Coated Steel Sheets

Hot-dip Galvanized Sheets, Electrogalvanized Sheets and Precoated Sheets
Coated Steel Sheets of NIPPON STEEL

Steel sheets are applied throughout a broad spectrum of life and industry—including automobiles, home electric appliances, building materials, housing, beverage cans, and transformers. Economic growth in the emerging countries and other parts of the world has spurred an expansion in steel sheet use.

By its speedy response to a wide range of needs and its rich line-up of products, NIPPON STEEL is renowned for its coated steel sheets. NIPPON STEEL develops and markets high-performance steel materials capable of responding to increasingly stringent needs, such as growing concern for the environment and energy conservation.

Coated steel sheets, in particular, are required to possess not only rust resistance but press formability, weldability, paintability, and various other properties as well. In addition to metallurgy, a growing diversity of other technologies is indispensable for meeting these needs. They include electro-chemistry, thin-film engineering, paint engineering, interface engineering, corrosion science, thermal technology, and alloying control (diffusion) technology. In the case of coated steel sheets, if any of these technologies is lacking, customer needs cannot be fulfilled.

NIPPON STEEL has outstanding command of these various elemental technologies and continues to develop products that perfectly meet the performance requirements of its customers.

Electro-galvanized steel sheets

- Advanced control over the coating atmosphere secures adhesion of the zinc to the base metal. These products are used mainly in home electric appliances and building materials.

Hot-dip galvanized steel sheets

- The surface texture is uniform and beautiful.
  - The lack of heat treatment during the coating process helps to retain the properties of the base metal. These products are used mainly in home electric appliances for indoor use.

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### Lineup of Coated Steel Sheets of NIPPON STEEL

