山东起达金属科技有限公司

Shandong Qida Metal Technology Co., Ltd

Technical Manual

Technical Manual of Prepainted Steel Sheets

彩涂钢板技术手册

Overview of Prepainted Steel Sheets

彩涂概述

Prepainted Steel Sheets

彩涂板简介

- 在钢板上涂上有机涂料，涂料可以有各种不同的颜色，彩色涂层钢板由此而得名，简称彩板，也称有机涂层钢板。由于彩色涂层钢板是在钢板加工成型前先涂上涂料，在国外也称为预涂层钢板. 彩涂板有机涂层起了覆盖隔离作用，可防止钢板生锈，使用寿命更长。
- 彩涂板的基板有冷轧基板、热镀锌基板、电镀锌基板、热镀锌铝镁基板、镀铝锌基板。彩涂板的面漆涂层种类主要分为:聚酯，硅改性聚酯，聚偏二氟乙烯，高耐久性聚酯等。
- 生产工艺从一涂一烘发展到了二涂二烘，也出现三涂三烘的工艺。
- 彩涂板的颜色可以有很多种，如桔黄、奶黄，深天蓝、海蓝，绯红，砖红、象牙、瓷蓝等。
- 彩涂板的表面状态可以分成正常涂层板、压花板、印花板。
- 彩涂板市场用途主要分为建筑、家电和交通运输等。

彩涂板发展

- 彩色涂层钢板二十世纪三十年代中期产生于美国，开始是窄带钢涂漆，美国在 1955 年建造了第一批宽带材涂层机组。二十世纪六十年代，涂层钢板在美国、欧洲和日本得到了迅速的发展。
- 我国在八十年代之前彩色涂层钢板产品的生产基本上属于空白。直到八十年代武钢、宝钢才相继建了二涂二烘型式的彩色涂层钢板生产线，填补了国内空白。随着宝钢彩色涂层钢板产品在国内的推广以及应用领域的扩大，人们对彩板的认识也越来越提高，因此到二十世纪末，二十一世纪初，国内彩色涂层钢板生产线如雨后春笋般地建了起来，用量也大大增加。据不完全统计，2016 年中国国内彩涂板用量约 580 万吨。

Brief Introduction

- Prepainted steel sheet is coated with organic layer, which provides higher anti-corrosion property and a longer lifespan than that of galvanized steel sheets.
- The base metals for prepainted steel sheet consist of cold-rolled, HDG electro-galvanized and Hop-dip zinc-alu-mag base metal. The finish coats of prepainted steel sheets can be classified into groups as follows: polyester, silicon modified polyesters, polyvinylidene fluoride, high-durability polyester, etc.
- The production process has evolved from one-coating-and-one-baking to double-coating-and-double-baking, and even three-coating-and-three-baking.
- The color of the prepainted steel sheet has a very wide selection, like orange, cream-colored, dark sky blue, sea blue, bright red, brick red, ivory white, porcelain blue, etc.
- The prepainted steel sheets can also be classified into groups by their surface textures, namely regular prepainted sheets, embossed sheets and printed sheets.
- The prepainted steel sheets are mainly provided for various commercial purposes covering architectural construction, electrical household appliances, transportation, etc.

History of Prepainted Steel Sheet

- The production of prepainted steel sheet originated in the United States in the mid 1930s. At the beginning, the technology was only adopted in producing prepainted steel strip. Till 1995, the first batch of coating equipment for broad strip steel was invented and produced in the United States in 1955. In the 1960s, the production of prepainted steel sheet made a rapid development in the United States, Europe and Japan. Besides, the prepainted steel products were also developed greatly all over the world.
- By the end of the 1980s, the production of prepainted steel sheet in China had been almost blank. Until the 1980s, Wusteel and Baosteel established the double-coating-double-baking production lines of prepainted steel sheets in succession. With increasingly promotion and application of Baosteel's prepainted steel sheets at home, more and more people make themselves acquainted with the production of steel sheets. Thus, at the turning point of the 20th century the 21st century, a lot of production lines of prepainted steel sheets emerged like bamboo shoots after a spring rain and there was also a great demand for such products. The domestic annual consumption of the prepainted steel is about 5.8 million tons according to the incomplete statistics.

典型彩涂板剖面结构示意图
Sketch Map of Sectional Structure of Prepainted Steel Sheet

- 精涂层 (Finished coating)
- 初涂层 (Primer)
- 化学转化层 (Chemical conversion coating)
- 镀层 (Metallic coating)
- 冷轧板 (Cold-rolled steel sheet)

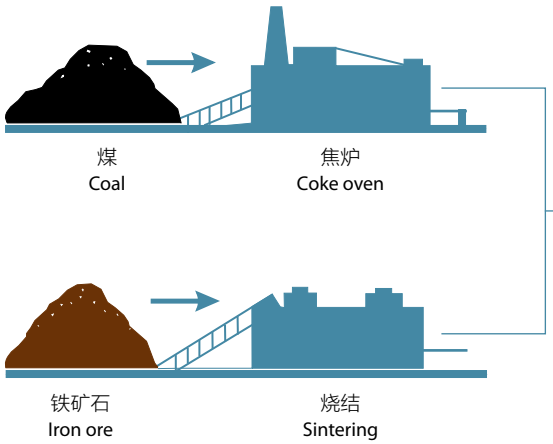
Overview of Prepainted Steel Sheets

彩涂概述

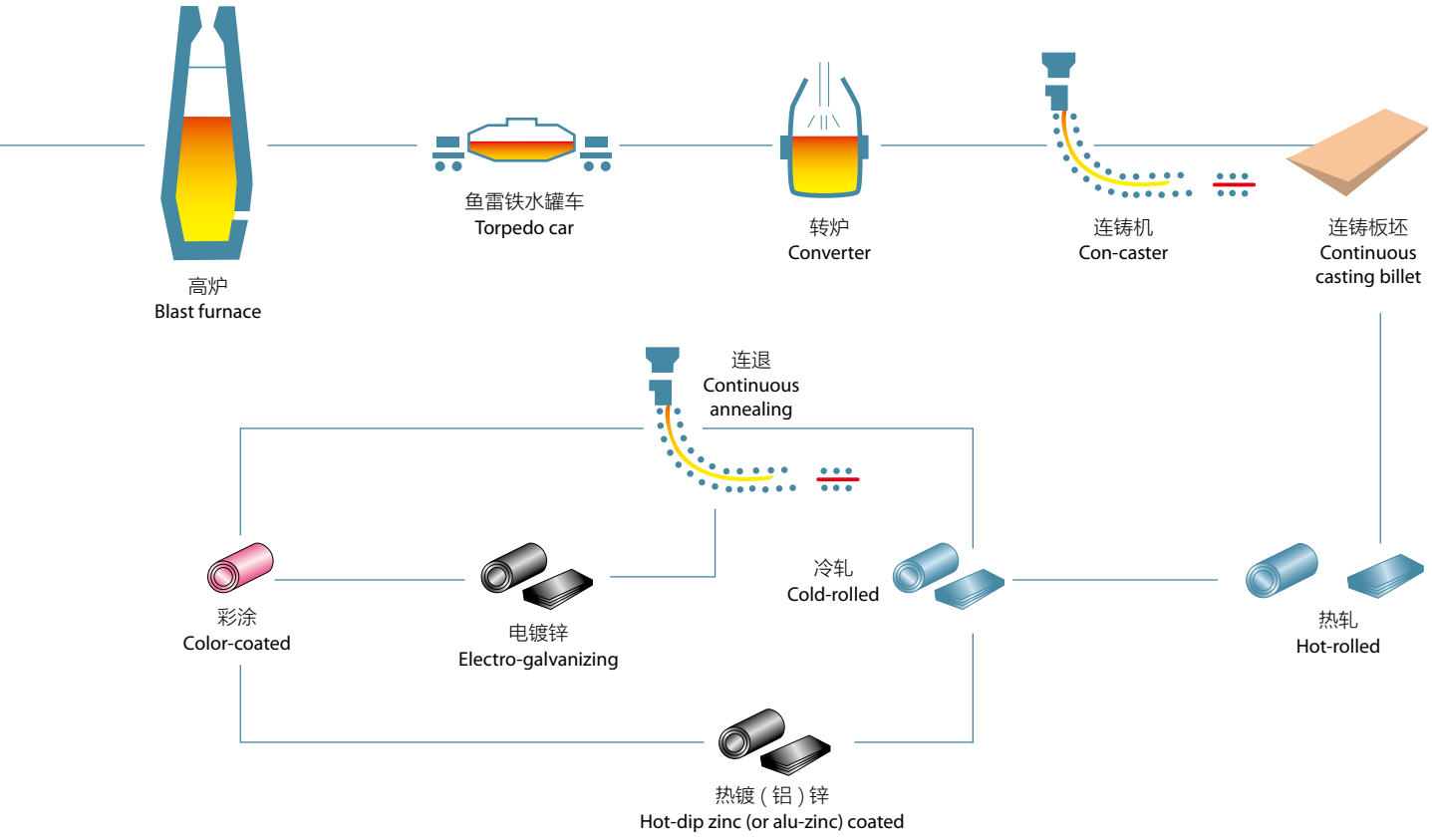
主要生产流程

Diagram of Main Production Process

Prepainted Steel Sheets



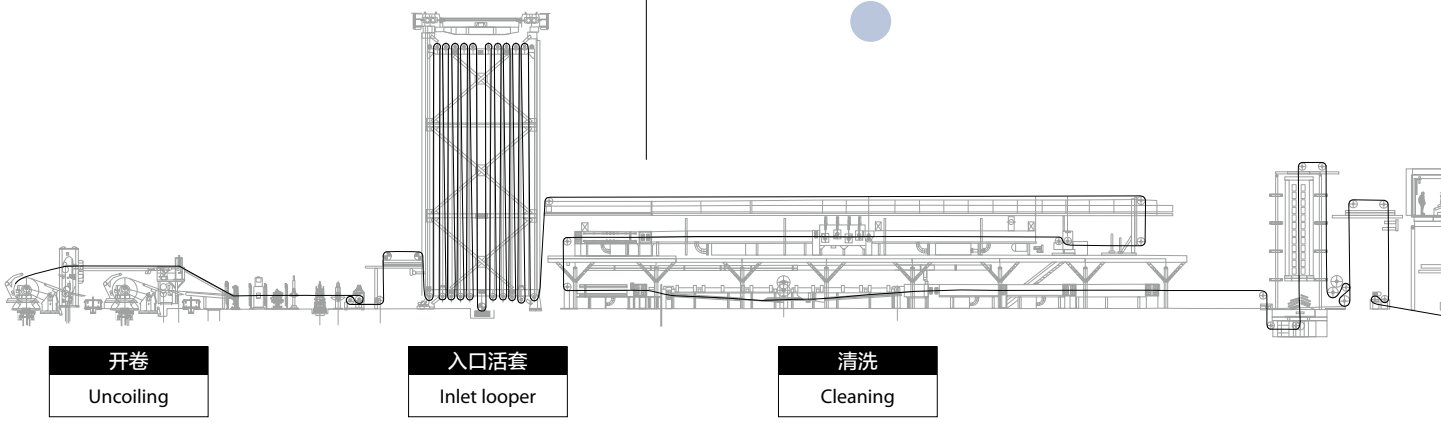
Prepainted Steel Sheets


高炉
Blast furnace
鱼雷铁水罐车
Torpedo car
转炉
Converter
连铸机
Con-caster
连铸板坯
Continuous casting billet
连退
Continuous annealing
彩涂
Color-coated
电镀锌
Electro-galvanizing
冷轧
Cold-rolled
热轧
Hot-rolled
热镀 (铝) 锌
Hot-dip zinc (or alu-zinc) coated

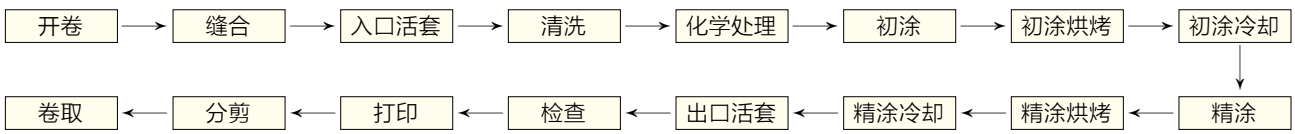
Overview of Prepainted Steel Sheets

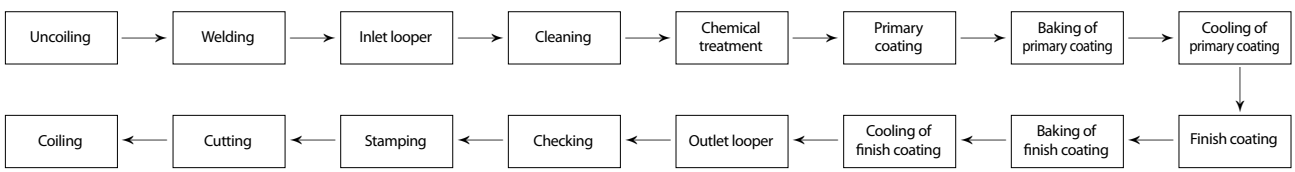
彩涂概述

工艺 Process

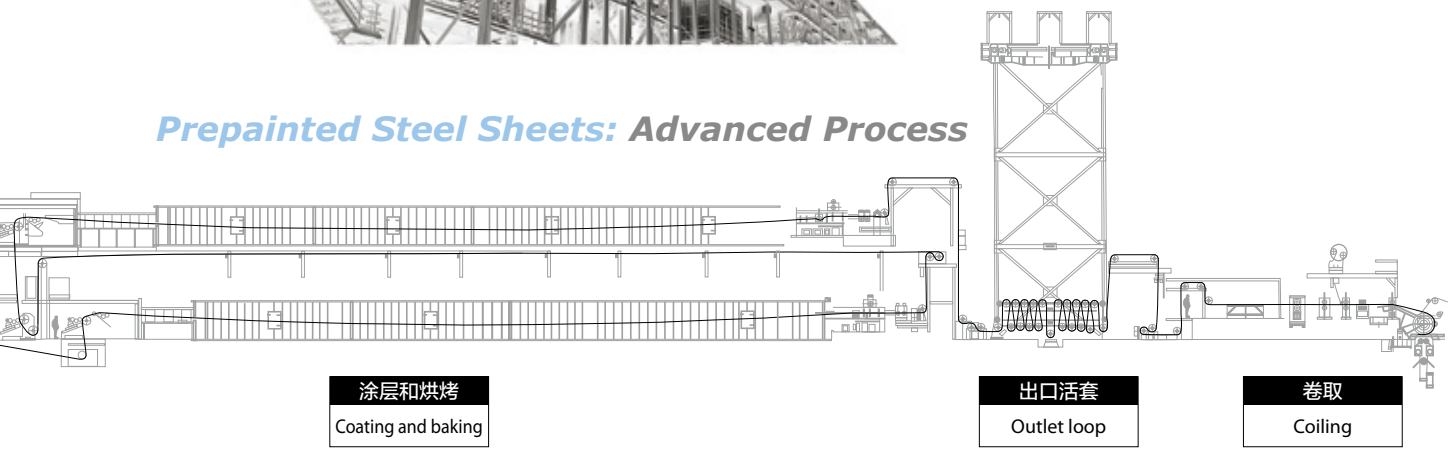


简单的工艺流程
Brief Production Flow of Prepainted Steel

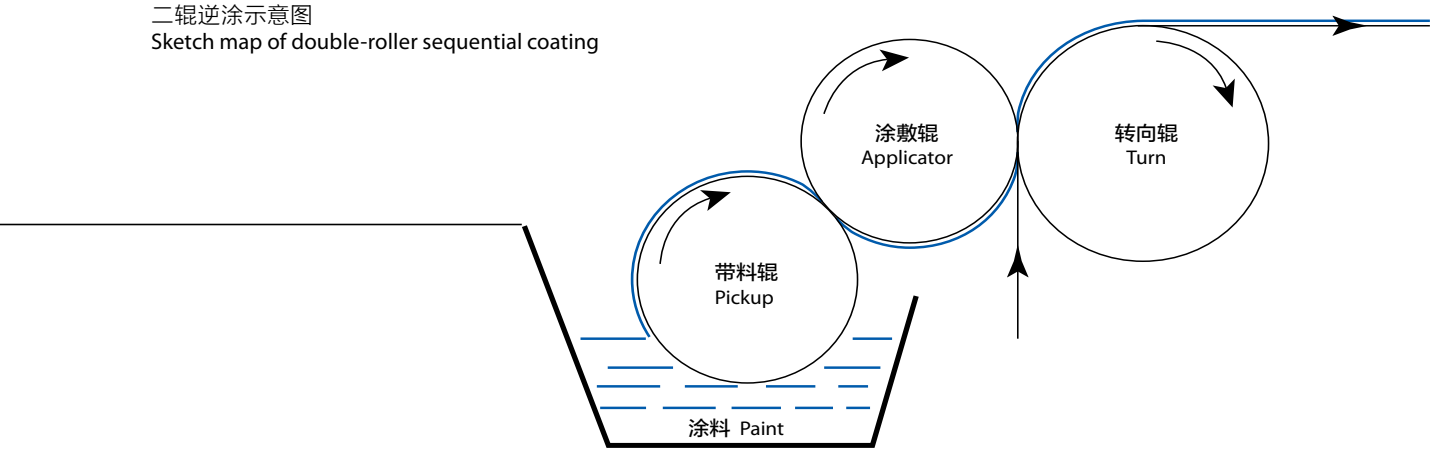




Prepainted Steel Sheets: Advanced Process



二辊逆涂示意图
Sketch map of double-roller sequential coating



Prepainted ***Steel Sheets***

Overview of Prepainted Steel Sheets

彩涂概述

机组 Production Line

- 宝钢已建成 4 条大型的二涂二烘型彩涂涂层钢板生产线，设计年产量总共可达 74 万吨。

  4 production lines of double-coating-double-baking pre-painted steel with a total designed output of 0.74 million tons are achieved .

Prepainted Steel Sheets

宝钢 4 条彩涂线的有关情况：

Several introductions to Baosteel's four production lines of prepainted steel:

	1号线 NO.1	2号线 NO.2	3号线 NO.3	4号线 NO.4
	宝山基地 Baoshan base			青山基地 Qingshan base
产能 Capacity	22	17	15	20
厚度 Thickness（mm）	0.3-2.0	0.3-1.0	0.22-0.8	0.2-1.6
宽度 Width（mm）	900-1550	700-1250	700-1305	800-1600
基板 Substrate	冷轧、热镀锌、镀铝锌、镀锌铝镁、电镀锌 Cold rolled /Hot-dip zinc coated /Hot-dip al-zn coated /Hot-dip zn-al-mg /Electro-galvanized			

Overview of Prepainted Steel Sheets

彩涂概述

涂层结构 Coating Structure

Prepainted Steel Sheets

- **1、涂层结构类型：**

  2/1： 上表面涂二次，下表面涂一次，烘烤二次。

  2/1M：上下表面各涂二次，烘烤二次。

  2/2： 上下表面各涂二次，烘烤二次。

- **2、不同涂层结构的用途**

  2/1： 单层背面漆的耐蚀性、抗划伤性较差，但具有良好的粘结性，主要应用于夹芯板；

  2/1M：背面漆的耐蚀性，抗划伤性和加工成型性较好，具有良好的粘接性，适用与单层压型板和夹芯板。

  2/2： 双层背面漆的耐蚀性、抗划伤性和加工成型性较好，多数用于单层压型板，但其粘结性不良，不宜用于夹芯板。

- **1. Type of coating structure**

  2/1: Coat the top surface of the steel sheet twice, coat the lower surface once, and bake the sheet twice.

