                | 0.50 | 1.20 | 0.12 | 0.045 | 0.30 |



板面锌层、涂层示意图  
Diagram of Steel surface coating and layers

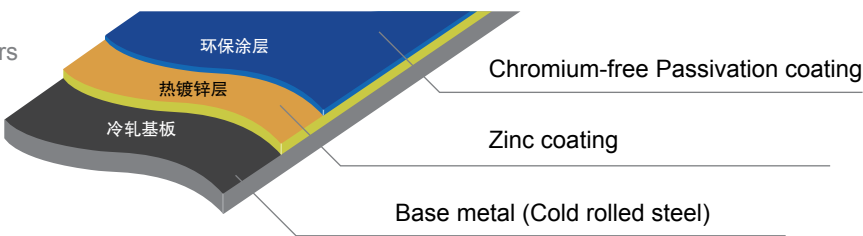


Table 3 - Mechanical properties

| Designation |   | Yield strength | Tensile strength | Elongation | Plastic strain ratio | Strain hardening exponent |
|-------------|---|----------------|------------------|------------|----------------------|---------------------------|
| Steel grade | Symbols for the types of available coatings | $R_e^a$        | $R_m$            | $A_{80}^b$ |                      |                           |
| Steel name  |   | Mpa            | Mpa              | % min.     | $r_{90}$ min.        | $n_{90}$ min.             |
| DX51D       | +Z  | —              | 270 to 500       | 22         | —                    | —                         |

Table 4 - Coating mass

| Coating designation | Minimum total coating mass <sup>a</sup> , both surfaces g/m <sup>2</sup> |                  | Theoretical guidance values for coating thickness per surface in the single spot test μm |                    | Density g/cm <sup>3</sup> |
|---------------------|--|------------------|--|--------------------|---------------------------|
|                     | Triple spot test   | Single spot test | Typical value <sup>b</sup>   | Range <sup>c</sup> |                           |
| Z275                | 275  | 235              | 20   | 15 to 27           | 7.1                       |

小锌花和正常锌花的差异  
Differences between minimized spangle and normal spangle

Table 5 - Differences between minimized spangle and normal spangle

| 内容                                  | 小锌花<br>Minimized Spangle (M)  | 正常锌花<br>Normal Spangle (N)   |
|-------------------------------------|---|--|
| 环保性<br><br>Environmental protection | 宝钢所供小锌花锌层中不含欧盟WEEE、RoHS指令所需限制的重金属元素铅，环保无毒害。<br><br>The zinc layer(coating) does Not contain Lead(Pb), which complies with EU WEEE and RoHS directives. This is a non-toxic and environmental friendly material. | 向锌液中添加某种重金属元素，使得钢板表面锌层产生一定尺寸的锌花。（如果添加锑，会对锌层性能构成一定影响；如果添加铅，则存在对人体有害的重金属元素。）<br><br>Through addition of certain heavy metal element into molten zinc bath, regular spangle pattern is produced on Hot-dip zinc-coated steel sheet. (If antimony is added, certain properties of zinc coating will be affected. If lead(Pb) is added, which is a kind of heavy metal, is harmful to human health.)                          |
| 耐蚀性<br><br>Corrosion resistance     | 不含额外重金属元素，锌层具有常规的耐蚀性、良好的镀锌结合力和镀层机械性能。<br><br>The zinc layer(coating) does Not contain any extra heavy metal elements, possess good corrosion resistance performance, good adhesion and mechanical properties.   | 铅是做为环保指令（家电行业）禁止添加的有害元素；锑会引起锌层中的锌铁合金层增厚，使锌层变脆、塑性及机械强度下降，此外，锑可使锌层的耐腐蚀性下降。<br><br>According EU RoHS directive, lead is restricted to use in electrical and electronic equipment. The addition of Antimony(Ti) will cause Zn-Fe alloy layer thickening in the zinc coating, making the zinc coating brittle, weakening formability and mechanical strength. The corrosive resistance of the zinc coating decreases as well. |

热镀锌材的表面处理介绍

Introduction of surface treatment of Hot-dip galvanized material

宝钢热镀锌无铬钝化板是将特殊造膜性有机物和添加剂组成的无铬处理剂和锌层表面反应形成钝化态薄膜，以取代传统的铬酸盐钝化膜，延缓钢板表面产生白锈的时间，使得产品具有优秀的裸露耐蚀性。宝钢热镀锌无铬钝化板由于完全不含铬，属于制造及使用环节中均不对环境造成污染的环境友好产品。

Baosteel's Hot-dip galvanizing of chromium-free passivation film is formed by special organic compounds and additives reacting with the zinc layer, replacing the traditional non-environmentally friendly chromate passivation. This process provides longer protection against white rust on the steel surface, and better corrosion resistance. Our Hot-dip galvanizing, chromium-free passivation treatment is a very environmentally friendly product, and does not release any harmful substance during production and fabrication.