<table>
<thead>
<tr>
<th>Type</th>
<th>Brand name</th>
<th>Coating structure (representative example)</th>
<th>Coating mass (g/m²)</th>
<th>Plate thickness (mm)</th>
<th>Width (mm)</th>
<th>Features</th>
<th>Post treatment</th>
<th>Main applications</th>
<th>Main applications</th>
<th>Main applications</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot-dip galvannealed steel sheet and strip</td>
<td>DURGRIP™</td>
<td>Zn-Al alloy</td>
<td>30</td>
<td>0.5</td>
<td>610</td>
<td>Coating resistance</td>
<td>General</td>
<td>Automotive outer and inner panels, Structural member (shutter)</td>
<td>6</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Base metal</td>
<td>120</td>
<td>4.5</td>
<td>1,850</td>
<td>Press formability</td>
<td>Lubricating</td>
<td>Steel furniture, automatic vending machine</td>
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<tr>
<td>Hot-dip galvanized steel sheet and strip</td>
<td>DURGRIP™</td>
<td>Zn</td>
<td>60</td>
<td>0.23</td>
<td>580</td>
<td>Coating resistance</td>
<td>General</td>
<td>Structural member (base, oil resistant structure, fuel tank)</td>
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<tr>
<td></td>
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<td>Base metal</td>
<td>120</td>
<td>6.0</td>
<td>1,840</td>
<td>Paint adhesion</td>
<td>Lubricating</td>
<td>Automobile outer and inner panels, Home appliance</td>
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<tr>
<td>Hot-dip zinc-aluminum-magnesium-silicon alloy coated steel sheet and strip</td>
<td>SuperDyma™</td>
<td>Zn-Al (11%) Mg (3%) Si (0.5%)</td>
<td>275</td>
<td>0.27</td>
<td>580</td>
<td>Coating resistance</td>
<td>General</td>
<td>Structural member (base, oil engineering structure, fuel tank)</td>
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<td></td>
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<td>Base metal</td>
<td>120</td>
<td>9.0</td>
<td>1,700</td>
<td>Scratch resistance</td>
<td>Lubricating</td>
<td>Automobile outer and inner panels, Home appliance</td>
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<td>Hot-dip aluminum-coated steel sheet and strip</td>
<td>ALSHEET™</td>
<td>Al-Si alloy</td>
<td>40</td>
<td>0.3</td>
<td>610</td>
<td>Coating resistance</td>
<td>General</td>
<td>Automotive exhaust system parts, heating equipment, Tissue, hot-water system</td>
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<td></td>
<td></td>
<td>5025, 5025A</td>
<td>160</td>
<td>2.5</td>
<td>1,250</td>
<td>Thermal resistance, heat reflectivity</td>
<td>Lubricating</td>
<td>Fuel tank</td>
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<tr>
<td>Sn-Zn coated steel sheet and strip</td>
<td>ECOKOTE™</td>
<td>Sn-Zn alloy</td>
<td>30</td>
<td>0.3</td>
<td>610</td>
<td>Corrosion resistance (oxide fuel)</td>
<td>General</td>
<td>Automotive outer and inner panels, Home appliance</td>
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<tr>
<td></td>
<td></td>
<td>Special film</td>
<td>50</td>
<td>2.0</td>
<td>1,250</td>
<td>Fuel non-permeable property</td>
<td>Lubricating</td>
<td>Heating equipment</td>
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<tr>
<td>Electrolytic zinc-coated steel sheet and strip</td>
<td>ZINKOTE™</td>
<td>Zn</td>
<td>10</td>
<td>0.4</td>
<td>600</td>
<td>Corrosion resistance</td>
<td>General</td>
<td>All equipment, electronic device, Home appliance</td>
<td>11</td>
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<tr>
<td></td>
<td></td>
<td>Base metal</td>
<td>40</td>
<td>3.2</td>
<td>1,650</td>
<td>Lubricity, formability, Stretch resistance</td>
<td>Lubricating</td>
<td>AI equipment, electronic device, OA equipment</td>
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<tr>
<td>Electrolytic zinc-nickel-coated steel sheet and strip</td>
<td>DURZINKLITE™</td>
<td>Zn-Ni alloy</td>
<td>10</td>
<td>0.4</td>
<td>600</td>
<td>Corrosion resistance</td>
<td>General</td>
<td>Automobile outer and inner panels, Home appliance</td>
<td>13</td>
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<tr>
<td></td>
<td></td>
<td>Base metal</td>
<td>40</td>
<td>2.3</td>
<td>1,650</td>
<td>Paint adhesion</td>
<td>Lubricating</td>
<td>Heating equipment</td>
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<tr>
<td>Zn-Ni alloy coated steel sheet and strip</td>
<td>ECOTRIO™</td>
<td>Zn-Ni alloy</td>
<td>4</td>
<td>0.15</td>
<td>580</td>
<td>Whisker resistance</td>
<td>General</td>
<td>All equipment, electronic device, OA equipment</td>
<td>14</td>
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<td></td>
<td></td>
<td>Special film</td>
<td>15</td>
<td>1.0</td>
<td>1,024</td>
<td>Solder wettability</td>
<td>Lubricating</td>
<td>Battery, Heating equipment, Automobile, fuel parts</td>
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<tr>
<td>Nickel Coated Steel Sheet and strip</td>
<td>SUPERNICKEL™</td>
<td>Fe-Ni alloy Ni layer</td>
<td>1</td>
<td>0.15</td>
<td>25</td>
<td>Corrosion resistance (particular after forming)</td>
<td>General</td>
<td>Home appliance</td>
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<td></td>
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<td>Ni layer</td>
<td>4</td>
<td>0.8</td>
<td>1,000</td>
<td>Coating adhesion</td>
<td>Lubricating</td>
<td>All equipment, electronic device, OA equipment</td>
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<tr>
<td></td>
<td></td>
<td>Base metal</td>
<td>1</td>
<td>0.8</td>
<td>1,000</td>
<td>Thermal resistance, heat reflectivity</td>
<td>Lubricating</td>
<td>Automobile fuel parts</td>
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<tr>
<td></td>
<td></td>
<td>Ni layer</td>
<td>1</td>
<td>0.8</td>
<td>1,000</td>
<td>Decorativeness (aluminum)</td>
<td>Lubricating</td>
<td>Auto body parts</td>
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<tr>
<td>Zinkote™ Color</td>
<td>ZINKOTE™</td>
<td>Zn</td>
<td>10</td>
<td>0.4</td>
<td>600</td>
<td>Corrosion resistance</td>
<td>General</td>
<td>All equipment, electronic device, OA equipment</td>
<td>12</td>
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<tr>
<td></td>
<td></td>
<td>Base metal</td>
<td>40</td>
<td>0.8</td>
<td>1,650</td>
<td>Creep resistance, corrosion resistance, elimination of coating process at user plant</td>
<td>Lubricating</td>
<td>Battery, Heating equipment, Automobile, fuel parts</td>
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<tr>
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<td></td>
<td>Zn</td>
<td>10</td>
<td>0.4</td>
<td>1,650</td>
<td>Creep resistance, corrosion resistance, elimination of coating process at user plant</td>
<td>Lubricating</td>
<td>Battery, Heating equipment, Automobile, fuel parts</td>
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</tbody>
</table>