  2/1M: Coat and bake twice for both top surface and undersurface.

  2/2: Coat the top/lower surface twice and bake twice.

- **2. Usage of different coating structures**

  2/1: The anti-corrosion property and scratch resistance of the single-layer backside coating is relatively poor, however, its adhesive property is good. The prepainted steel sheet of this kind is mainly used for sandwich panel;

  2/1M: Back coating has good corrosion resistance, scratch resistance and molding performance. Besides it has good adhesion and is applicable for single layer panel and sandwich sheet.

  2/2: The anti-corrosion property, scratch resistance and processing property of the backside coating of prepainted steel sheet is better, so it is widely used for roll forming. But its adhesive property is poor, so it is not used for sandwich panel.

彩涂分类及代号
Category & Coding of Prepainted Steel Sheet

分类 / Classification	项目 / Item	代号 / Code
用途 Applications	建筑外用 / Construction external use	JW
	建筑内用 / Construction internal use	JN
	钢窗 / Steel windows	GC
	家电 / Household appliance	JD
	家具 / Furniture	JJ
	其它 / Others	Q T
涂层表面状态 Surface finish	涂层板 / Normal coated	TC
	压花板 / Embossed	YA
	印花板 / Printed	YI
	网纹板 / Checker	WA
	绒面板 / Suede	RO
	珠光板 / Pearly-lustre	ZH
	抗刮板 / Anti-scuffing	KA
面漆种类 Types of top coatings	聚酯 / PE	PE
	硅改性聚酯 / Silicon modified polyesters	SMP
	高耐久性聚酯 / High-durability polyester	HDP
	聚偏二氟乙烯 / Polyvinylidene fluoride	PVDF(PVF2)
面漆功能 Base metal	普通 / Regular	/
	自洁 / Self cleaning	AP
	抗静电 / Antistatic	AS
	抗菌 / Antisepite	AB
	隔热 / Adiabatic	AH
基板类型 Substrate	电镀锌板 / Electro-galvanized base metal	ZE
	热镀锌板 / Hot-dip zinc coated base metal	Z
	热镀铝锌板 / Hot dip Al-Zn steel sheet	AZ
基板表面预处理类型 Pretreatment types for substrate surface	普通化学预处理 / Normal chemical pretreatment	C
	无铬化学预处理 / Chrome free chemical pretreatment	C5
涂层结构 Coating type	正面二层、反面一层 / Two coatings on top side, and one coating on the bottom	2/1
	正面二层、反面二层 / Two coatings on top side, and two coatings on the bottom	2/2
	正面二层、反面二层(注：反面涂层的厚度低于2/2产品反面涂层的厚度) Two coatings on top side, and two coatings on the bottom (Note: The thickness of bottom side coating is smaller than that of the product type 2/2)	2/1 M

Prepainted Steel Sheets

Introduction of Usage
用途简介

建筑 Construction

彩涂板是木材和其他材料的具有竞争力的取代者，因为它们具有防止褪色、耐大气腐蚀，抗粉化等优点。它们使建筑的维护费用降到最低的水平。同时，各种各样的颜色，表面结构和镀层，使它具有极大的灵活性和可选性。

在我国 90% 以上的彩板应用于建筑，宝钢彩涂板在建筑行业也得到了广泛的应用。

宝钢彩涂板和镀锌板满足了大型场馆建设中对材料色彩、造型、品质、性能等各方面的苛刻要求。在我国会展中心、体育场馆、航空枢纽、文化设施等许多标志性建筑中得到了认可。经过 30 年不断探索和改进，不仅在钢铁行业得到成熟的应用，在汽车制造、有色金属、电力、煤矿、轻工、医药、食品等行业也得到了普遍认可。从学校、住宅到商业建筑，从别墅到高层商住楼，时刻为您营造温馨、和谐、舒适的生活环境。

彩色涂层钢板的用途分类
Application of Prepainted Steel Sheets

建筑业 Construction	室外 Outside	厂房、农用仓库、住宅预制构件、瓦楞屋顶、墙壁、雨水管道、阳台、货售亭、卷帘门 workshop, agricultural warehouse, residential precast unit, corrugated roof, wall, rainwater drainage pipe, terrace, retailer booth, roller shutter door
	室内 Inside	门、门框、房屋轻钢结构、屏风、天花板、电梯、楼梯、通风道 door, doorcase, light steel roof structure, folding screen, ceiling, elevator, stairway, vent gutter
电器 Electrial appliance		冰箱、洗衣机、开关柜 、仪表柜、空调、微波炉、面包机 refrigerator, washer, switch cabinet, instrument cabinet, air conditioning, micro-wave oven, bread maker
家具 Furniture		暖气片 、灯罩、衣柜、桌子、床 、更衣箱、书架 central heating slice, lampshade, chifforobe, desk, bed, locker, bookshelf
运输业 Carrying trade		汽车和火车内装饰、隔板、集装箱、隔离栏、轮船隔仓板 exterior decoration of auto and train, clapboard, container, isolation lairage, isolation board
其它 Others		写字用白板、垃圾箱、广告牌、钟表、打字机、仪表盘、体重器、照相器材 writing panel, garbage can, billboard, timekeeper, typewriter, instrument panel, weight sensor, photographic equipment

The prepainted steel sheet for construction is an attractive substitute for wood and other materials, owing to its advantages, including fast color, good durability performance, chalking resistance, etc.It minimizes the maintenance cost. At the same time, various colors, surface structures and coatings provide such products with great flexibility and option.

In China, more than 90% color coated sheets are applied in construction, and Baosteel's prepainted steel sheets are also widely used in such field.

Baosteel's prepainted steel sheets satisfy the large-scale halls'rigorous requirements in construction in material color, shape, quality, property, etc. They have been recognized by many landmark buildings in China, covering hall centers, sports halls, aviation knobs, cultural facilities, etc. After 30 years'continuous research and improvement, Baosteel has been not only widely used but also been commonly recognized in auto, non-ferrous metal, power industry, coal mining, light industry, medicine, foodstuff, etc. Baosteel's construction steel has already substituted traditional building materials

with its safety, durability, esthetic quality and environmental-friendly property, for always building up a comfortable, harmonious and cozy living environment, from schools and residences to commercial buildings, and from villas to top-grade commercial apartments.

Prepainted ***Steel Sheets***

Introduction of Usage

用途简介

家电

Household Appliances

- 家电彩板一般以电镀锌、热镀锌和冷板为基板，用于生产冰箱和大型空调系统，冰柜、面包机、家具等。
- 家电产品的应用始于良好的外观。
- 保证质量，拒绝污迹，是宝钢彩涂产品的承诺。它可应用于冰箱、冷冻柜、洗衣机、空调和其他家电产品。我们的彩涂产品生产线，装备了一流的生产控制和检化验装置，同时，我们在彩涂板生产中积累的大量经验，使我们的产品质量胜人一筹。精良的包装和便捷的物流系统，保证我们的产品以零缺陷交付给您。一批批高光泽，高质量的彩涂产品已经交到家电产品用户的手上，使他们在产品、质量上具备了良好的竞争优势。

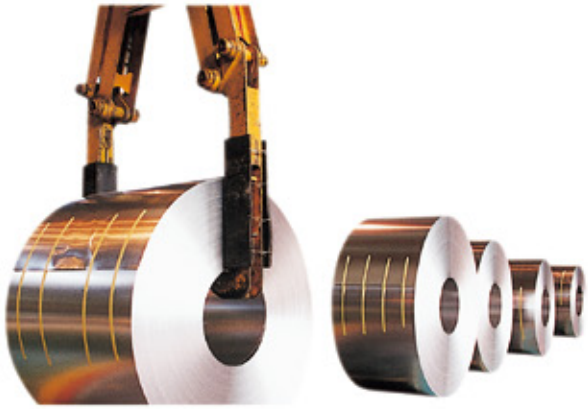
Prepainted Steel Sheets

- The prepainted steel sheet for household appliances often takes electro-galvanized, hot-dip zinc-coated and cold rolled steel sheet as its base metal, which is widely applied in manufacturing refrigerators, large-scale air-conditioning systems, refrigerating cabinet, bread maker, furniture, etc.
- The distribution of electrical household appliances is started from their good appearances.
- Baosteel promises to guarantee the quality of its prepainted steel products. Its products can be applied to refrigerators, refrigerating cabinets, washers, air conditionings and other household appliances. Baosteel's production lines of prepainted steel products are equipped with first-grade equipment of production control, check and inspection, at the same time; its products also take the leading potion among fellow ones with Baosteel's abundant experience in the production of prepainted steel sheets. With excellent packing and convenient logistic system, Baosteel guarantees to deliver its customers the products with zero defect. Batches of prepainted steel products with good luster and high quality that have already delivered to all the providers of electrical household appliances offer them a powerful competitive force in quality.

Introduction of Base Metals

基板介绍

种类 Type



Prepainted Steel Sheets

彩涂板的基板可以分成冷轧基板、热镀锌基板、电镀锌基板、热镀锌铝镁基板。

- **冷轧基板**

  由冷轧基板生产的彩涂板，具有平滑美丽的外观，且具有冷轧板的加工性能：但是表面涂层的任何细小划伤都会把冷轧基板暴露在空气中，从而使露铁处很快生成红锈。因此这类产品只能用于要求不高的临时隔离措施和作室内用材。

- **热镀锌基板**

  热镀锌彩涂板除具有锌的保护作用外，表面上的有机涂层还起了隔绝保护、防止生锈的作用，使用寿命比热镀锌板更长。热镀锌基板的含锌量一般为 180g/m^2（双面），建筑外用热镀锌基板的镀锌量最高为 275g/m^2（双面）。

- **热镀铝锌基板**

  采用热镀铝锌钢板 (55%Al-Zn) 作为彩涂基板。通常含铝锌量为 150g/m^2（双面）。

  热镀铝锌板的耐蚀性是热镀锌板的 2 ~ 5 倍。

  高至 490℃的温度下连续或间歇使用不会严重氧化或产生氧化皮。

  反射热和光的能力是热镀锌钢板的 2 倍，反射率大于 0.75 是节省能量的理想建筑材料。

- **电镀锌基板**

  通常含锌量为 20/20g/m^2，因此该产品不适合使用在室外制作墙、屋顶等。但因具有美丽的外观和优良的加工性能，因此主要可用于家电、音响、家具、室内装潢等。

- **热镀锌铝镁基板**

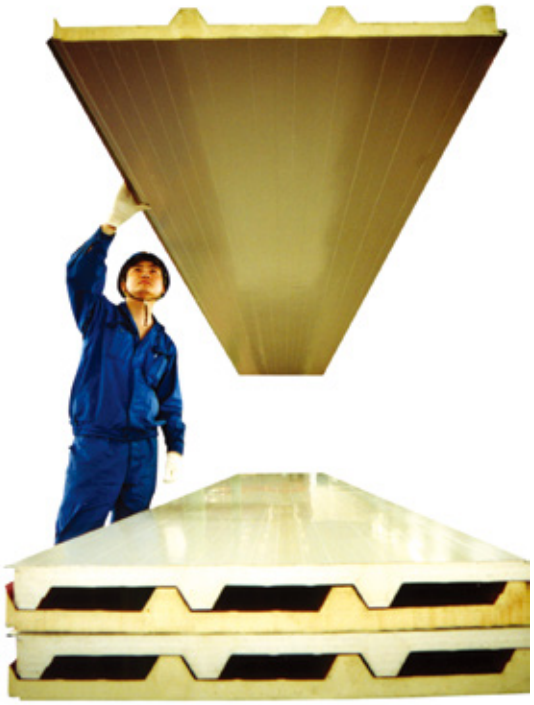
  锌铝镁镀层钢板是在现有的热镀锌或热镀铝锌镀层中上添加一定铝镁等相关微量元素，达到提升钢板耐蚀性能、切边保护性能的目的。已有公开的实验室加速实验、户外暴露实验等结果表明，一定范围内 Al、Mg 含量增加会提高耐蚀性几倍到十几倍。加 Mg 之后的另一大优点是钢板的切边耐蚀性提高，含 Mg 的 Zn 基腐蚀产物会覆盖在切口表面，从而对切口形成保护。

The base metals for prepainted steel sheet consist of cold-rolled, HDG electro-galvanized and Hop-dip zinc-alu-mag base metal.

- **Cold-rolled base metal**
  The prepainted steel sheet processed with cold-rolled base metal features in its smooth and beautiful appearance and the machinability of cold rolled steel sheet, however, in case of any tiny scratch on the top coating may expose the cold rolled base metal in the air and the exposed base metal may rust soon. Thus, the products of this kind can only be used as temporary isolation measures and indoor materials with low requirements.

- **Hot-dip zinc coated base metal**
  The prepainted steel sheet with hot-dip zinc-coated base metal as its base metal not only has the protective function of zinc coating but also has an isolation and protection function with its organic layer that prevents it from rusting and prolongs its service span longer, than that of hop-dip zinc steel sheet. The zinc content of hop-dip zinc base metal is generally 180 per 1 square meters(both sides), while that of the hot-dip zinc base metal for construction outdoors is 275 square meters per 1 square meters.

- **Hop-dip alu-zinc base metal**
  The hop-dip alu-zinc base metal adopts the hot-dip zinc-aluminum coated steel sheet (55%Al-Zn) as its prepainted base metal.
  The corrosive resistance of the hot-dip alu-zinc coated steel sheet is twice to 5 times as much as that of the hot-dip zinc-coated base metal.
  It can satisfy the processing requirements of rolling, coiling and others processes alike.
  Its color won't change while continuously or intermittently working with an ambient temperature up to 316℃ .
  Neither serious oxygenation nor oxide scale might appear while continuously or intermittently working with an ambient temperature up to 490℃ .
  Its heat and the light reflected are respectively twice as much as those of hot-dip zinc steel sheet, and its reflectivity is more than 0.75, exceeding 0.65(required by the EPA Energy Star Standard), which is an ideal construction materials of saving energy.



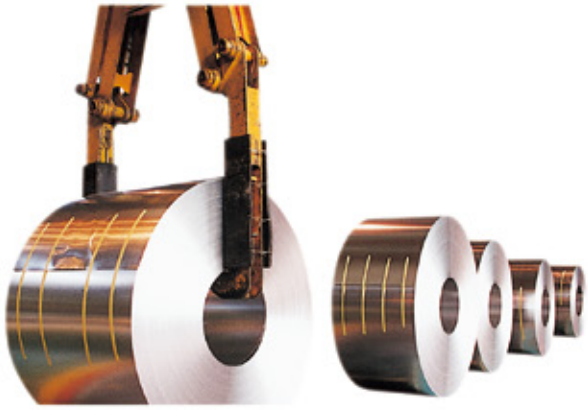
- **Electro-galvanized base metal**
  The prepainted electro-galvanized steel sheet adopts an electro-galvanized base metal coated and baked with an organic coating. Owing to the thin zinc-coated layer of the electro-galvanized base metal, the zinc content of the prepainted steel sheet of electro-galvanized base metal is usually 20/20g/m^2, and the products of this kind are not suitable for building walls or roofs outdoors. However, it has esthetic appearance and excellent machinability, which makes it suitable for electrical household appliances, acoustic devices, steel household appliances, interior decoration, etc.

- **Hop-dip zinc-alu-mag base metal**
  Hop-dip zinc-alu-mag base metal means that a certain proportion of trace elements such as Al/Mg are compounded into the hot-dip zinc coat or hot-dip al-zn coat. The purpose aims the promotion of the ability of anti-corrosion and cutting edge protection. The public accelerating and exposure experiments reveal the enhancement of ability in anti-corrosion with a certain proportion of Al and Mg will be significant as several times to more than ten times. Furthermore, another appreciable benefit of adding the element of Mg is the promotion in the anti-corrosion on the cutting edges. The remained film of Mg-Zn after the corrosion promises a better protection for the cutting edges.

Introduction of Base Metals

基板介绍

特性 Characteristics



Prepainted ***Steel Sheets***

一、环境与镀层对基板寿命的影响

基板的镀层种类、镀层重量以及不同的使用环境对基板的使用寿命起着决定性的作用。如图一、图二所示：

1. Longevity of base metal influenced by environment and coating

The longevity of the base metal would be influenced by coating types, weight and environment. For details, please refer to the diagram 1, 2:

Prepainted Steel Sheets

图表一：镀层重量在不同环境的表现（源于 BS5493–1977）

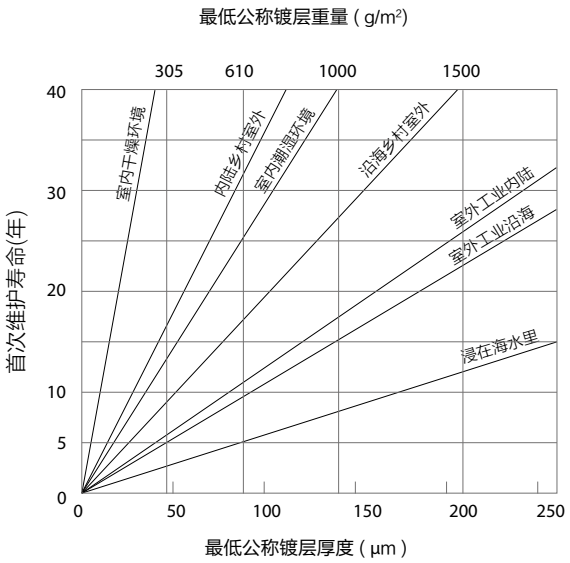
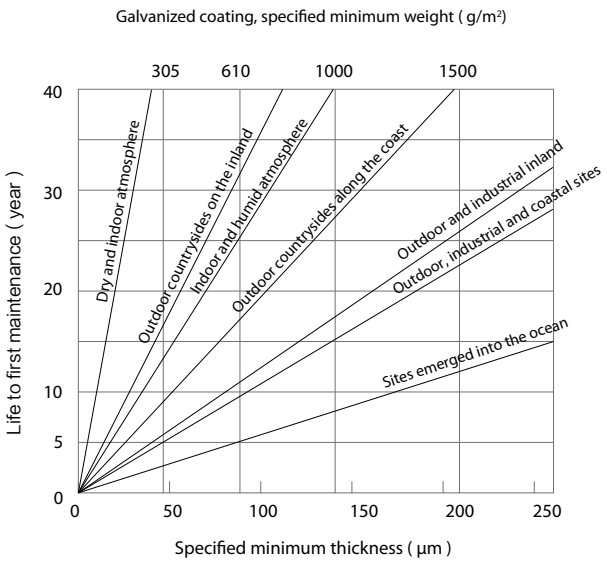
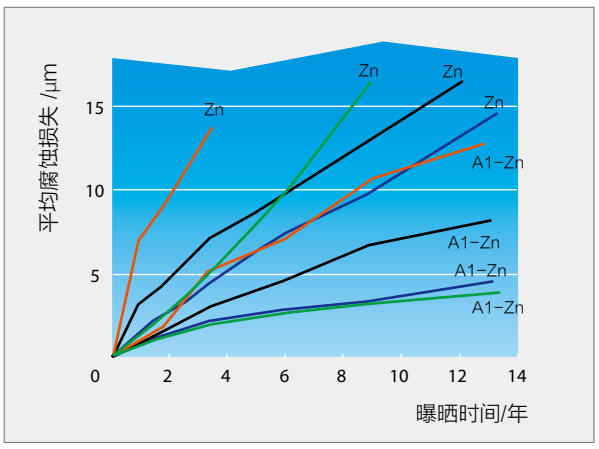