宝钢无铬钝化特征性能  
Baosteel chromium-free passivation characteristics

**Formability**  
★ ★ ★

**Corrosion Resistance**  
★ ★ ★

**Chemical Resistance**  
★ ★ ★ ★

宝钢无铬钝化测试性能  
Baosteel chromium-free passivation test performance

Table 6 - Baosteel chromium-free passivation test performance

| 序号<br>No. | 项目<br>Test                   | 试验方法<br>Method  | 实物水平<br>Result                        |
|-----------|------------------------------|---|---------------------------------------|
| 1         | 耐腐蚀性<br>Corrosion Resistance | 平板：ASTM B117标准，盐雾试验 SST72hr<br>Sheet: ASTM B117 Standard Salt Spray Test (72 hrs) | 白锈面积≤10%<br>White rust ≤10%           |
|           |                              | 杯突（6~8mm）：盐雾试验 SST48hr  |                                       |
| 2         | 耐高温性<br>Heat Resistance      | 220℃，烘烤20分钟后取出并冷却<br>220°C baking 20 mins, then cool off.                         | 外观无明显变化<br>No apparent surface damage |

## 在暖通行业的应用

Application in the field of HVAC industry

### 主要中央空调品牌及通风管道结构件

Major brands of central air conditioning and ventilation pipe and ductwork

宝钢热镀锌产品以其优异的综合性能及批次稳定性，已成为国内及国外知名中央空调品牌的钢铁用材首选，宝钢已经和各主要空调制造商建立了良好的长期合作关系。在整个暖通行业内，宝钢热镀锌产品也成为高端建筑项目中暖通通风管道结构件用材的首选。

Baosteel's Hot-dip galvanized products with excellent comprehensive performance and stability, have become the preferred choice of steel strip of both major domestic and foreign central air conditioning contractors, particularly in the high end market. Baosteel has also established a good long-term relationship among the major air conditioning manufacturers.

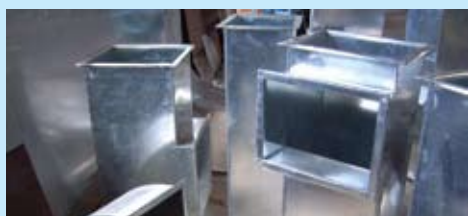
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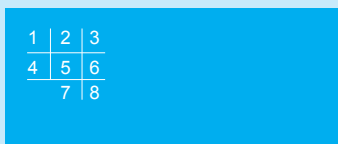


## 中央空调用材在高端建筑项目中的应用实例

Examples of the application of central air-conditioning in high-end construction projects

宝钢热镀锌产品已广泛应用于中国大陆及国外各类酒店、商场、公寓等商用及民用建筑中的暖通领域，近年来大陆众多城市的标杆性高档建筑中，均采用了宝钢热镀锌产品做为建设中暖通部件的用材。

HVAC Hot-dip galvanized products have been widely used in hotels, shopping malls, apartments, commercial and civil buildings. In recent years Baosteel's hot-dip galvanized strip, has been established as the material of choice for HVAC ductwork and components in high-profile projects in China.



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3. 广州名商天地
4. 北京富顿中心
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6. 上海鹏欣国际家纺中心
7. 深圳威新软件科技园
8. 重庆开县人民医院





#### Compliance of RoHS Declaration

**Dear Customers:**

**After careful evaluation of EU Directives 2002/95/EC (commonly called "RoHS"), Baoshan Iron & Steel Co., Ltd. (hereinafter referred to as BAOSTEEL) hereby certifies the steel products manufactured by BAOSTEEL, which have been listed in the ANNEX, are fully comply with Directive 2002/95/EC of the European Parliament and of the Council of January 2003, on the restriction of the use of certain Hazardous Substances in electrical and electronic equipment. None of our products nor packaging materials contain any unconditionally banned substances, including Cadmium (Cd) and its compounds, Lead (Pb) and its compounds, Hexavalent chromium (Cr) compounds, Mercury (Hg) and its compounds, and prohibited flame retardants, namely Polybrominated biphenyls (PBB's), nor Polybrominated diphenyl ethers (PBDE's).**

**As Regulations from different authorities are updated frequently, normally, these changes are within scope, and typically involve adding substances with specific constraints and eliminating exemptions on certain substances with specific constraints. BAOSTEEL continually tracks changes to regulations, evaluates the further revise in time and update this declaration to reflect these changes.**

**Baoshan Iron & Steel Co., Ltd.**  
**February 28, 2011**

A red circular stamp is located to the right of the signature. The outer ring of the stamp contains the text 'BAOSHAN IRON & STEEL CO., LTD.' in English and Chinese. The inner part of the stamp contains the date 'February 28, 2011'.

## REACH Compliance Declaration

Dear Customers:

After careful evaluation of the European Union Regulation (EC) 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), Baoshan Iron & Steel Co., Ltd. (hereinafter referred as BAOSTEEL) hereby certifies the steel products manufactured by BAOSTEEL, which have been listed in the ANNEX 1, are fully comply with the related requirements of REACH:

1. Under the structure of the REACH Regulation, BAOSTEEL is a manufacturer of "articles" to our EU customers (according to ECHA's guidance for articles, the steel coils, plates, sheets, bars, wire rods shall be considered as articles). We do not manufacture "substances" or "preparations" and our articles do not involve the "intentional release of substances". Accordingly, we foresee no registration or pre-registration requirement for the products we supply to you.
2. With regard to the requirements of Article 33 of REACH: Duty to communicate information on substances in articles. We declare that none of the SVHCs (the Candidate List of Substances of Very High Concern for authorisation currently released by ECHA till the date of Dec.19, 2011, please refer to annex 2) is present in BAOSTEEL's steel products (and also package) in quantities totaling in a concentration equal or above 0.1%.
3. With regard to the requirement of Article 67 of REACH: A substance on its own, in a preparation or in an article, for which Annex XVII contains a restriction shall not BAOSTEEL's steel products (and also package) in quantities totaling in a concentration equal or above 0.1%.

As REACH Regulation is updated frequently, for the major changes afterwards, such as the addition of SVHC substances into Annex XIV, the addition of restricted substances in Annex XVII, BAOSTEEL will evaluate the further revise in time and update this declaration to reflect these changes.

Baoshan Iron & Steel Co., Ltd



Jan 10, 2012

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