**Information about environmental load chemical substances contained in the products of NIPPON STEEL is supplied in the form shown below:**

1) Material Safety Data Sheet (MSDS)
2) Information about specified chemical substance content (supplementary MSDS)
3) Specified Chemical Substances Data Sheet (SSDS)

For more details, please confirm by accessing our website: www.nipponsteel.com
**DURGRIP™**
Hot-dip galvannealed steel sheet and strip

### Main Characteristics
- Excellent paint adhesion and weldability—provided by reheating the zinc-iron alloy layer produced by heating
- Exceptional post-coating corrosion resistance
- Excellent press-formability, ranging from bending to deep drawing
- Availability of sheet with highly lubricative film treatment

### Typical Properties

#### Press Formability
The application of lubricative film treatment imparts good press formability.

#### Weldability
The resistance weldability of galvanized steel sheet, in contrast to that of cold-rolled steel sheet, generally requires appropriate welding conditions in the region of high heat input. This is because zinc is a soft metal that easily conforms to the partner metal and because zinc’s low melting point causes it to melt and spread out during the initial welding stage, thereby resulting in lower current density. Consequently, less heat is generated in the overlapped areas.

#### Direct Spot Weldability
The appropriate welding conditions for coated steel sheets are shown in the figure below. Adequate welding current regions for coated steel sheets are higher than those for cold-rolled steel sheets.

### Example of Appropriate Welding Conditions for Galvanized Sheet

### Main Applications
- Electric appliances
  - Washing machine, refrigerator, air conditioner, automatic vending machine (outer plate, side plate, back plate, bottom plate, parts)
- Building and furniture
  - Skylight, door, shelf, shutter, cabinet, steel furniture, office equipment
- Automobile (outer, inner, parts)

### Zinc Coating Mass and Corrosion Resistance
As the zinc coating mass increases, the corrosion resistance of the hot-dip galvanized sheet is extended.

#### Corrosion Resistance Mechanism of Conventional Chrome Plating

### Main Properties

#### Structure and Function of Coating Films
Chrome plating film
- Shifting out of corrosion factors
- Coating adhesiveness
- Zinc coating layer
- Steel sheet

Chromate-free coating film
- Shifting out of corrosion factors
- Coating adhesiveness
- Zinc coating layer
- Steel sheet

Function of Chromate Coating Film
- Effects similar to those offered by special coating film containing corrosion-suppression agent

### Corrosion Resistance Mechanism of Chromate-Free Coating Film

#### Corrosion Resistance Mechanism of Chromate-Free Coating Film
- Zinc coating layer
- Coating adhesiveness
- Special coating layer containing corrosion-suppression agent