Diagram 1:typicallives of zinc coatings in selected environments (from BS5493-1977)



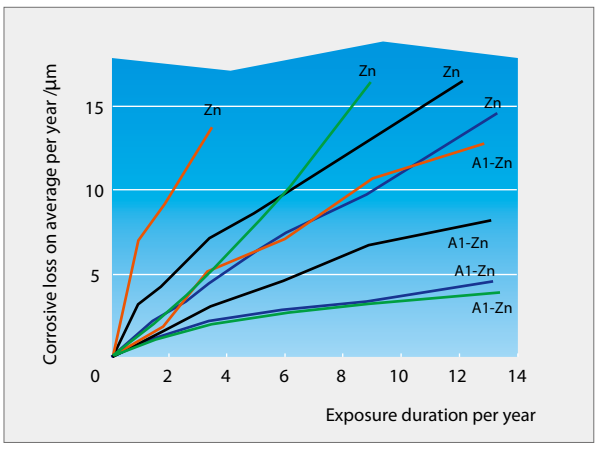
图表二：大气曝晒实验



严重海洋性气候　中等海洋性气候

乡村气候　工业性气候

Diagram 2: Atmospheric Exposure Test



Rough marine climate　Moderate marine climate

Countryside climate　Industrial climate

二、宝钢彩涂产品特性
Characteristics of prepainted steel products

1、彩涂常用牌号及用途
Type and usage of prepainted steel sheet:

基板类型 Type of base metal	彩涂牌号 Steel grade	基板牌号 Grade of base metal	用途 Application
热镀锌 Hot-dip zinc coated	TDC51D+Z	DC51D+Z	一般用 / Normal use
	TDC52D+Z	DC52D+Z	冲压用 / For drawing
	TDC53D+Z	DC53D+Z	深冲用 / For deep drawing
	TS220GD+Z	S220GD+Z	结构用 / Structure
	TS250GD+Z	S250GD+Z	结构用 / Structure
	TS280GD+Z	S280GD+Z	结构用 / Structure
	TS320GD+Z	S320GD+Z	结构用 / Structure
	TS350GD+Z	S350GD+Z	结构用 / Structure
	TS550GD+Z	S550GD+Z	高强结构用 / For high-strength structure
低铝锌铝镁 Hot-dip zn-al-mg coated substrate with a low proportion of Al	TDC51D+ZM	DC51D+ZM	一般用 / Normal use
	TDC52D+ZM	DC52D+ZM	冲压用 / For drawing
	TDC53D+ZM	DC53D+ZM	深冲用 / For deep drawing
	TS220GD+ZM	S220GD+ZM	结构用 / Structure
	TS250GD+ZM	S250GD+ZM	结构用 / Structure
	TS280GD+ZM	S280GD+ZM	结构用 / Structure
	TS320GD+ZM	S320GD+ZM	结构用 / Structure
	TS350GD+ZM	S350GD+ZM	结构用 / Structure
	TS550GD+ZM	S550GD+ZM	高强结构用 / For high-strength structure
镀铝锌 Hot-dip alu-zinc alloy coated	TDC51D+AZ	DC51D+AZ	一般用 / Normal use
	TS250GD+AZ	S250GD+AZ	结构用 / Structure
	TS300GD+AZ	S300GD+AZ	结构用 / Structure
	TS350GD+AZ	S350GD+AZ	结构用 / Structure
	TS450GD+AZ	S450GD+AZ	结构用 / Structure
	TS550GD+AZ	S550GD+AZ	高强结构用 / For high-strength structure
电镀锌 Electro-galvanized	TSECC	SECC	一般用 / Normal use
	TSECD	SECD	冲压用 / For drawing
	TSECE	SECE	深冲用 / For deep drawing

具体技术指标详见相应标准
Details as related standards

2、镀铝锌、热镀锌基板彩涂的不平度、力学性能按照相应基板，下表数据供参考，具体以订货标准为准。
The specifications of flatness and mechanical properties follow the regulations of the Hot-dip alu-zinc alloy coated or Hot-dip zinc coated substrate.The follows could be taken as the references.If there are any discrepancy between the follows and order standards, please take the latter.

表 1：

单位 / Unit: mm

牌号 Steel grade	拉伸试验[a, b, c] Tensile test[a, b, c]			r_{90} 不小于 Not less than ⩾	n_{90} 不小于 Not less than ⩾
	屈服强度 Yield strength MPa	抗拉强度 Tensile strength MPa	断后伸长率 A_{80mm}% 不小于 Elongation A_{80mm}% ⩾		
TDC51D+Z/ZM/AZ	240 ~ 380	270 ~ 500	22	-	-
TDC52D+Z/ZM/AZ	140 ~ 300	270 ~ 420	26	-	-
TDC53D+Z/ZM/AZ	140 ~ 260	270 ~ 380	30	-	-
TDC54D+Z/ZM/AZ	120 ~ 220	260 ~ 350	36	-	-

a 无明显屈服时采用$R_{P0.2}$，否则采用R_{eL}。

b 试样为GB/T 228.1规定的P6试样，试样方向为横向。

c 当产品公称厚度大于0.50mm，但小于等于0.70mm时，断后伸长率允许下降2%；当产品公称厚度不大于0.50mm时，断后伸长率允许下降4%。

a If no obvious yield strength appears, $R_{P0.2}$ would be used. For the rest, R_{eH} should be used.

b The test samples are regulated as the P6 according to GB/T 228.1 with a transverse direction.

c The elongation permits a decline of 2% on the nominal thickness 0.5-0.7mm（ excluding 0.5, but including 0.7 ）.

表 2：

单位 / Unit: mm

牌号 Steel grade	拉伸试验[a, b, c, d] Tensile test [a, b, c, d]		
	屈服强度 不小于 Yield strength MPa ≥	抗拉强度 不小于 Tensile strength MPa ≥	断后伸长率 A_{80mm}% 不小于 Elongation A_{80mm}% ≥
TS220GD+Z/ZM	220	300	20
TS250GD+Z/ZM/AZ	250	330	19
TS280GD+Z/ZM	280	360	18
TS300GD+AZ	300	380	18
TS320GD+Z/ZM	320	390	17
TS350GD+Z/ZM/AZ	350	420	16
TS450GD+AZ	450	480	15
TS550GD+Z/ZM/AZ[e]	550	550	–

a 无明显屈服时采用$R_{P0.2}$，否则采用R_{eH}。

b 除S550GD+Z外，其他牌号的抗拉强度可要求140MPa的范围值。

c 试样为GB/T 228.1规定的P6试样，试样方向为纵向。

d 当产品公称厚度大于0.50mm，但不大于0.70mm 时，断后伸长率允许下降2%；当产品公称厚度不大于0.50mm 时，断后伸长率允许下降4%。

e 对于牌号为S550GD+Z的产品，当产品的厚度不大于0.70mm时，由于厚度减薄效应，导致伸长率过低，无法测得到屈服强度。此时，屈服强度用抗拉强度代替。

a If no obvious yield strength appears, $R_{P0.2}$ should be used. For the rest, R_{eH} should be used.

b The tolerance of tensile strength could be required at minimum of 140 Mpa except TS550GD+Z/ZM/AZ.

c The test samples are regulated as the P6 according to GB/T 228.1 with a longitudinally direction.

d The elongation permits a decline of 2% on the nominal thickness 0.5-0.7mm（ excluding 0.5, but including 0.7 ）

e The yield strength of TS550GD+Z/ZM/AZ will be unavailable due to the excessively low elongation triggered by thickness decreasing effect, when its nominal thickness is no more than 0.7mm.

3、钢板的不平度 / **Flatness**

单位 / Unit: mm

规定的最小屈服强度 The minimal yield strength MPa	公称宽度 Nominal width mm	不平度 mm Flatness ≤					
		普通精度 Regular PF.A			高级精度 Advanced PF.B		
		公称厚度 mm Specified thickness			公称厚度 mm Specified thickness		
		＜0.70	0.70~＜1.20	≥1.20	＜0.70	0.70~＜1.20	≥1.20
＜260	≤1200	8	7	6	5	4	3
	＞1200～1500	10	8	7	6	5	4
	＞1500	15	13	11	7	6	5
260~＜360	≤1200	10	8	7	7	6	5
	1200～1500	13	11	9	8	7	6
	＞1500	17	15	13	11	10	9
≥360	≤1200	13	10	8	10	8	7
	1200～1500	16	13	11	12	10	8
	＞1500	21	19	17	14	12	10

4、钢板的不平度超高级精度 / **Super precision**

单位 / Unit: mm

规定的最小屈服强度 The minimal yield strength MPa	公称宽度 Nominal width mm	不平度 mm Flatness ≤			
		超高级精度 Super precision PF.C			
		公称厚度 Specified thickness mm			
		＜0.50	0.5~＜0.70	0.70~＜1.20	≥1.20
＜260	≤1200	3	2.5	2	2
	＞1200～1500	3.5	3	2.5	3
	＞1500	4	3.5	3	3

Introduction of Coatings

涂料介绍

组成 Composition

Prepainted ***Steel Sheets***

- **涂料的组成及其作用**

各种不同的涂料，都有四个部分组成，即 (1) 树脂 (2) 颜料 (3) 溶剂 (4) 助剂。其中溶剂是挥发部分。

(1) 树脂

树脂即成膜物质，是涂料中的最主要成分和基础，也称基料，它是决定涂膜性质的主要因素。要求作为成膜物质的树脂在涂料储存期内相当稳定，不发生明显的物理变化和化学变化：在成膜时，在规定的条件下，能迅速固化成膜。

树脂种类繁多，在卷材涂料中常用的树脂有丙烯酸树脂、环氧树脂、聚酯树脂和聚氨酯等。不同的树脂，其物理性能和化学性能、以及耐候性、耐蚀性是不一样的。

(2) 颜料

颜料须与树脂配合使用，在涂料中的主要作用是使涂膜着色，颜料比例不同会影响涂膜硬度、光泽度以及耐蚀性等。

Prepainted Steel Sheets

(3) 溶剂

溶剂是液态涂料的重要组成部分，在涂料烘干过程中是能挥发的成分。一般也用溶剂调节涂料粘度，这种用于调节涂料粘度的溶剂称为稀释剂。溶剂对涂料的制造，贮存、涂敷、漆膜的形成和成膜质量有着很大的影响。

(4) 助剂

助剂是为改善涂料性能而加入的少量添加剂。助剂在涂料中用量极少，作用却显著，如有的能改进涂料和涂膜的性能，有的能改善烘干时间、有的能防止涂膜产生病态等。助剂种类繁多，有催干剂、固化剂、流平剂、消泡剂、消光剂、稳定剂等。

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(3) Solvent

The solvent is an important component of liquid coating, which is volatile while baking the coating. Generally, the solvent is also used to adjust the viscosity of the coating, and the solvent of this kind is also called diluent. The solvent has important influences on the production, storage and application of coating, the formation of the membrane and the quality of the membrane formation.

(4) Additives

The accessory ingredient is a small amount of additive for improving the performance of coating. Although the dosage of the accessory ingredient is little in the coating, its function is remarkable. For instance, some of them can improve the performance of coating and that of the membrane, some can adjust the baking time, and some can prevent the membrane from morbidity. There is a great variety of the accessory ingredients, including siccative, curing agent, leveling agent, defoaming agent, flatting agent, stabilizing agent, etc.

▸ Composition and function of coatings

Every kind of coating consist of four kinds of ingredients, namely (1) resin, (2) pigment, (3) solvent, and (4) additives. Among them, the solvent is a kind of volatile organic compound.

(1) Resin

Resin, namely the membrane forming matter, is the principal component and base of coating, also called base material, and the vital factor determining the property of the membrane. It is required that, being a membrane forming matter, resin should be very stable without any obvious physical change or chemical change in the storage period of coating. Under the specified condition, it can should be quickly dried and congealed into a membrane within the period of membrane formation. There is a great variety of resin products, among which the commonly used ones in the coil coating consist of acrylic resin, epoxy, polyester resin, polyurethane, etc. Different resin has different physical & chemical characteristics as well as different properties in weatherproof, and corrosion resistance.

(2) Pigment

Pigment must match resin in coating, which mainly colors the membrane. Different proportion of pigment of the coating membrane has different rigidity, glossiness, and corrosion resistance, etc.

Introduction of Coatings

涂料介绍

分类 Classified

Prepainted Steel Sheets

用 途	建筑涂料和家电涂料
结 构	底漆、面漆
树 酯	环氧、聚酯、硅改性聚酯、聚氨酯、聚偏二氟乙烯等
功 能	自洁、抗静电、隔热等

Usage	Coating for electrical household appliances
Structure	Primer, finish coating
Resin	Epoxy, polyester, silicon modified polyester, polyurethane, polyvinylidene fluoride, etc.
Function	Self-cleaning, antistatic, heat insulation, etc.

Prepainted Steel Sheets

底漆种类和膜厚

底漆有环氧、聚酯、丙烯酸和聚氨酯等。

一般根据产品的用途、使用场合、加工程度，以及与面漆的配套来选择底漆。底漆的膜厚通常为 5-7um。

(1) 环氧底漆

与基材的附着力良好、耐水、耐碱、抗化学腐蚀性好，是最早的卷材用底漆，柔韧性能不如其它底漆。

(2) 聚酯底漆

对基材的附着力好、柔韧性优异、对潮湿的环境较敏感、耐化学药品不如环氧底漆。

(3) 水溶性丙烯酸底漆

对基材的附着力良好、很好的柔韧性、有机溶剂含量低、低温固化。

(4) 聚氨酯底漆

具有耐化学药品性、耐久性、柔韧性好。

Category and film thickness of primers

The category of the primer includes epoxy, polyester, acrylic acid, polyurethane, etc.

In general, the primer is chosen in accordance with the usage, environment condition, processing stage and finish coat. The film thickness of the primer is usually 5-7 um.

(1) Epoxy primer

The epoxy primer has a strong adhesion to the base metal and good properties in waterproof, alkali-proof and chemical resistance, which is the original primer for the coiled steel, having a poorer flexibility than that of other primers.

(2) Polyester primer

The primer has strong adhesion to the base metal and excellent flexibility, which is relatively sensitive to damp environment and has a chemical resistance poorer than that of epoxy primer.

(3) Water-soluble acrylic acid primer

The primer of this kind has strong adhesion, excellent flexibility, lower organic solvent and low-temperature curing.

(4) Polyurethane primer

The primer of this kind has excellent chemical resistance, durability and flexibility.

Introduction of Coatings

涂料介绍

面漆种类及特点

Category and Characteristics of Finish Coats

Prepainted ***Steel Sheets***

- **面漆种类**

在卷钢涂料中，起耐久性作用的是树脂和颜料，最常用的面漆有聚酯、硅改性聚酯、高耐久性聚酯和聚偏二氟乙烯等。

(1) 聚酯

附着力良好、颜色丰富、在成型性和室外耐久性方面范围较宽、耐化学药品性中等、成本低。

(2) 硅改性聚酯

涂膜的硬度、耐磨性和耐热性良好；以及良好的外部耐久性和抗粉化性、光泽保持性，柔韧性一般、成本中等。

(3) 高耐久性聚酯

优良的颜色保持性和抗紫外线性能、优良的室外耐久性和抗粉化性、漆膜附着力好，颜色丰富、优异的性价比。

(4) 聚偏二氟乙烯

优异的颜色保持性和抗紫外线性能、优异的室外耐久性和抗粉化性、优良的抗溶剂性、良好的成型性、抗脏性、颜色有限、成本高。

Prepainted Steel Sheets

- **Category of finish coats**
  Among all the ingredients of coil coatings, resin and pigment have the function of duration, and the primers commonly used consist of polyester, silicon modified polyester, polyvinylidene fluoride, high durability polyurethane, etc.

  (1) Polyester
  The finish coat of this kind has strong adhesive force, a variety of colors, wide scope of properties in formation and durability outdoors, moderate chemical resistance and low cost.

  (2) Silicon modified polyesters
  The membrane of the finish coat of this kind has excellent rigidity, abrasion resistance, thermal resistance, good outside durability, chalking resistance, high retention of color and luster, ordinary flexibility, moderate cost, etc.

  (3) High-durability polyester
  The finish coat of this kind has excellent retention of color, resistance of ultra-violet radiation, strong outdoors durability, chalking resistance, strong adhesion to the base metal, plenty of colors and relatively lower cost compared to the same quality.

  (4) Polyvinylidene fluoride
  The finish coat of this kind features in its excellent retention of color, resistance of ultra-violet radiation, outdoors durability, chalking resistance, resistance to solvent, formability, good dirt resistance, finite colors and high cost.

涂层性能
Performance of Coating Film

1、宝钢彩涂板正面常规性能（下表供参考，以订货标准为准）
Common performance of front coating of baosteel's prepainted steel sheet

面漆种类 Category	涂层厚度 Thickness (μm)	铅笔硬度 Pencil hardness	180°弯曲[a] 180°bend[a]		反向冲击 Impact (J)	耐中性盐雾 Salt pray resistance[b]	紫外灯加速老化 Aging[c]			
			厚度≤0.75mm (钢窗料厚度≤0.80mm) Thickness ≤0.75mm (Thickness of steel materials for door and window ≤0.80mm)			试验时间 Time(h)	试验时间 Time(h)		失色[e]	失光[e]
			A级 A level	B级 B level			UVA-340	UVB-313		
聚酯PE[d]	≥20	≥F	≤4T	≤3T	≥9	≥1000	≥600	≥400	≤4级	-
硅改性聚酯 SMP	≥20	≥F	≤4T	≤3T	≥9	≥1000	≥720	≥480	≤4级	-
高耐久性聚酯 HDP	≥22	≥HB	≤4T	≤3T	≥9	≥1500	≥960	≥600	≤3级	≤3级
聚偏二氟乙烯 PVDF[f]	≥23	≥HB	≤4T	≤2T	≥9	≥2000	≥1800	≥1000	≤2级	≤2级

a 厚度>0.75mm(或钢窗料厚度>0.80mm)的钢板及钢带做90°弯曲；试样方向为纵向。
b 试样为平板试样并进行封边处理。
c UVA-340采用12小时为1循环周期：8h紫外光照，黑板温度60℃±3℃，4h冷凝，黑板温度50℃±3℃。UVB-313采用8小时为1循环周期：4h紫外光照，黑板温度60℃±3℃，4h冷凝，黑板温度50℃±3℃。
d 用户如有要求，可规定铅笔硬度为HB。
e 功能型涂层的失光和失色允许放宽一个等级。
f 涂层厚度≥30μm时，铅笔硬度要求为B。

a If the thickness >0.75mm(thickness of steel materials for door and window > 0.80mm), the steel sheet or coil should be curved by 90°. And the samples are shaped with a transverse directions.
b The samples are edge sealed plates.
c UVA-340 method: a time cycle of 12 hours, 8 hours' exposure to the UV light, black board temperature 60℃±3℃, 4hours' condensation, black board temperature 50℃±3℃. UVB-313: a time cycle of 8 hours, 4 hours' exposure to the UV light, black board temperature 60℃±3℃, 4hours' condensation, black board temperature 50℃±3℃.
d The pencil hardness could be available on HB as the customer's requirement.
e Deterioration of color and gloss for functional coat is permitted with the extension of one more class.
f Pencil hardness is B on coat with thickness not less than 30μm.

2、宝钢不同背面涂层结构的性能比较（控制值）
Performance Comparison for Different Back Coating Structures of Baosteel (Controlling Value)

背面涂层结构 Coating structure	2/1	2/1M	2/2
涂层数 / Coating layer	1	2	2
颜色 / Color	黄绿色 / Yellow-green	钢白 / Steel white	云白 / Cloud white
涂层厚度 / Coating thickness	≥5μm	≥8μm	≥12μm
铅笔硬度 / Pencil hardness	-	≥F	≥F
反向冲击 / Reverse Impact	-	≥9J	≥9J
柔韧性 / Flexibility	-	≤5T	≤5T
用途 / Application	夹芯板 / Sandwich sheet	夹芯板、单层压型板 Sandwich sheet, Single layer panel	单层压型板 / Single layer panel

Introduction of Products

彩涂产品介绍

高耐久性聚酯 (HDP)

High-Durability Polyester

Prepainted ***Steel Sheets***

HDP 涂料耐久性好的原理

(1) 树脂：HDP 采用高分子量的树脂，聚合物支链少，键能稳定，不易光解，因此不易粉化和光泽降低。

(2) 颜料：HDP 采用无机陶瓷颜料，在日光中不易褪色。

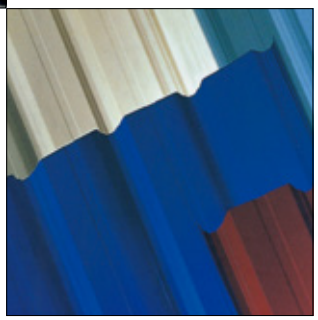
宝钢高耐久性聚酯的供应商为世界上最早的也是最大的涂料公司之一，*提供 15 年涂层质量保证*。

HDP 与 PE 涂层 UV 试验对比

QUV testing comparision of HDP coating & PE coating

试验方法 Test method (ASTM G53)	光泽保持率 Retention rate of glossiness		色差 (ΔE) Color difference (ΔE)	
	普通聚酯 Common polyester PE	HDP	普通聚酯 Common polyester PE	HDP
QUVA(2000H)	＞70%	100%	＜3	＜1
QUVB(500H)	＞20%	＞80%	＜5	＜3

Prepainted Steel Sheets



- **Reasons why HDP has longer durability**

  (1) Resin: HDP adopts the high molecular weight resin with little branched chain polymer, stable bond energy and resistance to photolysis, so HDP has a relatively good resistance to chalking and excellent retention of luster.

  (2) Pigment: HDP adopts inorganic ceramic pigments, which makes it hard to fade in the sunlight.

  The supplier, one of the earliest and largest coating enterprises in the world, who provides Baosteel with high-durability polyester (HDP), ***offers a quality guarantee of their coating products for 15 years.***

Introduction of Products
彩涂产品介绍

聚偏二氟乙烯 (PVDF)
Polyvinylidene Fluoride

Prepainted Steel Sheets

- **氟碳彩板的用途**

PVDF 氟碳涂层为现有建筑涂层中的极品，为公认的具有最好保护作用的有机涂层，能保证金属建筑板几十年不受损害，并始终保持美丽的颜色。从 1965 年进入市场起，氟碳涂层在世界各地的建筑物经历了 30 多年的日晒风吹雨打，始终保持完美无损。PVDF 为聚偏二氟乙烯。氟原子最大的电负性能形成十分稳固的氟碳键，加上其分子独特的对称性，使 PVDF 具有超常的稳定性，独特的抗紫外光光解性能及优异的绝缘性能和机械性能。

- **涂料性能**

该产品积累了三十多年的生产技术经验，涂料采用专利配方，Kynar 500 或 Hylar 5000，无机陶瓷颜料，每一种新的原料都必须经过佛罗里达十年曝晒证明才能商业使用，从而使产品质量得到可靠保证。美国 Fitzpartrick 核电站厂房彩板采用热镀锌基板，涂上含 70% 树脂的氟碳涂料。1971 年建成至今不仅表面及基板完好，而且色彩依旧。

宝钢氟碳涂料的供应商为世界上最早的也是最大的氟碳涂料公司之一，*提供 20 年涂层质量保证*。

Prepainted Steel Sheets

- **Usage of fluorocarbon prepainted sheet**

  The PVDF fluorocarbon coating is a masterwork among the existing construction coatings, which is generally acknowledged as an organic coating with the best protective performance, guarantees the metal building board not to be damaged for decades and always retains its beautiful color. Since entering the market in 1965, the fluorocarbon coatings world-widely applied to buildings have already successfully traveled through various poor weathers and still remained perfect in the past 30 years. PVDF denotes polyvinylidene fluoride. The fluorine-carbon bond formed by a fluorine atom with the largest electronegativity, together with its unique symmetry of molecule, lets the PVDF has an extra stability, unique resistance to photolysis of ultra-violate radiation, excellent insulation and mechanical properties.

- **Performance of coating**

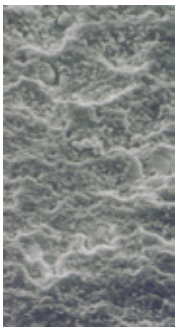
  Baosteel has already accumulated more than 30 years' technical & production experience of the coatings of this kind. The coating adopts some patented recipes, Kynar 500 or Hylar 5000, and inorganic ceramic pigment, and each kind of new materials must be put into commercial uses upon Florida' s ten-year insolation certificate, which guarantees the product quality. The prepainted steel sheet for the workshop of Fitzpartick Nuclear Power Plant of the U.S.A. adopts the hot-dip zinc coated base metal that is coated with the fluorocarbon coating with 70% resin content. Since the workshop was built in 1971, while not only the surface and the base metal of the prepainted steel sheet are still perfect, but also its color is retained well.

涂料曝晒后表面比较（放大 1000 倍）
Comparison of coating surface after insolation (enlarge by 1000 times)

佛罗里达 45 度角向南
Florida: in the south by an angle of 45 degree

PVDF 氟碳 13 年
PVDF fluorocarbon: 13 years

SMP 硅改性聚酯 9 年
SMP silicon modified polyester: 9 years



PE 聚酯 6 年
PE polyester: 6 years

The supplier, one of the earliest and largest coating enterprises in the world, who provides Baosteel with PVDF, ***offers a quality guarantee of their coating products for 20 years***.

宝钢氟碳彩板实物质量
Actual quality of Baosteel's fluorocarbon prepainted steel sheet

性能指标 Performance index	膜厚 Thickness of film		光泽度 Glossiness		铅笔硬度 Pencil hardness		冲击功 Absorbed-in-fracture energy		T弯 T bend		色差ΔE Color difference
	正面 Front side	反面 Back side	正面 Front side	反面 Back side	正面 Front side	反面 Back side	正面 Front side	反面 Back side	正面 Front side	反面 Back side	
实物水平 Actual level	24 μm	15 μm	25	32	≥F	≥H	9J	9J	≤2T	≤2T	0.61

Introduction of Products
彩涂产品介绍

Prepainted *Steel Sheets*

彩涂印花钢板

定义：

彩涂印花钢板也称印刷钢板，是在钢板上涂一层油漆烘烤后，用照像凹版技术印刷出图案，再涂上透明漆经烘烤而成之产品。

图纹：

图纹一般是木纹状的，用户若有特殊要求，可另行协商研制。

用途：

主要用作内外墙壁及室内物品装饰。

金属压花彩涂钢板

定义：

金属压花彩涂钢板是在钢板彩涂之后，进行压花处理使彩涂钢板被压出凹凸花纹的产品。

用途：

金属压花彩涂钢板因具有优良立体感，广泛应用于室内装饰面板等用途。

可供规格：

金属压花彩涂钢板不受涂层品种限制，但因使金属变形较为困难，故基板厚度一般不超过 0.60mm。

印花钢板

压花钢板

家电环保彩涂板

定义：

通过对镀层，预处理和涂料中有害元素（铅、镉、六价铬等）的控制及合适的环保彩涂产品生产工艺，生产符合欧洲RoHS 指令的家电用彩涂钢板。

基板种类：

电镀锌基板、热镀锌基板、冷轧基板。

钢种：

普通、冲压、深冲压

涂层结构：

2/1、2/2、2/1M

颜色：

普通素色、金属色、珠光色

用途：

冰箱侧板、空调室内机侧板、空调室外机面板，洗衣机箱体，冰柜箱体、DVD 上盖板、微波炉箱体，热水器外壳、灯罩等

Color-coated Printed Steel Sheet

Definition:

Color-coated printed steel sheet, also called printed sheet, is prepared by being coated with a layer of paint and baked pattern is printed out using the gravure technologies, then a layer of clear lacquer is coated and after being baked again, color-coated printed steel sheet is obtained.

Patterns:

Patterns are typical wood texture (as shown in the figure). Special requirements from customers may be met via negotiation and research otherwise.

Application:

Mainly applied to decoration for interior and exterior walls and indoor items.

Metal Embossed Color-coated Steel Sheet

Definition:

Metal embossed color-coated steel sheet is the product prepared via being color-coated and applied to produce embossed patterns on color-coated steel sheet.

Application:

Metal embossed color-coated steel sheet is extensively applied as indoor decoration panels because of its good stereoscopic impression.

Provided specification:

Metal embossed color-coated steel sheet is not limited by coating types. But the substrate thickness is normally no more than 0.60mm as it may make the metal hard to deform.

Environmental Friendly Home Appliance Color-coated Sheet

Definition:

To produce the home appliance color-coated steel sheet in accordance with European RoHS Directive by controlling hard elements (lead, cadmium, hexavalent chrome) in plated layer, pre-treatment and coating and adopting proper environmental friendly production processes for color-coated products.

Substrate type:

Electro-galvanized substrate, hot dip galvanized substrate, cold rolling substrate.

Steel type:

Normal, drawing, deep drawing.

Coating structure:
2/1, 2/2, 2/1M.

Color:

Normal solid color, metal color, pearlescent color.

Application:

Refrigerator side sheet, indoor air conditioner side sheet, outdoor air conditioner panel, washing machine cabinet, freezer cabinet, DVD upper cover, microwave oven cabinet, water heater case, lamp cover, etc.

Introduction to the Functional Coat

功能涂料介绍

自洁 Self-cleaning

Prepainted Steel Sheets

- **1、什么让彩板变脏了?**

  天晴时空气中的污染物以及下雨时雨水中的污染物都会残留于墙面或屋顶彩板涂层的表面，形成图 1 的景象。根据污染物特性和使用环境污染物分为城市型和郊区型。

  城市型：汽车尾气、工业粉尘颗粒等。

  郊区型：尘土。

- **2、何为自洁彩板?**

  自洁彩板是一种新型的户外建筑用彩涂钢板。它的有机涂层除了具有普通彩板的高装饰性及耐候性外，还具有特殊的自清洁功能。采用这种材料制成的厂房不需要人工清洗维护，只借助于雨水的冲刷就能在空气质量较差的工业和城市地区保持屋顶和墙面彩板的外观鲜艳性，保持彩色涂层的高装饰性。

- **3、不同涂层体系的沾灰及可清洁性**

  氟碳涂料：中低等的沾灰程度，具有很好的可清洁性。

  普通聚酯体系：高的沾灰程度，不易清洁。

  宝钢目前自洁板：中高的沾灰程度，易清洁。

- **4、宝钢自洁彩板**

  具有优异的抗沾污性能，能抵抗污染物渗透到漆膜内。优异的亲水性能保证了雨水充分展开于涂层表面，起到良好的冲刷效果。

Prepainted Steel Sheets

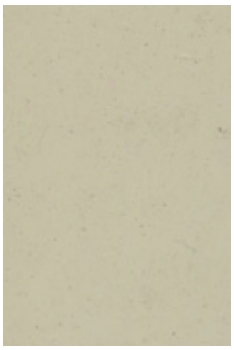
- **1. Why does the prepainted steel sheet become dirt?**
  The pollutants produced either in a sunny day or in a rainy day may rest on the surfaces of the prepainted steel sheets applied to wall finishes or roofs, which is showed in Figure 1.
  The pollutants can be classified into two groups, namely urban pollutants and suburban ones, according to the characteristics of pollution and environment.
  Urban Pollutants: auto exhaust gas, industrial dust and fog, etc.
  Suburban: dust.
- **2. What's the self-cleaning prepainted steel sheet?**
  The self-cleaning prepainted steel sheet is a new prepainted steel sheet for outdoors construction. Its organic coating not only has excellent properties of decoration and weatherproof that common prepainted steel sheets might possess but also has the special self-cleaning function. The factory buildings built by the prepainted steel sheets of this kind needn't any manually-operated cleaning or maintenance, which can retain the cleanness and glossiness of the prepainted steel sheets applied to the walls and roofs only by rainwater, even those in the industries and cities with poorer air quality, and can maintain the high decorative property of the prepainted steel sheets.
- **3. Different coating system might have different contamination and cleaning property**
  Fluorocarbon coating: at the medium and low contamination level, and easy to clean.
  common polyester system: at high contamination level, and hard to clean.
  Self-cleaning sheet: at medium and high contamination level, easy to clean.
- **4. Baosteel's self-cleaning prepainted steel sheet**
  Has excellent resistance to staining, which can prevent the pollutants from being penetrated into the coating membrane. Its good water solubility ensures that the rainwater can fully cover the surface of the coating and cleanse the surface well.

图 1：白灰墙面彩板使用一年后的表面污染情况

Figure 1: One year after the prepainted steel sheet is applied to the lime wall finish

下图为普通涂层与自洁涂层对比情况
Comparision of common coating & self-cleaning coating

普通彩板挂片半年后的实物
Actual view of common prepainted steel sheets applied after half a year



自洁彩板挂片半年后的实物
Actual view of Baosteel's self-cleaning prepainted steel sheets applied after half a year

普通彩板
Common prepainted steel sheets

宝钢自洁彩板
Baosteel' s self-cleaning prepainted steel sheet

亲水涂层与普通涂层对比
Comparision of Water-soluble coating & common coating

Introduction to the Functional Coat

功能涂料介绍

隔热 Adiabatic Products

Prepainted Steel Sheets

隔热彩板又称冷屋顶板（Cool Roof 中的一种）指借助于板面的反射将太阳照射的部分热量反射回大气中，从而阻隔建筑物室外热量向室内传递，降低室内温度的一种新型功能彩板。其功能的实现主要由面漆涂层性能的革新而获得。

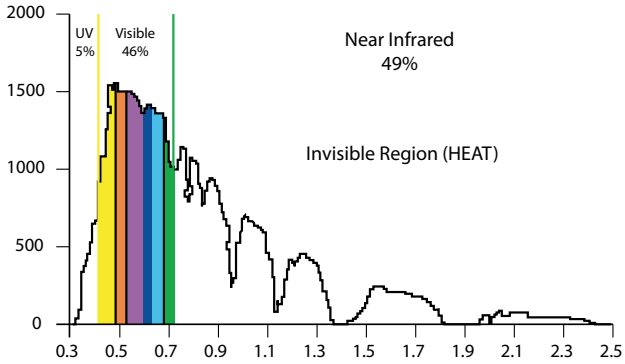
通过面漆的颜料及填料的改进，面漆涂层对日光照射能量的反射会比普通彩板有所增强，从而降低建筑物室内温度，提高热舒适性，减少空调的使用，降低使用成本，间接的也可以减轻能源的利用，减少热岛效应等。

Prepainted Steel Sheets

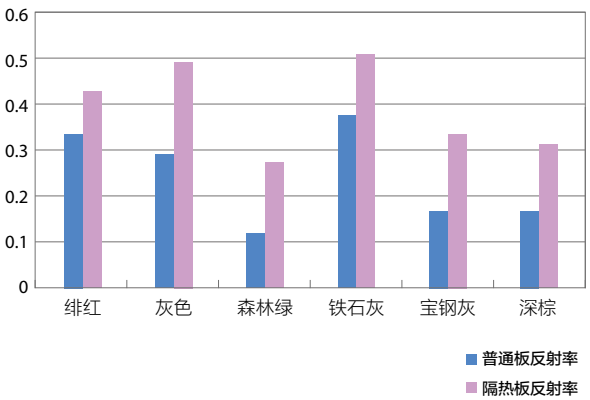
Adiabatic prepainted steel also known as the cool roof means a superior kind of prepainted steel that decreases the temperature in the house by reflecting the sunlight to the air to decrease the thermal conduct into the interior space.The development of function mainly attributes to the revolution of the paint system.

The reflection are enhanced by reformation of pigments and additives.The decline of temperature contributes to the more comfortable life and less frequency use of air conditions. The cost will be reduced by higher efficient utility of energy, since the Heat-island Effect is weakened.

彩涂隔热原理
Theory of Adiabatic prepainted steel



宝钢隔热聚酯产品反射率比较



Introduction to the Functional Coat

功能涂料介绍

抗静电 Antistatic

Prepainted ***Steel Sheets***

抗静电用彩涂板

- **1、静电的产生**

不同物质的分子、原子以及对电子的相互吸引作用不同瞬间就能产生电荷，这种电荷称之为静电荷。即使很小的静电荷也能产生极高的静电压。一般来说，极性基团较多的聚合物容易携带正电荷，反之则容易携带负电荷。

在日常生活中到处都有产生静电的现象。如：人在空调房间走过合成地毯时能产生超过 1000 伏特的电荷积累；在冬天穿脱衣服和汽车开门时会产生手被电击的感觉。

导体和半导体表面也会产生静电现象，但是由于电荷能在表面和材料内部传递，因此不会在表面产生静电荷的积累。而彩涂产品表面的聚酯或氟碳是高分子聚合物，属绝缘材料，一旦带上电荷则很难去除。

- **2、静电的危害**

（1）吸附灰尘和细菌

（2）降低产品的表面及使用性能

（3）引起静电放电会造成燃烧或爆炸

Prepainted Steel Sheets

- **3、抗静电彩涂板的工作原理**

  抗静电彩涂板的抗静电原理是在绝缘的聚酯涂层中加入导电性材料，使原来绝缘的涂层变成半导体，配合建筑工程的接地线的安装，可使彩涂钢板表面因空气对流及衣物摩擦而产生的静电得以导入大地而消失。

- **4、抗静电彩涂板的用途**

  主要用在抗静电、高清洁度无尘、无菌场所。如：电子半导体业、食品加工业，制药业、医院等。

- **5、抗静电彩涂板的性能**

  (1) 加工性和耐久性能和普通聚酯相当。

  (2) 耐化学药品性及耐溶剂性略高于普通聚酯。

  (3) 表面电阻 (Ω/cm^2) 为 10^6–10^9Ω，(普通聚酯在 10^{13}Ω 左右)。

Antistatic prepainted steel sheet

- **1: Source and danger of static electricity**

  The electric charge may be generated instantaneously when different molecules and atoms are absorbing one another and interacting, which is also called static charge. Even very small static charge can generate a high static voltage. Generally speaking, the polymer with many polar groups is apt to carry positive charge; otherwise, it is apt to carry negative charge.