### Examples of Paint Adhesion (Primary Adhesion)

### Typical Properties

#### Press Formability

#### Weldability

#### Direct Spot Weldability

#### Main Applications

### Main Applications
- Civil engineering structure and building construction
  - Guard rail, corrugated pipe, spiral pipe, deck plate, duct, roofing material, fence, sound-insulation wall, shielding pipe, light-gauge shape, shutter, sash, door, housing structural member (column, beam)
  - Automobile
    - Floor, various parts
  - Shipbuilding
    - Deck, frame
  - Electric appliance
    - Refrigerator, washing machine, heating equipment, air conditioner, automatic vending machine, showcase parts
  - Industrial machinery
    - Container for transporting agricultural products, various parts requiring corrosion resistance

### Main Characteristics
- High corrosion, and rust resistance similar to that of conventional chrome-plated sheet even with chromate-free treatment
- Excellent zinc adhesion and responsiveness to severe fabrication conditions
- Product lineup with excellent tribological properties by means of chromate-free treatment

### Main Applications
- Automobile
- Shipbuilding
- Electronic equipment
- Electrical appliance
- Industrial machinery
**SuperDyma™**

**Hot-dip zinc-aluminum-magnesium-silicon alloy coated steel sheet and strip**

**Main Characteristics**

- With remarkably high corrosion resistance compared to hot-dip galvanized steel sheet, inhibits corrosion resistance in cut-end surfaces
- Strong alkaline resistance even in direct contact with mortar and concrete
- Superior substitute for stainless steel (weak in chloride resistance) and aluminum (weak in alkaline resistance)
- Availability of chromate-free sheet having properties similar to those of chromate-treated sheet

**Typical Properties**

- **Coating Layer Composition and Corrosion Resistance (Salt Spray Tests)**
  - Comparison of the salt spray corrosion loss of various coated sheets
  - Corrosion Resistance of Flat Surfaces: The corrosion resistance of SuperDyma (rated by salt-spray tests to determine corrosion loss) is extremely high—about 30 times that of hot-dip Zn-coated sheets.

- **Corrosion Protection Mechanism on Cut-end Surfaces and At Welded Sections**
  - Corrosion Protection Mechanism at Cut-end Surfaces

- **Acid and Alkaline Resistance of Various Coated Sheets**
  - Graph showing corrosion loss under acidic and alkaline conditions

- **Scratch Resistance**
  - The coating layer of SuperDyma is hard, thus offering high scratch resistance.

**Main Applications**

- **Bridge (cable rack)**
- **Automobile parts**
- **Air-conditioning unit (upper plate)**
- **Compact house (roof, frame)**

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**ALSHEET™**

**Hot-dip aluminum-coated steel sheet and strip**

**Main Characteristics**

- Outstanding weather resistance and corrosion resistance
- Discoloration and high thermal resistance in high-temperature application
- Excellent high-temperature heat reflectivity, compared to hot-dip galvanized steel sheets

**Typical Properties**

- **Thermal Resistance**
  - The surface appearance of ALSHEET at high temperatures is far superior to that of hot-dip galvanized steel sheet or that of cold-rolled steel sheet. No surface discoloration occurs at 350°C or under. At temperatures above that, the surface becomes an Al-Fe alloy, causing a discoloration. However, this conversion to an alloy prevents oxidation of the base metal, helping to retain the steel sheet’s thermal resistance.

- **Chemical resistance**
  - Because ALSHEET, like aluminum, easily generates fine yet stable oxide and hydroxide films in the atmosphere and in water, its corrosion resistance under various conditions is superior to that of galvanized steel sheets. In application, however, it should be borne in mind that, contrary to galvanized steel sheet, galvanic action (sacrificial action) cannot be expected of ALSHEET.

**Main Applications**

- **Hot-water system**
- **Oven toaster**
- **Bread machine**
- **Stove**
- **Fan heater**
- **Cloth dryer**
- **Automobile** (muffler, manifold cover, converter cover)
**ECOKOTE™-S**
Sn-Zn coated steel sheet and strip

**Main Characteristics**
- Higher corrosion resistance than found in conventional fuel tank metallic materials
- High corrosion resistance, even when used with bio fuels
- Meets hydrocarbon permeation regulations; is free of environmental load substances
- Highly recyclable

**Typical Properties**
Responsiveness to Environmental Preservation: ECOKOTE™-S is most suitable for use as an eco-friendly fuel tank material.