  In our daily life, the static there are various static phenomena. For example, a voltage over 1000 volt may produce while a man is walking on the composite carpet in an air conditioning room, and our hand always feel an electric shock while we are taking off in winter, or opening doors of the auto car.

  The surface of both conductor and semiconductor may also generate static electricity; however, because the accumulated charge can be conducted by the surface and the internal of materials, there is little static charge accumulated there. While the polyester or fluorocarbon on the surface of the prepainted steel sheet is a kind of high molecule polymer, which is an insulating material. However, as long as the surface generates electric charge, it may be really hard to discharge.

- **2: The danger of accumulation of static charge on the surface:**

  (1) Adsorbing dust and bacteria.

  (2) Damage the performance and usage of the surface of the product.

  (3) Cause the static electricity discharged, which may bring about fire disaster or explosion.

- **3: Working principle of the antistatic prepainted steel sheet**

  The working principle of the antistatic prepainted steel sheet is to add some conducting materials in the insulating polyester coating, which gets the former insulated coating, become a semiconductor. Being assorted with the earthing system of the construction, the accumulated static electricity on the surface of the prepainted steel sheet that is sourced from air convection or fabric friction is conducted into the earthing system and then disappears.

- **4: Usage of the antistatic prepainted steel sheet**

  Mainly used in antistatic, high cleanness and bacteria-free environments, covering: electronic semi-conductor industry, foodstuff processing industry, pharmaceutical industry, hospitals, etc.

- **5: Performance of the antistatic prepainted steel sheet**

  (1) Its machining property and durability match that of the prepainted steel sheet with common polyester as its base metal.

  (2) Its resistance to chemicals and solvents is slightly higher than that of the common polyester prepainted steel sheet.

  (3) Its surface resistance(Ω/cm^2) is 10^6-10^9Ω(common polyester prepainted steel sheet: about 10^{13}Ω).

Introduction to the Functional Coat

功能涂料介绍

抗菌 Antisepitc

Prepainted Steel Sheets

抗菌彩涂板

- **定义：**
  抗菌即先控制微生物的活动和繁殖，创造一个清洁环境，并将其逐步杀灭的一种长期杀菌作用；以生活环境中生息的细菌为对象，抗菌效果可续数年以上，长期保持生活环境的（微生物学）卫生性。
- **机理：**
  金属离子溶出型的抗菌机理，在使用过程中抗菌剂缓慢释放出金属离子，溶出的金属离子即能破坏细菌的细胞膜或细胞原生质活性酶的活性，而具有抗菌效果。
  抗菌彩涂板一般采用无机类抗菌剂，使用复合的金属离子溶出型和活性氧的抗菌剂，达到长效和广谱抗菌的要求，低毒性和高效快速。
- **用途：**
  用于医院墙面、天花板、食品储藏加工区域、通风系统等。

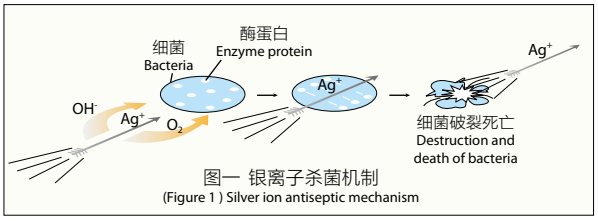
Prepainted Steel Sheets

Antiseptic Color-coated Sheet

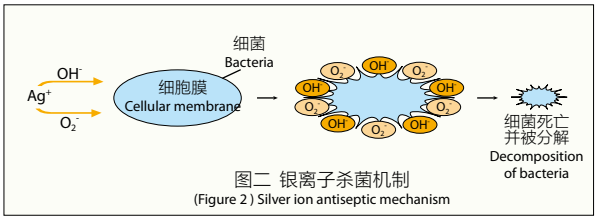
- **Definition:**
  Antisepsis is a long period germicidal action to control the activity and propagation of microorganisms to create a clean environment and then gradually kill all these microorganisms. As for bacteria growing in the living environment, the antiseptic effects may continue for more than several years and maintain long period (microbiology) hygiene for living environment.

- **Mechanisms:**
  Stripped metal ion antiseptic mechanism. Antiseptic agent slowly releases metal ions in application. Stripped metal ion can destroy the cell membrane of bacteria or activity of cellular protoplasm active enzyme, so it has antiseptic effects.
  Antiseptic color-coated sheet normally adopts the inorganic antiseptic agent. To meet the requirements for long acting and board spectrum antisepsis, low toxicity and high efficiency and quick speed, the antiseptic agent combining stripped metal ions and active oxygen are used.

- **Application:**
  Used for hospital wall face, ceiling, food storing and processing area, ventilating system, etc.



图一 银离子杀菌机制
(Figure 1) Silver ion antiseptic mechanism



图二 银离子杀菌机制
(Figure 2) Silver ion antiseptic mechanism

Introduction of New Products

新产品介绍

先进高强基板彩涂
Advanced Prepainted Steel with High-strength Substrate

***Prepainted* Steel Sheets**

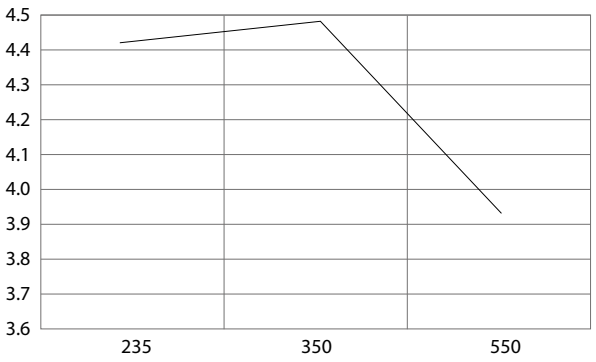
近年来，国内外彩色涂层钢板市场对高强、高韧、具有良好成型性能的彩色涂层钢板产品需求显著提高，同时对成本控制要求也不断增加。对此，宝钢成功开发出具有高强、高韧先进高强钢彩色涂层钢板产品，主要利用相变强化的原理，可在不增加或少增加成本的前提下，获得具有高强、高韧特性、加工成型性能和板型良好的先进高强彩色涂层钢板产品，更好地满足了用户对不同钢种性能的要求。

牌号 Steel grade	规格 Dimensions mm	屈服 Yield strength MPa	抗拉 Tensile strength MPa	延伸率 Ratio of elongation
THC500 / 550 CPD+AZ	0.45 ~1.0* 800 ~1250	≥500	≥550	≥10%

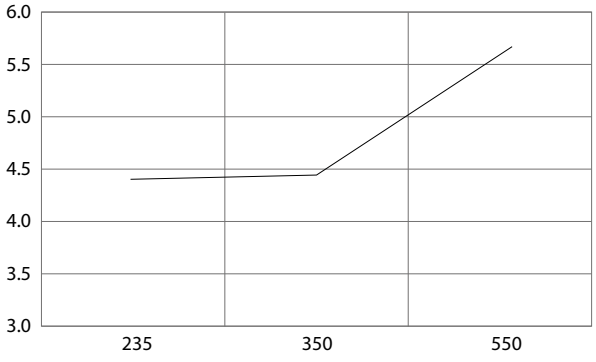
该产品经宝钢用户辊压成型后，比传统的 550 强度基板彩涂大幅提高抗风揭能力。
The performance of wind uplift resistance is significantly promoted after the rolling by Baosteel's customers comparing to the traditional 550.

Considering a prominent boosted demand for prepainted steel at lower cost with high strength, high ductility and brilliant formation, Baosteel has succeeded in developing the products as the market requires.The principle of phase transition is utilized to acquire the advanced products with high strength, high ductility, brilliant formation and minimal flatness, which satisfy the customers' requirements on distinctive characteristics of steel.

传统的 550 彩涂抗风揭能力
The performance of wind uplift resistance
of traditional 550



THC500 / 550CPD+AZ 彩涂抗风揭能力
The performance of wind uplift resistance
of THC500 / 550CPD+AZ



Introduction of New Products

新产品介绍

超厚涂层彩涂
Super Thick Coated Prepaitned Steel

Prepainted Steel Sheets

彩涂钢板涂层厚度一般指钢板上表面涂层厚度，是包括底漆和面漆的总厚度。一般情况下，上表面涂层厚度在 20-25 微米。为了提高涂层对镀层和钢板的保护能力，可以采用增加涂层厚度的方法。

为此，宝钢推出了厚涂层彩涂钢板系列，主要包括：厚底漆二涂层氟碳彩涂钢板、三涂层珠光氟碳彩涂钢板、超厚双面氟碳彩涂钢板、厚涂层聚氨酯彩涂钢板、厚底漆聚酯系列彩涂钢板等。

图 1 是不同涂层盐雾试验中划线扩蚀程度的比较情况，从图中可以看出，3000 小时的盐雾试验中，与普通厚度的聚酯和高耐候聚酯相比，氟碳涂层钢板划线部位扩蚀宽度变化最缓慢，也就是说不同涂层中，氟碳涂层耐蚀性最为优秀，且随着涂层厚度的增加，耐蚀性更加优异。

由于有超厚的氟碳的涂层，因此耐候性也是非常优异的，图 2 为不同品种和膜厚彩涂钢板经过 3000 小时 QUVB 试验后失光率的对比，从图中可以看出，氟碳产品的失光率远远低于普通聚酯（PE）；上表面总膜厚为 23 微米氟碳和 45 微米氟碳钢板由于氟碳膜厚均为 20 微米左右，因此失光率基本一致，而上表面总膜厚为 62 微米的氟碳钢板，氟碳涂层的总厚度超过 35 微米，在失光率上也是最优的，且 62 微米氟碳产品粉化等级仍保持在最优 0 级。

宝钢新推出的厚涂层系列：厚底漆二涂层氟碳彩涂钢板（厚底漆氟碳）、三涂层珠光氟碳彩涂钢板（三涂层氟碳）、超厚双面氟碳彩涂钢板（超厚双面氟碳）、厚涂层聚氨酯彩涂钢板（厚涂聚氨酯）、厚底漆聚酯系列彩涂钢板等，在耐候性和耐蚀性上是存在差异的，为了便于大家理解和推广，请见图 3 示出的各品种比较示意图。我们可以根据建筑物所处内外环境，建筑物寿命等推荐合适的涂层钢板。

Prepainted Steel Sheets

The coat thickness of the prepainted steel mainly means the top thickness including the top paint and the primer. Usually, 20-25 micron paint are applied on the top. For the acquisition of better protection to the alloy coat and the metal underneath, it is a brilliant way to increase the thickness of organic coat.

Baosteel develop series of prepainted steel products with super thick coat. They are 2 lays PVDF, 3 lays PVDF with pearly-lustre, super thick PVDF on both sides, super thick PU, PE with thick primer.

The demonstration of diagram compare the results on the scratch corrosion of different types of prepainted steel in the salt spray. It indicates that scratch of PVDF stretches most slowly during the 3000 hours' experiment comparing to the PE and HDP with regular thickness.Then we come to a conclusion that PVDF take the priority place in the corrosion resistance. And the performance get better when the coat thickness increases.

The weatherability of the super thick PVDF turn out to be appreciably excellent. The gloss loss of prepainted steel with different type and thickness after 3000 hours' QUVB is listed in the Figure 2. The gloss loss of PVDF perform apparently lower than the PE. The prepainted steel with the top thickness of 23 micron and 45 micron are similar in the gloss loss due to the similar mass of fluorocarbon.The PVDF with the thickness of 62 micron results in level 0, which is the best performance in the evaluation standard. The gloss loss of the prepainted steel with the thickness of 62 and 35 micron are the most excellent ones.

The series of thick prepainted steel:2 layers PVDF with thick primer(thick primer PVDF), 3 layers PVDF with pearly-lustre(3 layer PVDF), super thick PVDF on both sides(super thick PVDF on both sides), super thick PU(thick PU), PE with thick primer, etc. We illustrate the concepts of different types shown as the Figure 3. And Baosteel are willing to recommend the suitable products to customers on the consideration of the building locations and the designs of service period.

图 1 不同涂料品种和膜厚在盐雾试验中划线扩蚀趋势

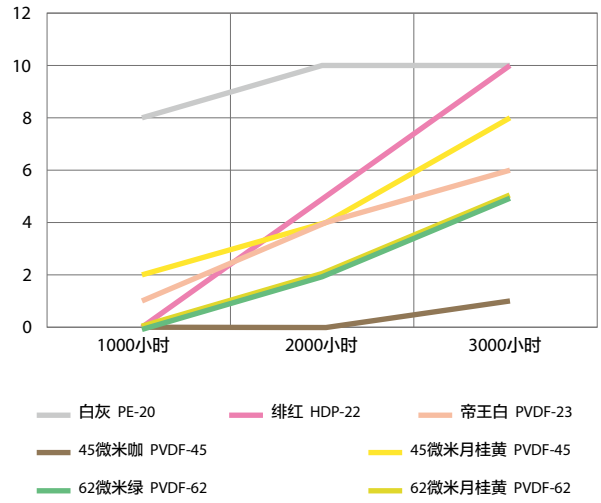


图 2 不同品种和膜厚彩涂钢板 QUVB 试验 3000 小时后失光率对比

The gloss loss of products with different types and thicknesses after the 30000 hours' QUVB

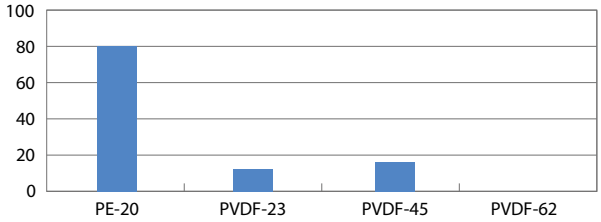
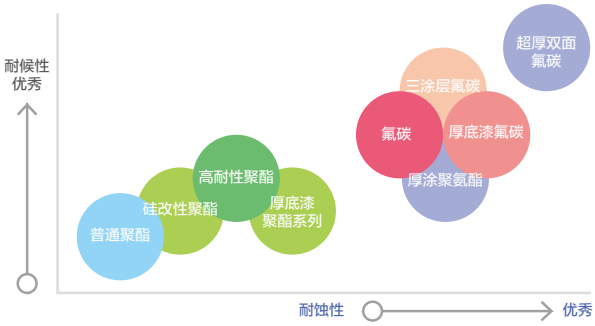


图 3 各涂层品种耐候性和耐蚀性比较示意图

The contrast of weatherability and corrosive resistances on different coat types



Test
试验

腐蚀过程 Process of Corrosion

Prepainted Steel Sheets

彩涂板的腐蚀过程

涂层钢板表面的有机涂层起覆盖隔离作用可防止涂膜下的基板较快的腐蚀。涂层钢板所选用镀层板也具有相应的耐蚀性。因此涂层钢板的耐腐蚀性，主要包括基板腐蚀和涂膜劣化两个方面。

在一般环境中，劣化过程首先表现为光泽降低，然后从表面引起粉化、脱落。由于树脂的分解，使涂层表面成为粉末而脱落。

劣化过程：

失光 → 褪色 → 粉化 → 表面开裂 → 涂层起泡脱落 → 白 / 红锈

劣化现象：如下表所示

Process of corrosion of the prepainted steel sheet

The organic coating on surface of the prepainted steel sheet can prevent the base metal coated with the coating from being quickly corroded. And the coated base metal selected for the prepainted steel sheet also possess corresponding resistance to corrosion.

So, the resistance to corrosion of the prepainted steel sheet mainly includes two parts, namely the resistance of the base metal and the resistance to deterioration of the coating film.

Under normal circumstances, the process of deterioration often starts from a loss of gloss, and then the chalking and shedding of the membrane. Owing to the decomposition of the resin content, the surface of the coating membrane starts chalking and then shedding.

Process of Deterioration

Lost of gloss → fading → chalking → surface rupture → blistering and shedding of the coating membrane → white / red rust

Apperance of Deterioration: shown in the following table:

劣化过程 / Process of deterioration	原因 / Reason
失光、变色 / Loss of gloss, color change	树脂、颜料变化、分解 / Decomposition, chalking of resin and pigments
粉化、开裂 / Chalking and shedding	由于树脂分解使表面出现粉末状龟裂 / Surface fracture and chalking after the decomposition of the resin
起泡、脱落 / Blistering and shedding	起因于锌生锈，在表面渗出 / Caused by the rusted zinc content seeped through the surface
白锈、红锈 / White/red rust	起因于局部的初期腐蚀和铁的腐蚀 / Caused by partially initial corrosion and the corroded base metal

试验方法 Method of Test

1、耐酸碱试验

原理

将试样在一定浓度的酸碱溶液中浸渍一定的时间，取出后评定色差、光泽的变化及是否有涂层起泡、脱落等现象。

结果

按照 GB/T 1766 对试样进行失光等级、变色等级、起泡等级、脱落等级等评定，平行试样测定结果取最差值为试验结果。

2、耐中性盐雾试验

原理

试样暴露在中性氯化钠盐雾气氛中至规定的时间后，评定其表面起泡、锈蚀等级和腐蚀蔓延距离等。

结果

（1）对于平板试样，按照 GB/T 1766 评定起泡等级、生锈等级等，取平行试样的最差值为试验结果。

（2）对于划叉和切口试样，在划线上选择一个代表性的区域，在至少 6 个等距离的位置上，测量划线处至起泡和锈蚀的最大腐蚀蔓延距离，取其算术平均值，即为平均腐蚀蔓延距离，并记录划线最大和最小腐蚀蔓延距离。

1. Acid/alkaline-resistance test

Principle

Soak the sample in the acid/alkaline solution with a specified concentration for a certain period, and then take it out of the solution to assess the change of color and gloss, and whether it blisters, sheds, etc.

Result

According to the standard GB/T 1766, assess the grade of the sample in loss of gloss, color change, blistering and shedding, etc.

In normal conditions, the iron is apt to rust, however, once the iron is galvanized, it will have a quite good resistance to corrosion and won' t rust. For details, please refer to the test below.

2. Test of resistance to neutral salt mist

Principle

After exposing, the sample in the neutral Nacl mist for a specified time, assess the surface blistering and rusting, the outreach of surface corrosion, etc.

Result

(1) For the flat-sheet sample, assess the grade of blistering and rusting by the GB/T 1766 standard, and take the worst result as the final.

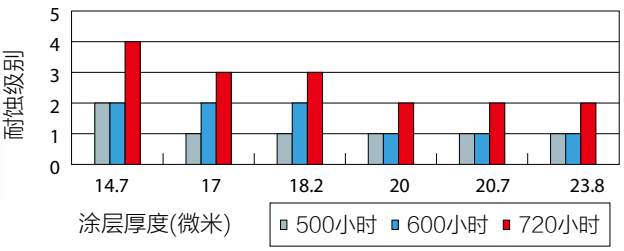
(2) For the scratched or notched sample, choose a typical area within the lineation scope, measure the intervals between the maximum outreach of corrosion of the blistered and rusted part and the lineation at six equidistant points at least, and then take the arithmetic mean value, namely the outreach of corrosion on average, and record the maximum and minimum distances at the same time.