- **Main Applications**
  - Fuel tank

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**ZINKOTE™**
Electrolytic zinc-coated steel sheet and strip

**Main Characteristics**
- Demonstrates similar effects in application as chromate-treated sheet due to ZINKOTE’s special film containing a corrosion inhibitor
- Availability of characteristic properties that conform to respective customer needs thanks to ZINKOTE’s diverse post-treatment lineup

**Main Applications**
- Various Parts
  - Audio equipment, etc
- Side Plate
  - Refrigerator, washing machine, etc

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**Characteristic Properties of Fuel Tank Material**

<table>
<thead>
<tr>
<th>Property</th>
<th>ECOKOTE™-S (Sn-Zn coating)</th>
<th>ALSHEET™ (Aluminum coating)</th>
<th>TERNESHEET (Pb-Sn coating)</th>
<th>Resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulation for upper limit for fuel permeation</td>
<td>No fuel permeation because of steel sheet</td>
<td>Inferior permeation shut-off performance</td>
<td>Inferior permeation shut-off performance</td>
<td>Inferior permeation shut-off performance</td>
</tr>
<tr>
<td>Promotion of recycling</td>
<td>High recyclability because of steel sheet</td>
<td>Inferior recyclability</td>
<td>Inferior recyclability</td>
<td>Inferior recyclability</td>
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<tr>
<td>Lighter weight</td>
<td>Lighter weight by use of steel’s rigidity instead of identical capacity</td>
<td>No inclusion of environment burden substance</td>
<td>Use of lead</td>
<td>No inclusion of environment burden substance</td>
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<tr>
<td>Regulation for environmental burden substance</td>
<td>No inclusion of environment burden substance</td>
<td>Use of lead</td>
<td>No inclusion of environment burden substance</td>
<td>Use of lead</td>
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<tr>
<td>Increasing use of eco-friendly fuel</td>
<td>Outstandingly high corrosion resistance</td>
<td>Concerns about certain resistance if use of chromate film is continued</td>
<td>Unwinding concerns about permeation and deterioration</td>
<td>Unwinding concerns about permeation and deterioration</td>
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<tr>
<td>Inner surface corrosion resistance</td>
<td>Degraded gasoline</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
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<tr>
<td>ECOKOTE™-S (Sn-Zn coating)</td>
<td>Degraded 20%FA/30%ME mixed gasoline</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
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<tr>
<td>ALSHEET™ (Aluminum coating)</td>
<td>Degraded ethanol-mixed gasoline</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>TERNESHEET (Pb-Sn coating)</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
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<tr>
<td>Outer surface corrosion resistance</td>
<td>Press formability</td>
<td>Weldability</td>
<td>Paintability</td>
<td></td>
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<tr>
<td>ECOKOTE™-S (Sn-Zn coating)</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
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<tr>
<td>ALSHEET™ (Aluminum coating)</td>
<td>x</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
</tr>
<tr>
<td>TERNESHEET (Pb-Sn coating)</td>
<td>Fair</td>
<td>Fair</td>
<td>Good</td>
<td>Excellent</td>
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</tbody>
</table>

**Corrosion Resistance**
Salt Spray Test: Flat Surface Section and Formed Section (Erichsen 7 mm Extruded Section)
- Example of Corrosion Resistance of Flat Surface Section
  - (A kind of typical surface treatments is shown)
- Example of Corrosion Resistance of Formed Section
  - ZINKOTE: Used for high-performance electric appliances and OA equipment