Test
试 验

试验方法 Method of Test

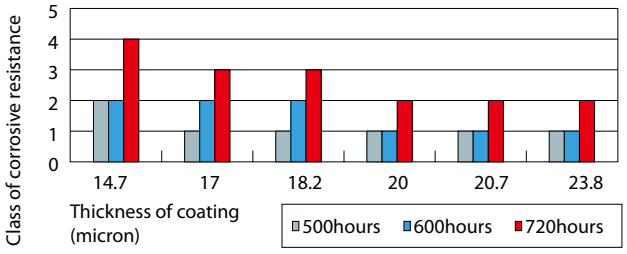
Prepainted Steel Sheets

涂层厚度对彩涂板耐蚀性的影响试验(耐盐雾性能)



注：耐蚀级别数越小性能越好

The corrosive resistance influence by the thickness
(Saltfog resistant)



Note: the smaller the class of the corrosive resistance is,
the better performance is.

Prepainted Steel Sheets

宝钢彩涂板中性盐雾试验结果

Results of the test of resistance to neutral salt mist of Baosteel's prepainted steel sheet

5%NaCL，35±2℃连续喷淋 1000 小时
5% NaCL, 35±2℃ continuous sprinkling for 1000 hours

彩涂板种类 Category of prepainted steel sheet	颜色 Color	起泡等级 The grade of blistering	生锈等级 The grade of rust	表面情况 Surface conditions
普通聚酯PE Regular polyester PE	海蓝 Sea blue	0级 Zero level	不生锈 No rust	无变化 No change
普通聚酯PE Regular polyester PE	白灰 Grey	0级 Zero level	不生锈 No rust	无变化 No change
普通聚酯PE(镀铝锌基板) Regular polyester PE (alu-zinc coated base metal)	白灰 Grey	0级 Zero level	不生锈 No rust	无变化 No change
硅改性SMP Silicon modified polyester SMP	香山白 White	0级 Zero level	不生锈 No rust	无变化 No change
硅改性SMP Silicon modified polyester SMP	海蓝 Sea blue	0级 Zero level	不生锈 No rust	无变化 No change
高耐久性HDP High duration of HDP	蚝白 Oyster white	0级 Zero level	不生锈 No rust	无变化 No change
高耐久性HDP High duration of HDP	净月灰 Moon grey	0级 Zero level	不生锈 No rust	无变化 No change
氟碳PVDF Fluorocarbon PVDF	宝钢灰 Royal grey	0级 Zero level	不生锈 No rust	无变化 No change
氟碳PVDF Fluorocarbon PVDF	宝钢蓝 Royal blue	0级 Zero level	不生锈 No rust	无变化 No change

试验标准：ASTM B117-2003 盐雾试验标准方法
Standard of test: Standard method of salt mist by the ASTM B117-2003.

评定标准：GB/T 1766-1995 色漆和清漆涂层老化评级方法（等同于ISO 4628-1980）
GB/T 1766-1995 color paint and varnish Grading method of coat aging(has identical effect as that of the ISO 4628-1980）

宝钢彩涂板耐酸碱试验结果

Results of the test of resistance to acid/alkali of Baosteel's prepainted steel sheet

耐弱酸、耐弱碱

Resistance to acid/alkali

0.1%HCl, 0.1%NaOH，室温下浸泡 1000 小时

0.1% Hcl or NaOH, soak for 1000 hours at room temperature

彩涂板种类 Category of prepainted steel sheet	颜色 Color	变色等级 The grade of color change	失光等级 The grade of gloss loss	起泡等级 The grade of blistering	表面情况 Surface conditions
普通聚酯PE Regular polyester PE	海蓝 Sea blue	0级 Zero level	0级 Zero level	0级 Zero level	无变化 No change
普通聚酯PE Regular polyester PE	白灰 Grey	0级 Zero level	0级 Zero level	0级 Zero level	无变化 No change
普通聚酯PE(镀铝锌基板) Regular polyester PE (alu-zinc coated base metal)	白灰 Grey	0级 Zero level	0级 Zero level	0级 Zero level	无变化 No change
硅改性SMP Silicon modified polyester SMP	香山白 White	0级 Zero level	0级 Zero level	0级 Zero level	无变化 No change
硅改性SMP Silicon modified polyester SMP	海蓝 Sea blue	0级 Zero level	0级 Zero level	0级 Zero level	无变化 No change
高耐久性HDP High duration of HDP	蚝白 Oyster white	0级 Zero level	0级 Zero level	0级 Zero level	无变化 No change
高耐久性HDP High duration of HDP	净月灰 Moon grey	0级 Zero level	0级 Zero level	0级 Zero level	无变化 No change
氟碳PVDF Fluorocarbon PVDF	宝钢灰 Royal grey	0级 Zero level	0级 Zero level	0级 Zero level	无变化 No change
氟碳PVDF Fluorocarbon PVDF	宝钢蓝 Royal blue	0级 Zero level	0级 Zero level	0级 Zero level	无变化 No change

试验标准：EN 13523-18:2003卷涂材料－试验方法－第18部分：耐污染
ASTM D1308-87（1998）日用化学品对清漆和着色有机面漆影响试验

Standard of test: EN 13523-18:2003 Coil Coating-Test Method- Section 18:Resistance to Pollutants
ASTM D1308-87（1998）test of daily chemicals' influence on varnish and painted organic finish coat

评定标准：GB/T 1766-1995 色漆和清漆涂层老化评级方法（等同于ISO 4628-1980）

GB/T 1766-1995 color paint and varnish Grading method of coat aging(has identical effect as that of the ISO 4628-1980）

Test
试验

试验方法 Method of Test

3、大气暴露试验

原理

彩涂板经自然大气老化后评定其涂层失光、变色、粉化、起泡、生锈、开裂等涂层老化性能。

结果

（1）对于平板试样，按照GB/T 1766评定试样的失光等级、变色等级、粉化等级、起泡等级、生锈等级和开裂等级等，取平行试样的最差值为试验结果。

（2）对于破坏试样，按照GB/T 1766评定试样T弯、冲击、划叉、铆接、折弯部位的起泡等级、生锈等级和边部腐蚀蔓延距离等，取平行试样的最差值为试验结果。

（3）大气暴露试样的评定也可由各大气暴露试验场完成后提供试验报告。

3. Air exposure test

Principle

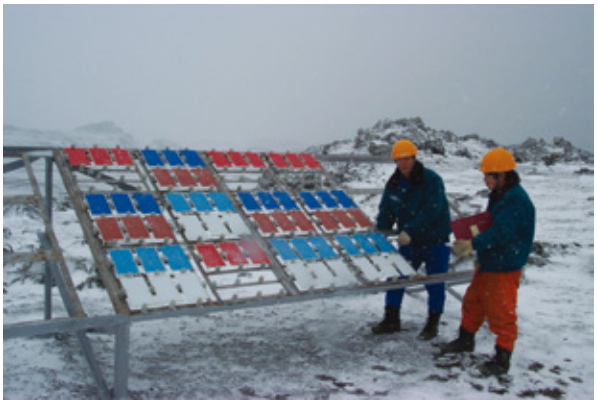
Assess the loss of gloss, color change, chalking, blistering, rusting, cracking and other aging features of the coating membrane after the prepainted steel sheet aged for being exposed in the air.

Result

(1) For the flat-sheet sample, assess the its grade in loss of gloss, color change, chalking, blistering, rusting, cracking, etc. by the GB/T 1766 standard, and take the worst result as the final.

(2) For the sample of destroyed steel sheet, assess the grade of all parts bended in T shape, shocked, scratched, riveted or curved in blistering, rusting and outreach of corrosion, etc. by the GB/T 1766 standard, and take the worst result as the final.

(3) This test can also be performed by other labs of air exposure, and it is required that the lab should submit the relevant test report to Baosteel.



Quality Assurance
质量保证

Prepainted Steel Sheets

质量保证

通过了 ISO9001、ISO/TS 16949 质量认证，建立和完善了一整套质量保证体系。

在一整套质量保证制度下，从订货、订单处理、质量设计、原料采购、生产计划的编制、产品的生产、试验检验，以及产品的包装．入库和发货等，都有完整的规程，并且通过整体产销系统计算机管理，不但提高了工作效率，而且保证了产品的质量。

使用承诺

PVDF 提供 20 年的使用承诺保证。

HDP 提供 15 年的使用承诺保证。

防伪

宝钢彩涂板是目前国内很多重点工程的首先材料，广大设计院和业主都积极推荐和选用宝钢彩涂板。但是市场上出现了仿冒的宝钢彩涂板，给用户的辩别和使用带来了困惑，如何辩别真伪，是宝钢和用户共同关心和迫切需要解决的问题。从 2016 年开始，宝钢彩涂板率先应用高速数码喷印技术，在彩涂钢板生产的同时，钢板背面间断喷印唯一的加密二维码和卷号、生产时间等信息。加密二维码只有宝钢可以解析，宝钢将会对每一次的扫描解析进行记录，从而帮助用户根据解析内容判别所购产品真伪。用户可以采用手机等装备进行二维码扫描，以核对钢卷真伪。

质量检测

宝钢的彩涂机组装备了大量先进的在线测试仪器，以保证和提高产品的质量，并且有一整套产品性能测试的设备和方法，对日常生产出的彩涂产品进行各有关性能的测试和控制，保证了产品质量达到国内领先水平和国际同类产品的水平。

产销研一体化

我们已经形成了产销研一体化的工作制度，在对市场调查，以及对用户状况的反馈，对产品质量和品种的开发和改进方面具有重大意义。

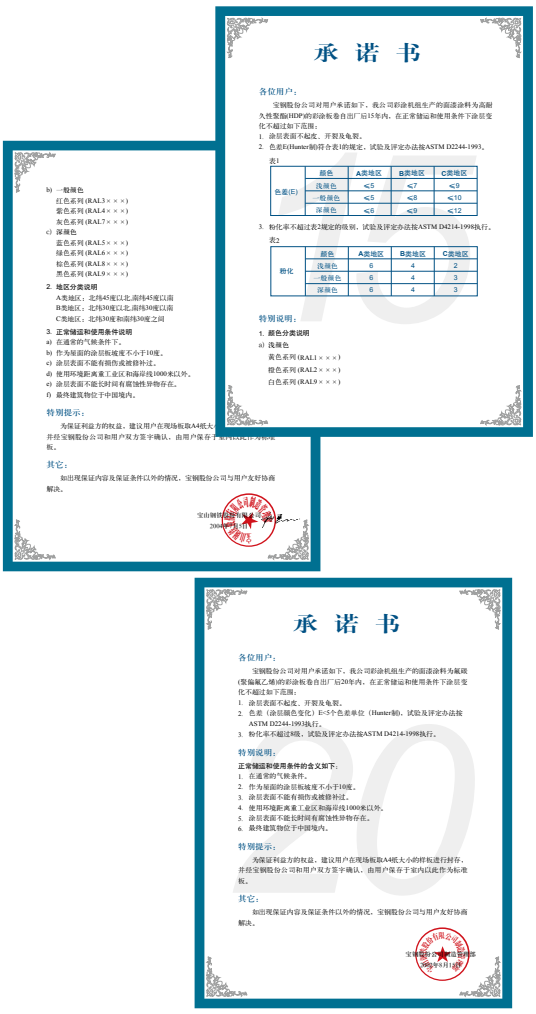
Quality Assurance

Baosteel has already passed the authentification by the ISO9001 and TS16949 in succession and established a completed set of quality assurance system. Under such a complete set of quality assurance systems, there has a complete set of regulations for ordering, order handling, quality design, purchasing raw materials, working out production plan, production, test and inspection, packaging, storage, delivering, etc. In addition, the PC-based production and marketing system not only improves the working efficiency but also assures the quality of product.

Service Promise

PVDF provides with a 20-year service promise.

HDP provides with a 15-year service promise.



承 诺 书

各位用户：

宝钢股份公司对用户承诺如下，我公司彩涂机组生产的面漆涂料为高耐久性聚酯(HDP)的彩涂板卷自出厂后15年内，在正常储运和使用条件下涂层变化不超过如下范围：

1. 涂层表面不起皮，开裂及龟裂。
2. 色差E(Hunter制)符合表1的规定，试验及评定办法按ASTM D2244-1993。

表1

	颜色	A类地区	B类地区	C类地区
色差(E)	浅颜色	≤5	≤7	≤9
	一般颜色	≤5	≤8	≤10
	深颜色	≤6	≤9	≤12

3. 粉化率不超过表2规定的级别，试验及评定办法按ASTM D4214-1998执行。

表2

	颜色	A类地区	B类地区	C类地区
粉化	浅颜色	6	4	2
	一般颜色	6	4	3
	深颜色	6	4	3

特别说明：

1. 颜色分类说明

a) 浅颜色

黄色系列 (RAL1 × × ×)

橙色系列 (RAL2 × × ×)

白色系列 (RAL9 × × ×)

b) 一般颜色

红色系列 (RAL3 × × ×)

紫色系列 (RAL4 × × ×)

灰色系列 (RAL7 × × ×)

c) 深颜色

蓝色系列 (RAL5 × × ×)

绿色系列 (RAL6 × × ×)

棕色系列 (RAL8 × × ×)

黑色系列 (RAL9 × × ×)

2. 地区分类说明

A类地区：北纬45度以北,南纬45度以南

B类地区：北纬30度以北,南纬30度以南

C类地区：北纬30度和南纬30度之间

3. 正常储运和使用条件说明

a) 在通常的气候条件下。

b) 作为屋面的涂层板坡度不小于10度。

c) 涂层表面不能有损伤或被锉补过。

d) 使用环境距离重工业区和海岸线1000米以外。

e) 涂层表面不能长时间有腐蚀性异物存在。

f) 最终建筑物位于中国境内。

特别提示：

为保证利益方的权益，建议用户在现场板取A4纸大小的样板进行封存，并经宝钢股份公司和用户双方签字确认，由用户保存于室内以此作为标准板。

其它：

如出现保证内容及保证条件以外的情况，宝钢股份公司与用户友好协商解决。

宝山钢铁股份有限公司冷轧薄板厂

2006年8月1日

承 诺 书

各位用户：

宝钢股份公司对用户承诺如下，我公司彩涂机组生产的面漆涂料为氟碳(聚偏氟乙烯)的彩涂板卷自出厂后20年内，在正常储运和使用条件下涂层变化不超过如下范围：

1. 涂层表面不起皮，开裂及龟裂。
2. 色差（涂层颜色变化）E-S个色差单位（Hunter制），试验及评定办法按ASTM D2244-1993执行。
3. 粉化率不超过8级，试验及评定办法按ASTM D4214-1998执行。

特别说明：

正常储运和使用条件的含义如下：

1. 在通常的气候条件。
2. 作为屋面的涂层板坡度不小于10度。
3. 涂层表面不能有损伤或被锉补过。
4. 使用环境距离重工业区和海岸线1000米以外。
5. 涂层表面不能长时间有腐蚀性异物存在。
6. 最终建筑物位于中国境内。

特别提示：

为保证利益方的权益，建议用户在现场板取A4纸大小的样板进行封存，并经宝钢股份公司和用户双方签字确认，由用户保存于室内以此作为标准板。

其它：

如出现保证内容及保证条件以外的情况，宝钢股份公司与用户友好协商解决。

宝钢股份公司冷轧薄板厂

2006年8月1日

Anti-counterfeit Prepainted Steel Sheet

Nowadays, prepainted steel of Baosteel is on the priority purchasing list of many important construction projects. The institutions of design and the proprietors are actively in recommending or using the prepainted steel of Baosteel. Unfortunately, the counterfeits are raising up in the market, which confuse the customers in the identity and usage. How to identify the real to the fake grows into an emergency.

Baosteel is the pioneer to employ the advanced technology of Digital jet printing. The back of the coil will be covered by the print with a unique two-dimension code which is encrypted as well as the coil numbers and production time. The encrypted two-dimension codes can only be deciphered by Baosteel. And once it is scanned and deciphered, the record will be made. It is a convenient way for the customers to use the cell phones to identify the reality by scanning the codes.

Quality Inspections

Baosteel' s prepainted steel sheet lines are equipped with a large amount of online test instruments so that they can ensure and improve the quality of product. There also has a complete set of equipment and techniques for testing and controlling the performance of their prepainted steel products, which ensures Baosteel' s product quality to take a leading position among the fellow products at home and reach the international standard.

Production-Marketing-Research Integration

We have established a complete set of working systems in production, marketing, research and development, which has significant meanings at all aspects, covering market investigation, response to customer' s feedback, quality control, improvement and innovation in products, etc.

Service Guide

使用指南

订货　Order

Prepainted Steel Sheets

- **询价和订货**

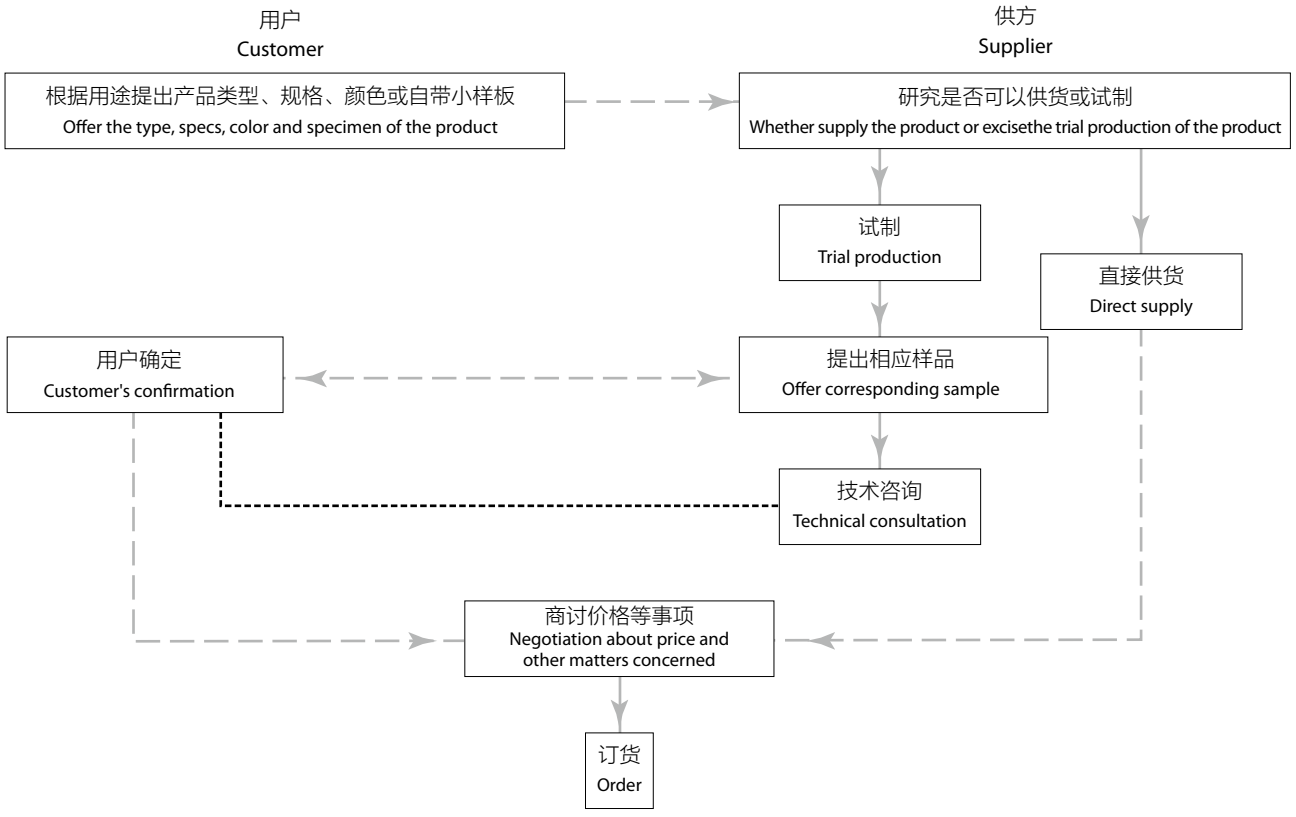
询价和订货时请提出以下详细的内容：

产品名称（例如热镀锌彩涂板）
技术标准（如 Q/BQB 440-2014）
牌号（如 TDC51D+Z）
镀层重量（如有特殊要求应写明）
涂层结构（如上、下表面都涂二层即 2/2；上表面涂二层，下表面涂一层即 2/1）
规格（厚 × 宽 × 长）
尺寸允许偏差
正面面漆种类
颜色（若特殊颜色需附样板并协商）
正反面（一般面漆卷在外面）
卷重（3-5 吨）
卷内径（610mm 或 508mm）
数量（吨）
用途
包装方式（立式或卧式）
交货期

Prepainted Steel Sheets

Enquiry and order
Please offer the details as follows when enquiry and ordering:
Name of Product
(e.g. hop-dip zinc-coated prepainted steel sheet)
Technical Standard
(Q/BQB440-2014) Grade (e.g. TDC51D+Z)
Weight of coating
(if any special requirement, please give clear indications.)
Structure of coating (e.g. double coatings on both top and bottom sides, i.e. 2/2; double coatings on top side and one coating on bottom side, i.e. 2/1)
Specs (thickness * width * length)
Allowance of size
Category of front finish coatings
Color (if any special requirements of color please enclose your specimen and timely negotiate with us)
Front and back (Generally finish coat coil faces outside)
Coil Weight (3~5 tons) Coil Inner Diameter (610mm or 508mm)
Quantity (tons)
Purpose
Packing Method (vertical or horizontal)
Date of Delivery

- **订价订货流程：**
  Flow of enquiry and order



Service Guide
使用指南

选材　Material Choice

Prepainted Steel Sheets

合理的选材不仅可以满足使用要求，而且可以最大限度地降低成本。如果选材不当，其结果可能是材料性能超过了使用要求，造成不必要的浪费，也可能是达不到使用要求，造成降级或无法使用。因此，用户应高度重视合理选材的重要性，必要时请与我们联系。

彩涂板的选择主要指力学性能、基板类型（镀层种类）和镀层重量、正面涂层性能和反面涂层性能的选择。用途、环境腐蚀性、使用寿命、耐久性、加工方式和变形程度等是选材时应考虑的重要因素。

- **力学性能、基板类型和镀层重量的选择**

力学性能主要依据用途、加工方式和变形程度等因素进行选择。例如，建筑物的屋面板通常不承重，且加工时变形不复杂，通常选用 TDC51D 即可。对于变形程度比较大的零件，应选择 TDC52D、TDC53D 这样成形性好的材料。而对于有承重要求的构件，就应根据设计要求选择合适的结构钢，如 TS280GD、TS350GD 等。彩涂板常用的加工方式有剪切、弯曲、辊压等，订货时应根据每种加工方式的特点进行选择。另外，由于实际生产时通常用基板的力学性能代替彩涂板的力学性能，而彩涂工艺可能导致基板的力学性能发生变化，对此应予以注意。

基板类型（镀层种类）和镀层重量主要依据用途，环境腐蚀性、使用寿命和耐久性等因素进行选择。防腐是彩涂板的主要功能之一，镀层种类和镀层重量是影响彩涂板耐腐蚀性的主要因素。由于建筑用彩涂板通常直接暴露在大气环境中，因此通常选择耐腐蚀性好、镀层厚的热镀锌板和热镀铝锌板等基板。另外，不同种类镀层的耐腐蚀性也不同，例如，在相同镀层厚度的情况下，热镀铝锌镀层的耐腐蚀性高于热镀锌镀层。此外，耐腐蚀性通常随镀层重量的增加而提高，因此可以通过使用耐腐蚀性高的基板和 / 或增加镀层重量的方法提高彩涂板的耐腐蚀性。不同镀层种类钢板的切边耐腐蚀

Prepainted Steel Sheets

性存在差异，这一点也应引起注意。除此之外，使用寿命、耐久性也是选材时不可忽视的重要因素,如要求使用寿命长、耐久性高时，应选用耐腐蚀性好或镀层重量大的基板。

由于镀铝锌材料的镀层中含有约 55% 的铝（Al），铝是双性金属，既能与酸反应，又能与碱反应。水泥与水混合成混凝土砂浆后，呈较高的碱性，在这样碱度环境下，铝（Al）会发生化学反应，最终导致镀层溶解，失去防腐保护能力。因此对于镀铝锌光板，包括镀铝锌基板的彩涂板，是不适合直接与湿水泥接触使用的。

- **正面涂层性能的选择**

正面涂层性能的选择主要指涂料种类、涂层厚度、涂层色差、涂层光泽、涂层硬度、涂层柔韧性 / 附着力、涂层耐久性和其他性能的选择。

A rational material choice can not only meet the customer's requirements but also lower the cost at the maximum level. If any improper choice of materials, the performance of materials may surpass the application requirements, as a result, just a waste of materials, otherwise it may not reach the requirements and lead to being degraded or discarded as a useless. However, customers should pay much attention to the proper choice of material. If any, please contact us.

The choice of the prepainted steel sheet is mainly determined by the mechanical property, type of base metal (type of coating), weight of coating, and the choices of the performances of front coating and back coating. Its usage, environmental corrosion, service time, durability, machining method and distortion level are the important factors that should be taken into consideration when choose relevant materials.

- **Choice of mechanical performance, type of base metal and weight of coating**

The choice of mechanical performance should base on the factors, such as usage, machining method, distortion level, etc. For example, the prepainted steel sheet for the roofing of the building usually bears few weight and has few complex distortion while being machined, so it often adopts TDC51D. The prepainted steel sheet for any parts with relatively big distortion should adopt the materials with good machinability, just like TDC52D andTDC53D. While the prepainted steel sheet for any structure with weight bearing requirements should follow the corresponding design to adopt proper structural steel, like TS280GD and TS350GD. The machining methods commonly adopted by the prepainted steel sheet consist of cutting, coiling, rolling, etc., and the descriptions of the properties of each kind of these should be chosen when ordering. In addition, we should notice that we often substitute the mechanical properties of the prepainted steel sheet for those of the base metal in practice while the process of the prepainted steel sheet might change the mechanical properties of the base metal. The choice of the type of the base metal (type of coating) and the weight of coating should be determined in accordance with usage, environmental corrosion, service life, etc. Corrosion resistance is one of the main functions of the prepainted steel sheet. The type and the weight of the coating are the influential factors to the corrosion resistance of the prepainted steel sheet. Owing to being always exposed in the air, the prepainted steel sheet for construction usually selects the base metals with good resistance to corrosion and thick coating , like hot-dip zinc-coated metal and hot-dip alu-zinc coated metal. In addition, different kinds of coating have different resistances to corrosion. For example, the resistance to corrosion of the coating of the hot-dip alu-zinc coated metal is higher than that of the hot-dip zinc coated metal with a of identical thickness. Additionally, the resistance to corrosion usually increases with increase of the coating, so we can improve the resistance to corrosion of the prepainted steel sheet by using the base metal with high resistance to corrosion and/or increasing the weight of the coating. We should also pay attention that the steel sheet with different coating has different resistance to corrosion of the trimming die. Otherwise, the service life and durability are also the important factors for choosing materials. If a longer service life and high durability required, a base metal with high resistance to corrosion or big weight of coating should be chosen.

Aluminium can react to both acids and alkalis. And hot dip galvanized steel contain the aluminium with a proportion of 55%. Since it is relatively alkaline, the concrete will react with the aluminium.The aluminium dissolves and vanishes its ability to resist corrosion. That explains why the prepainted steel with the hot dip galvanized substrate is unable to support the direct contact with the concrete.

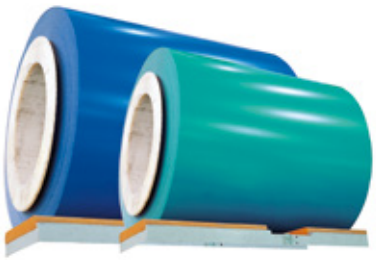
- **Choice of performance of front coating**

The performance choice of front coating is mainly determined by the type of coating material, and the thickness, color difference, coat gloss, rigidity, flexibility/adhesion, durability and other performances of coating.

涂料种类

面漆

常用的面漆有聚酯、硅改性聚酯、高耐久性聚酯和聚偏二氟乙烯，不同面漆的硬度、柔韧性 / 附着力、耐腐蚀性等方面存在一定的差异。聚酯是目前使用量最大的涂料，耐久性一般，涂层的硬度和柔韧性好，价格适中。硅改性聚酯耐久性和光泽、颜色的保持性有所提高，但涂层的柔韧性略有降低。高耐久性聚酯既具有聚酯的优点，又在耐久性方面进行了改进，性价比较高。聚偏二氟乙烯的耐久性优异，涂层的柔韧性好，但硬度相对较低，可提供的颜色较少，价格昂贵。各种面漆详细的性能指标可参考有关资料或向专家咨询。面漆主要根据用途、环境腐蚀性、使用寿命、耐久性、加工方式和变形程度等因素来确定。



底漆

常用的底漆有环氧、聚酯和聚氨酯，不同底漆的附着力、柔韧性、耐腐蚀性等方面存在一定的差异。环氧与基板的结合力良好，耐腐蚀性较高，但柔韧性不如其它底漆。聚酯与基板的结合力好，柔韧性优异，但耐腐蚀性不如环氧。聚氯酯是综合性能相对较好的底漆。各种底漆详细的性能指标可参考有关资料或向专家咨询。底漆通常由生产商根据生产工艺、用途、环境腐蚀性以及与面漆的匹配关系来确定。

涂层厚度

彩涂板耐腐蚀性的高低与涂层厚度有密切关系，通常耐腐蚀性随涂层厚度的增加而升高。应根据环境腐蚀性、使用寿命和耐久性来确定合适的涂层厚度。

涂层色差

彩涂板在生产和使用过程中都可能出现色差，由于色差受生产组批、颜色深浅、使用时间、使用环境、用途等多种因素的影响，因此通常由供需双方在订货时协商。

Category of coatings

Finish coat

The finish coats commonly used can be classified into four groups, namely polyester, silicon modified polyester, high-durability polyester and polyvinylidene fluoride. The finish coats have different performances in rigidity, flexibility/adhesive force, corrosion resistance, etc. The coating of polyester is the most popular coating for the time being, which has common durability, good rigidity and flexibility of coating and moderate price. The coating of silicon modified polyester has been already greatly improved in durability and retention of gloss and color, but the flexibility of its coating is still lower. The high-durability polyester coating not only possesses the merits of the polyester coating but also makes a great improvement in durability. Its quality is better. The coating of polyvinylidene fluoride has excellent durability and good flexibility of coating, while its rigidity is relatively poor, its color available is less and its price is high. For details of these finish coatings, please consult about relevant materials or contact experts. The finish coatings should be determined by the usage, environmental corrosion, service life, durability, machining method, distortion level, etc.

Primer

The primers commonly used consist of epoxy, polyester and polyurethane. Different primers can be differed by the adhesive force, flexibility, resistance to corrosion, etc. The epoxy primer has strong adhesive force to the base metal and higher resistance to corrosion, while its flexibility is poorer than those of other primers. The polyester primer has strong adhesive force to the base metal and excellent flexibility, while its resistance to corrosion is poorer than that of the epoxy primer. The polyurethane primer is a better primer with comprehensively good performances. For details of these primers, please consult about relevant materials or contact experts. The primer is usually determined by the manufacturer through matching the primer with corresponding process technology, purpose and environmental corrosion.

Thickness of coating

The corrosion resistance of the prepainted steel sheet has closed relationship with the thickness of the coating, and in general, the resistance to corrosion often increases with the increase of the thickness of the. The thickness of the coating should be determined properly by the environmental corrosion, service life and durability.

Color aberration of coating

Being influenced by the production batch, color change, service life, operating environment, purpose, etc., the prepainted steel sheet may have color aberration while being produced or using, so the color aberration of coating should be negotiated by both of the provider and the customer when ordering.

涂层光泽

涂层光泽主要依据用途和使用习惯进行选择。例如，国内建筑用彩涂板通常选择中、低光泽，家电用彩板通常选择高光泽。

涂层硬度

涂层硬度是涂层抵抗擦划伤、摩擦、碰撞、压陷等机械作用的能力，与彩涂板的耐划伤性、耐磨性、耐压痕性等性能有密切联系，主要依据用途，加工方式，储存运输条件等进行选择。

涂层柔韧性 / 附着力

涂层柔韧性 / 附着力与彩涂板的可加工性有密切联系，主要依据加工方式、变形程度等进行选择。在变形速度快、变形程度大时应选择冲击功值高和 T 弯值小的彩涂板。

涂层耐久性

涂层耐久性是彩涂板在使用过程中体现出来的性能，通常用使用寿命的长短进行衡量。涂层耐久性主要受涂料种类、涂层厚度、环境腐蚀性等因素的影响。涂层真实的耐久性可通过大气暴露试验来确定。也可通过人工老化试验对耐久性进行评估。耐中性盐雾试验是最简单、最常用的人工老化试验方法之一，紫外灯加速老化试验也是比较常用的人工老化试验。此外，彩涂板可能会用于酸雨、潮湿等特殊环境，此时还应选择相应的人工老化试验进行评价。需要注意的是人工老化试验通常无法完全模拟实际的使用环境。

其它性能

彩涂板在有些情况下可能需要有比较好的耐有机溶剂性、耐酸碱性、耐污染性等性能，对于这类特殊性能也应引起注意。

- **反面涂层性能的选择**

反面涂层通常由生产商根据用途，使用环境来确定。环境的腐蚀性不高时，反面通常只涂覆一层，主要起装饰作用。如果反面粘贴隔热材料，应在订货时注明，以便生产厂在反面涂覆有良好粘结性能的涂料。环境腐蚀性高时应涂覆二层，以提高耐腐蚀性。

Gloss of coating

The gloss of coating should be determined by the purpose and usage. For instance, the prepainted steel sheet for the construction at home often adopt the steel sheet with a moderate and low gloss of coating, while those for the electrical household appliances often adopt the high-gloss ones.

Rigidity of coating

Coat hardness is the ability to resist any damages from mechanical operation, such as scratch, friction, collision, and pressing, etc., which is close to the properties of the prepainted steel sheet, such as its resistance to scratch, durability, resistance to pressure, etc., and mainly determined by the usage, machining, storage & transportation, etc.

Flexibility/Adhesive force of coating

The flexibility/adhesive force of the coating is close to the machinability of the prepainted steel sheet, which is mainly determined by the machining way, distortion degree, etc. Incln case of any fast and severer distortion, the prepainted steel sheet with high resistance to collision and small T-shape angle should be selected.

Durability of coating

The durability of the coating is a kind of performance that is indicated during the usage of the prepainted steel sheet, which is usually valued by its service life. The durability of the coating is usually influenced by the type of the coating, thickness of the coating, environmental corrosion, etc. The actual durability of the coatin can be determined via the air exposure test. In addition, it can also be assessed by the test of artificial aging test of the coating. The test of resistance to neutral salty mist is one of the simplest and commonest artificial tests; and the artificial aging test by ultra-violet lamp is also a relatively common method. In addition, the prepainted steel sheet may be used in a special environment with acid rain and humidity, so it should be assessed by corresponding artificial aging test prior to use. We should pay attention that the artificial aging test often fails to completely stimulate the actual operating environment.

Other performances

We should also notice that the prepainted steel sheet may have some requirements of better organic-soluble property, resistance to acid/alkali, resistance to pollution, etc. under peculiar circumstances.

- **Choice of performance of back coating**

The back coating is often determined by the manufacturer in accordance with the purpose and operating environment. In case of poorer environmental corrosion, it just requires a layer of back coating, which mainly functions as a decoration. If lower back insulating materials required, please indicate in the order, so that the manufacturer can timely coat the materials with strong adhesive force to the base metal. In case of higher environmental corrosion, please coat two layer of coating to improve the resistance to corrosion.

Prepainted Steel Sheets

Service Guide

使用指南

储存、运输

Storage and Transportation

- **彩涂板的储存、运输**

  储存、运输和装卸是影响彩涂板质量的重要环节，由于操作不当，储存、运输和装卸过程中可能出现划伤、压印、腐蚀等各种缺陷，为尽可能减少和避免各类缺陷的产生，下面给出一些操作中的注意事项。关于储存、运输和装卸方面的具体规定可参考有关资料或向专家咨询。

- **储存**

  产品应存放在干燥通风的室内环境中，避免露天存放以及存放在易发生结露和温差变化大的地方。

  产品应存放在干净整洁的环境中，避免各种腐蚀性介质的侵蚀。

  储存场地的地面应平坦、无硬物并有足够的承重能力。卧式钢卷应放在橡皮垫，垫木、托架等装置上，捆带锁扣应朝上，不能直接放在地面上或运输工具上。

  为避免产生压伤，钢卷通常不堆垛存放。钢板堆垛存放时应严格限制堆垛层数，将重量和尺寸大的板包放在下面。彩涂板的力学性能和部分涂层性能如铅笔硬度、T 弯值、冲击功

Prepainted Steel Sheets

值等可能随储存时间的延长而发生变化，因此建议用户尽快加工。

储存场地应留有足够的空间供吊运设备使用。应对钢板和钢卷的存储位置进行合理的安排以便于取用，尽可能减少不必要的移动。

- **运输**

产品应按照出厂时的状态进行运输，不能随意拆卸原有包装。装卸时吊具与产品间应加橡皮垫以防止发生碰伤，有条件的情况下应使用专用吊具。

运输车辆的车厢应打扫干净，车底板上应铺橡皮垫或其它防护装置，车厢四周也应采取必要的防护措施，防止包装产生压痕或碰伤。

立式包装的钢卷在运输和装卸时也应保持立式。

产品应固定牢固，避免在运输时产生相对移动或滚动而造成产品损伤或发生意外事故。

钢板在取出时不能拖拉，以防止切口和切断时产生的毛刺擦伤下面的钢板。钢板应轻拿轻放，不要碰到其它硬物。

- **Storage and transportation of prepainted steel sheet**

Storage, transportation, loading and unloading are the important links that may influence the quality of prepainted steel sheet. Because some improper operation in these procedures may bring various deficiencies, such as scratch, pressure, corrosion, etc., we should pay attention to the following precautions. For the details in storage, transportation, loading/unloading of the prepainted steel sheet, please consult about relevant materials or contact qualified experts.