**Conductivity (Grounding Property)**
- Loresta (4 Prove Type)
  - Concept of Contact Resistance Measurement Device (Loresta 4 Prove Type)
  - Measurement: Loresta DP type made by Mitsubishis Chemical Corp.
  - Measurement: 4 contact type probe method, constant current application system
  - Measurement: 10 nA to 10 µA
  - Measurement: 200 mA, 4 contacts, pin interval 5 mm, spring pressure 2.4 kN

**Contact Resistance Tests (Loresta 4 Prove Type)**
- Conducting rate (%) | Conducting rate (%) X 100
  - Conduction less than 0.05

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**Application**
- Flat panel display
- Chassis, various parts
- Copying machine, printer
- Various parts
- Audio equipment, etc
- Side Plate
- Refrigerator, washing machine, etc
ZINKOTE™ COLOR
Pre-Coating Steel Sheet and Strip

Main Characteristics
- Excellent cost performance and reduced manufacturing term at user plant by coating only one side of ZINKOTE with a beautiful topcoat
- Available colors (3): black, silver, and white, and preparation of improved scratch-resistant type
- Black coated sheets (2): both-sided black coated type, and high-conductivity/good heat-absorption type

Product Lineup

<table>
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<tr>
<th>Color</th>
<th>Type</th>
<th>Heat treatment symbol</th>
<th>Surface finish</th>
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<tbody>
<tr>
<td>Black</td>
<td>Improved scratch-resistant type</td>
<td>KJ2</td>
<td>D</td>
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<tr>
<td>Silver</td>
<td>Improved scratch-resistant type</td>
<td>SJ2</td>
<td>D</td>
</tr>
</tbody>
</table>

Main Applications
- Home appliance
- AV equipment, electronic device
- OA equipment
- Housing equipment (interior, steel furniture)

DURZINKLITE™
Electrolytic zinc-nickel alloy-coated steel sheet and strip

Main Characteristics
- Outstandingly high corrosion resistance even with conventional electrolytic galvanizing mass
- Fine appearance and finishing after coating, similar to cold-rolled sheet
- Easy spot and seam welding

Typical Properties

Bare Corrosion Resistance
In commonly conducted salt spray testing, the bare corrosion resistance of DURZINKLITE coated surfaces is more than 3 times greater than galvanized sheets with equal coatings. This product shows favorable corrosion resistance even with a thin coating mass, but the provision of a special chromate treatment further improves corrosion resistance.

Example of Welding Current Range for Single Sport Welding of Both-side Galvanized Sheet
Individual spot or seam welding of DURZINKLITE can be conducted using low welding current, and because the welding current range is wide, welding is easy.

Examples of single spot welding at a range of welding currents for both-side galvanized sheet are shown at right. In each case, adequate nuggets are formed using a comparatively low welding current, and the recommended range of welding currents is wide to allow easy welding.

Examples of Corrosion Resistance Assessment of DURZINKLITE (Non-treated Sheet Salt Spray Test)

Weldability

Examples of Welding Current Range for Single Sport Welding of Both-side Galvanized Sheet

Reference: Time required for the occurrence of red rust in the salt spray test JIS Z 2371

<table>
<thead>
<tr>
<th>Type</th>
<th>Welding current (A)</th>
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<tbody>
<tr>
<td>DURZINKLITE</td>
<td></td>
</tr>
<tr>
<td>ZINKOTE</td>
<td></td>
</tr>
<tr>
<td>DURGRIP (galvanized)</td>
<td></td>
</tr>
<tr>
<td>Cold-rolled</td>
<td></td>
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</table>

Black coated sheets (2): both-sided black coated type, and high-conductivity/good heat-absorption type
**ECOTRIO™**
Zn-Sn-Ni alloy coated steel sheet and strip

**Main Characteristics**
- Lead-free and chromate-free, and conforms to RoHS (Restriction of Hazardous Substances) Directive
- Greater suppression of whiskers compared to electrolytic tinplate
- Solubility and conductivity that are similar to electrolytic tinplate and higher than those of galvanized steel sheet
- Availability of thin-gauge products with a minimum thickness of 0.15 mm
- NEW ECOTRIO even in thin coating mass specifications: Taking over the basic properties of ECOTRIO
- High-strength ECOTRIO. Cost-cutting substitute for nickel silver and stainless steel sheets