- **Storage**

Products should be stored in a dry and ventilated room, instead of being stored in the open air or a place with moisture and a great change of temperature.

The products should be stored in a clean and neat environment, preventing from various corrosive substances.

The storage field should be smooth and level, having a good bearing capacity.

Horizontal steel coil should be placed on the brackets with rubber cushions or wooden cushions and be locked with the lock catch on the topside. It mustn’t be placed onto the ground or vehicles directly.

To avoid being pressed, the steel coil mustn' t be stored in stacking. When the steel sheets are stored in stacking, a limit to every stack should be specified and the sheets with large weight and size should be placed in the lower part of the stack.

The mechanical properties of the prepainted steel sheet and part of performances of the coating, including pencil hardness, T-shape bend, collision, etc. may varies with the time, so we recommend customers to use the products as soon as possible.The storage field should keep enough room for the hoisting and transporting equipment.

The storage of the steel sheets and coils should be scientifically arranged in advance, so as to avoid unnecessary shifting and conveniently use.

- **Transportation**

The product must be transported with the state while leaving from the factory and the original packing mustn' t be assembled or changed at will.

While loading/unloading, the rubber cushions should be inserted between the hoisting, loading/unloading equipment, so as to prevent the steel products from any damage. If any, please adopt the special hoisting, loading/unloading equipment for the products only.

The vehicles in charge of transporting the products should keep clean, rubber cushions and other protective devices should be furnished for the floors of the vehicles, and the necessary actions should be also taken around the carriages, so as to prevent the packing of the products from any damage.

The steel coils packed in vertical should also be transported, loaded/unloaded vertically.

The products should be firmly fixed, so as to prevent them from any damage or unexpected accidents for from the rolling or shifting of the products while being transported.

Do not dragged out the steel sheet, and prevent it from being damaged or scratched by the sentus around the notch or fracture of the other sheet underside. Please fetch and place the steel sheet gently and keep it from any rigid article.

Prepainted ***Steel Sheets***

Service Guide
使用指南

加工　Machining

▸ 加工

彩涂板因其表面有涂层，因此在加工时与普通冷轧板和镀层板存在很多不同的地方，最主要的区别就是必须在保证涂层完好的前提下进行成形加工。加工时的注意事项如下：

力学性能是衡量成形性的重要指标，是确定和调整加工工艺的重要参数，因此加工时应首先予以考虑。

铅笔硬度、T 弯、冲击功等指标与加工性能有密切的联系，因此应予以充分考虑。

零件的形状复杂、变形程度较大时，应采用多道次成形。如果一次成形，可能会因变形量过大破坏涂层与基板的结合力。

加工时应根据模具形状、变形特点、工艺条件等因素设定合适的间隙，间隙设定时应考虑涂层的厚度。

大多数涂层可作为固体润滑剂，并可满足多数成形工艺的润滑要求，有些涂料可通过调整配方提高涂层的润滑性。如涂层的润滑性不足，可通过涂油、涂蜡、覆可剥离保护膜等方法提高润滑性。但应注意湿润滑剂容易吸污物，应在安装前清除。可剥离保护膜在施工结束后也应尽快去除。

应根据设备状况、工艺条件、零件形状等因素设定合理的加工速度，变形速度过高容易导致涂层剥落。温度低时涂层的柔韧性降低，因此应避免低温加工。若环境温度较低，应将材料加热到一定温度后再进行加工。

加工时产生的切口断面易发生腐蚀，因此应采取必要的防护措施，如涂防护涂料、嵌封条等。

加工时应尽量减少切断面的毛刺，防止毛刺划伤表面。

应保持所有与涂层接触的表面干净整洁，及时清理加工时产生的切屑和金属颗粒，防止异物损坏涂层表面。

加工时应尽量减少成型辊辊面或模具表面的磨损，保持接触面光洁，防止涂层表面产生压痕、划伤等缺陷。

应尽可能采用工厂预先装配然后再送现场进行安装的施工方式，安装时应采取保护措施防止损坏涂层。

加工时如发现涂层表面破损应及时采用专用修补涂料进行修补，防止破损处发生腐蚀。

涂层的加工性能会随储存时间的延长而降低，因此建议用户在制造完成之日起 1 年内加工使用。

钢板及钢带用于生产夹心板时，考虑到用户的黏结剂和生产工艺与钢板及钢带的匹配性，建议先进行小批量试验，并注意避免结露。

涂层类型是 PVDF 的产品，其涂层特性比较特殊，建议用户在加工时覆塑料膜，以降低涂层脱落的风险。

由于银色等金属颜色中的颜料呈鳞片状分布（普通颜料呈球形），其对涂膜的光学特性有着重要的影响。也就是说，对于同样的光线，在不同角度观测会产生不同的光反射效果。针对同一配方，这种鳞片状结构会使涂膜在不同的角

度亮度不同。因此，如果不同钢板的压型角度或者安装方向有差异，均会产生光学性明暗色差。在使用过程中应注意如下事项：

(1) 在压型加工时，保持压型设备在最稳定状态，使每块钢板在压型、安装时始终保持方向一致，避免因方向不同造成的色差。

(2) 建筑物同一面墙上的压型板须处于同一平面，不能有角度偏差。

(3) 建议安装之前一定要检查、对比不同钢卷是否有色差，同一工程谨慎使用不同合同的产品

- **Machining**

The prepainted steel sheet has a surface coating , by which it can be easily differed from cold-rolled steel sheet and galvanized steel sheet while being machined, and the most extinguished difference is that the whole machining should be implemented on the condition that the coating is kept well. precautions while machining are listed as follows:

The mechanical performance is an important index to assess the machinability of the prepainted steel sheet and a vital parameter to determine and adjust the processing crafts, so it should be taken into consideration first of all while machining. The hardness of pencil, T-shape bending, absorbed-in-fracture energy, etc are close to the machinability, so they should be taken into consideration fully.

For any part with complex structure and large-scale distortion, it is recommended to adopt multi-procedure machining. If adopt one-stop machining, the adhesive force between the coating and the base metal might be damaged by too large distortion.

Some intervals during machining should be properly set by the die form, distortion feature, machining conditions, thickness of coating, etc. Most of coating can act as a solid lubricant and meet the lubricant requirements of the common machining, and some coating can improve the lubricant property of the coating through adjusting the prescription. When the lubricity of the coating is not high enough, it can be improved by applying grease, wax or removable protective, etc. But we should pay attention that such moist lubricants are apt to absorb pollutants, so they should be cleaned out prior to the installation. And the removable protective coating should be also wiped off prior to the completion of the installation.

The machining speed should be rationally set in accordance with the equipment conditions, process conditions, shape of part, etc. Any excessively high speed might lead to the shedding of the coating. The flexibility of the coating may be lowered at low temperature, so we must avoid machining under such circumstances. If the ambient temperature is relatively low, the materials should be machined after being heated up to a certain temperature.

The notch and fracture of the prepainted steel sheet while machining may be apt to corrosion, so some protective measures, such as covering protective coat and embedding seal, should be taken. Try to reduce the sentus around the notch and fracture while machining, and prevent the surface coating of the prepainted steel sheet from being scratched by the sentus.

Try to keep all the contact surfaces to the coating clean and timely clear the scraps and metallic granules away while machining, so as to prevent the surface of the coating from any damage.

Try to reduce the abrasion of the molded roll surface and the die surface, keep the contact surface clean, and prevent the surface of the coating from pressure, scratch and any other damages.

Try to adopt the construction policy that the factory takes charge of pre-assembly and sends to implement the onsite installation, and take necessary measures to protect the surface from any damage while installation.

In case of any scratch on the surface while machining, please timely adopt the specified materials to repair and prevent the scratched prepainted steel sheet from corrosion.

There will be a significant decline in the ability of formation as the time eclipses. And we recommend that the material should be proceeded in 1 year after its production.

The small quantities of tests are suggested before the mass manufacture of sandwich panels, because the binder and processing procedure might not match the coil.

We suggest that a film be previously covered to prevent the peeling of coat, since the PVDF is quite special.

Metallic colors such as silver have great impact on the reflection of light from the coat surface. Because the special pigments in these colors are shaped as scaly, while the regular ones are spherical. In other words, the reflecting effect will be different on the observing directions even in the identical light. The lightness of the coating will not the same at different directions due to the scaly shape. As a result, different rolling angles or installing directions would contribute to the bright and darkness. Please take care of the follows.

(1) In order to avoid the color differences led by all kinds of directions of rolling and installing, the equipment should be well maintained at their best status.

(2) The deviation of installing angles should be avoided when the panels are served in one flat wall.

(3) It is recommended that color differences of coils should be inspected prior to the installation. And it is relatively dangerous to apply the coils from the different orders in a same project.

Prepainted ***Steel Sheets***

Service Guide
使用指南

安装维护　Installing Maintenance

- **安装毛刺**

彩涂钢板表面决不允许金属锉屑、钻屑、切屑和其他金属物件如铆钉和紧固件等残留，因为金属残留物受侵蚀后将引起锈斑。这些残留物一经发现，需立即从屋顶扫除，或至少在每天施工结束后进行清扫。避免在上面行走以避免破坏漆膜。在严格要求的场合，建筑物安装 2 周内需进行检查，以去除可能生锈的残留物质。此时清除残留物将有助于屋顶外观保持长久。

- **剥离膜**

部分彩涂板表面敷上一层特殊设计的透明有机薄膜。有机薄膜可以保护彩板涂层在储运过程中发生擦划伤，但在安装结束后需立即剥除。太阳光照射将增强有机膜和彩板表面的黏附作用。

- **清洗**

通常，用干净的水能够清除钢板表面积存的大多数灰尘和残留物。理论上，至少每六个月需要清扫一次，在盐雾较多的海岸及工业粉尘较重的地方，清扫应更频繁。对冲洗不掉的顽渍，可采用家用清洗剂。无论什么情况，在大面积清洗之前，先擦洗一个不显眼的小块测试。

不要私自将洗涤剂和漂白剂混合，如果要求进行洗涤和漂白，使用含漂白剂的洗涤剂。

使用上述任一种洗涤剂，用浸透了的软布、海绵、软毛刷或低压喷头由上至下清洗钢板表面，避免擦拭条痕、避免产生光亮点。建议不要采用去污粉或工业洗涤剂，因为它们将损害油漆。水溶性洗涤剂如“奥妙”非常有效，可以使用。如果出现真菌和长霉，上述方法无法去除，推荐使用含漂白剂的洗涤剂，如含漂白剂的“汰渍”。洗涤后的钢板表面需彻底清除洗涤剂残留。

- **补漆**

  如果在安装和使用过程中出现擦划伤，可能需要对缺陷部分进行补漆。补漆不当或过多可能损坏整个表面。1.5 米处看上去不显眼的擦划伤最好不要进行修补，因为正常风蚀能将其掩盖。

  补漆只需对油漆脱落部分进行修补，补漆前，对需要进行修补的部位需用酒精清除污物、石蜡及其他污秽。建议不使用喷补漆对大面积区域进行修补，因为喷补漆风干不如工厂预涂漆。与建筑板生产厂商或涂料供应商索取适合的喷补系统。不推荐使用气溶胶或喷雾修补擦划伤缺陷。最佳的修补工具为高质量的画画刷。

  如果按上述方法进行维护，彩涂钢板将长时间保持其原有本色。

- **Burrs installation**

  The remnants of metal chips are strictly forbidden to appear on surface of the steel, because they will definitely initiate the corrosion plaques. The cleaning work should be done immediately when the metal chips are found, or at least done after completion of one day' s work. The walking on the panel is also prohibited to prevent the damage to the coat. The inspection should be carried out in 2 week after completion of the installation to eliminate the corrosive remnants as possible as we can according to the higher requirements.It is the very time to clear the remnants to guarantee the roof a long life.

- **Peeling of films**

  There is a special design of organic and transparent film on the partial prepainted steel. It protects the prepainted steel from the collision or abrasion in the storage. Butit should be removed immediately after the installation, because the adherence between the organic film and the steel will be enhanced in the sunlight.

- **Clearance**

  The accumulative remnants and dusts usually could be removed by the pure water. The clearing work should be done every 6 months at least. It need more frequent to do clearing work in the regions along the coast or where heavy industrial dusts occurs.

  Complexion of detergents and bleaches is prohibited. The detergents which contain a proportion of the bleaches are recommended if required.

  The clearances should be done form the top to the bottom with soft cloths, sponges, banister brushes or low pressure sprinkles, which avoids the scar or lightening spots. It is not a good idea to use the abstergents or industrial detergents which harm the coat.Water soluble detergents such as “OMO” can be apparently efficient which is our recommendation.

  The methods mentioned above will not apply to the place where the fungi and moulds exist.detergents containing a proportion of bleaches such as“Tide” are recommended. The remnants should be clean out when the work is finished.

- **Repair to the coat**

  It is possible to repair the coat that damaged by scratch or abrasion in the installation or service. The incorrect or excessive repair to the coat could severely damage the whole surface.It is suggested that not to be repaired if the defects are not obviously observed form a distance of 1.5m, which could be covered by the wind corrosion.

  The repair to the coat should be done on the peeling surface. The clearance of dirt,olefin or others with alcohol should be done previously to the repair.It is more difficult to dehydrate the repair coat by spraying than the baking in the factory. The method of spraying coat to the defects in the huge area is not recommended. The suitable repair system could be available form the entrepreneurs of the panels or paints.

  We do not recommend the method of gasoloid or aerosol to cover the defects. The best repairing tools concludes in the high qualified brushes of painting.

  The prepainted steel will stay in the original status for very long life, if the methods mentioned above are followed.

Service Guide
使用指南

包装 Packing

包装方式有卧式和立式两种

The packing can be classified into two kinds, namely packing in vertical or horizontal.

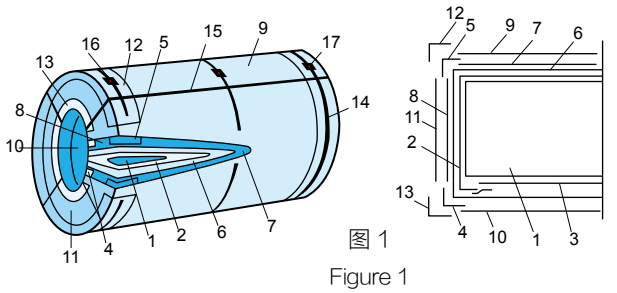
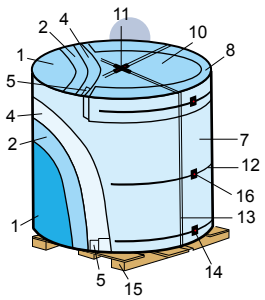


图 1

Figure 1



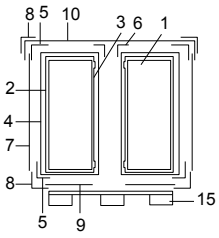


图 2

Figure 2

1 钢卷	2 外周防锈板	3 内芯防锈纸
4 纸内护角	5 纸外护角	6 塑料套
7 外周瓦楞纸	8 圆护瓦楞纸	9 外周包板
10 内周护板	11 铁圆护板	12 铁外护角
13 铁内护角	14 周向捆带	15 径向捆带
16 锁扣垫片	17 锁扣	

1 Steel coil	2 Peripheral anti-rust board	3 Inside anti-rust paper
4 Inside paper corner armor	5 Outside paper corner armor	6 Plastic cannula
7 Peripheral corrugated paper	8 Circle protective corrugated paper	9 Periphery wrapper sheet
10 Inner guard board	11 Circle iron guard board	12 Outside iron guard board
13 Inside iron guard board	14 Latitude strapping	15 Radial strapping
16 Lock catch gasket	17 Lock catch	

1 钢卷	2 外周防锈纸	3 内忒防锈纸
4 塑料套	5 纸外护角	6 纸内护角
7 外周包板	8 铁外护角	9 铁圆护板
10 圆盒盖	11 十字锁扣	12 周向捆带
13 十字捆带	14 锁扣垫片	15 托架
16 锁扣		

1 Steel coil	2 Peripheral anti-rust board	3 Inside anti-rust paper
4 Plastic cannula	5 Outside paper corner armor	6 Inside paper corner armor
7 Periphery wrapper sheet	8 Outside iron guard board	9 Circle iron guard board
10 Round lid	11 Cross lock catch	12 Latitude strapping
13 Cross strapping	14 Lock catch gasket	15 Bracket
16 Lock catch		

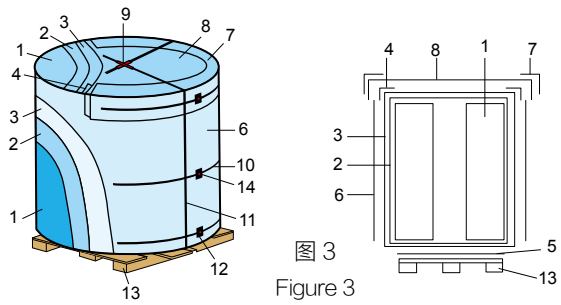


图 3
Figure 3

1 钢卷	2 外周防锈纸	3 塑料套
4 纸外护角	5 圆形瓦楞纸	6 外周包板
7 铁外护角	8 圆盒盖	9 十字锁扣
10 周向捆带	11 十字捆带	12 锁扣垫片
13 托架	14 锁扣	

1 Steel coil	2 Peripheral anti-rust board	3 Plastic cannula
4 Outside paper corner armor	5 Circle protective corrugated paper	6 Periphery wrapper sheet
7 Outside iron guard board	8 Round lid	9 Cross lock catch
10 Latitude strapping	11 Cross strapping	12 Lock catch gasket
13 Bracket	14 Lock catch	

标志

标志按需要应包括：商标、供方名称、品名、标准、规格、捆包号、用户合同号、炉号、镀层重量、颜色、生产日期、计重方式、净重、毛重，收货单位、防护标志等。

质量证明书

每批交货的钢板及钢带（钢卷）必须开具质量证明书。质量证明书上按需要应注明：商标、供方名称、品名、标准、产品规格、钢卷号或捆包号、用户合同号、炉号、颜色、重量、订货单位、件数、标准中规定的各项试验的结果、交货日期、质量证明书签发日期、质量管理部门负责人的签字等。

Label

Upon relevant demand, the content of the label should include:Trade mark, name of supplier, name of a product, standard, specification, tie bag number, contract number for customer, number of the stove, plate layers of weight, color, date of production, weighting way, net weight, gross weight, receiving division, anti-counterfeit mark, etc.

Certificate of quality

The certificate of quality should be presented when deliver each batch of steel plates and steel strip (steel coil), Trade mark, name of supplier, name of product, standard, product specification, steel coil number or of tie bag number, contract number for customer, number of the stove , color, weight, purchase unit, quantity , the results of every test specified in the standard, delivery date , issuing date of quality certificate , signature of the head of quality control department, etc.