**Typical Properties**

**Chromate-free Coating Film**
- Test Result for Occurrence or No Occurrence of Whisker under High Temperature and High Humidity Condition

**Solder Wettability (Solder Wetting Time)**
- Measurement Results for Solder Wettability Time

**Corrosion Resistance**
- Corrosion Resistance (Salt Spray Test)

**Main Applications**
- Game console
- Automobile AV equipment
- TV set
- Personal computer
- Electric and electronic parts
- Audio system

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**SUPERNICKEL™**
Nickel Coated Steel Sheet and Strips

**Main Characteristics**
- High adhesion and corrosion resistance due to formation of Fe-Ni alloy layer
- Availability of material quality that conforms to the particular application and the degree of fabrication
- Diverse surface finishes are available from an outstanding fine mirror finish to a rough dull finish.
- Availability of coatings from thin to heavy and of differential coatings on front and rear surfaces
- Same thermal resistance as that of stainless steel

**Typical Properties**

**Surface Gloss**
- Glossiness of surface finish

**Coating Adhesion (workability)**
- An example of evaluation of coating adhesion (workability)

**Main Applications**
- Primary battery case, Secondary battery case
- Negative electrode collector for secondary battery
- Oven toaster reflector plate
- Fuel filler pipe and parts

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**NIPPON STEEL CORPORATION**
NIPPO ST STEEL CORPORATION

VIEWKOTE™ Pre-Coating Steel Sheet and Strip

Main Characteristics

- Smooth and fine painted surface
- Selection of colors and material properties that meet specific needs, through the combined use of diverse paints and base substrates
- Improved such factors as process, space, energy and load savings at user plant

[Paint type of VIEWKOTE]
- Type I / Highly workable type
- Type II / Balanced type in workability surface physical properties
- Type III / Stain-resistance type
- Type IV / Highly workable, stain-resistant type(universal type)
- Type V / Highly corrosion-resistant type

Typical Properties

Application | Application/part materials | VIEWKOTE recommended specifications
--- | --- | ---
Lighting equipment | Reflecting board | Front side: VIEWKOTE Type I
| | Back side: VIEWKOTE Type II
Flat panel TV | Back panel | Front side: VIEWKOTE Type IV
| | Back side: Electroconductivity Type
Digital recorder | Chassis | Front side: VIEWKOTE Type IV
| | Back side: Electroconductivity Type
Auto on-board equipment | Chassis | Front side: VIEWKOTE Type IV
| | Back side: Heat Absorption Type

Premium Series

High Reflection Type VIEWKOTE
- Diffuse reflectivity of 92-98%.
- Can be deep drawn.
- Has excellent basic properties including corrosion and chemical resistance.
- Both electromagnetic shielding and temperature control can be achieved by selecting heat absorption type with good electroconductivity in the back coating.
- Chromate-free and eco-friendly.

Self-Cleaning Type VIEWKOTE
- Hydrophilic coating vastly improves resistance against rain drop stains.
- Offers high workability thanks to optimal substrate design.
- Also offers excellent weatherability and stain resistance in processed surfaces.
- A wide range of color variations, including metallic tones.
- Chromate-free and eco-friendly.

Antistatic Type VIEWKOTE
- Prevents static electricity caused by friction from conveyors and rubber suction disks in the processing/ production process.
- Reduces dust adhesion caused by static electricity.
- Reduces electric shocks caused by static electricity.
- Chromate-free and eco-friendly.

Orange-Peel-Surfaced VIEWKOTE
- A pebbled surface like that of an orange peel is achieved by special beads in the coating. These beads then melt during heating when the coating is enameled.
- This coating improves processing yield by making handling scratches less visible.
- Its workability, chemical resistance, and other basic properties are the same as conventional VIEWKOTE. (Can also include antistatic property.)
- Chromate-free and eco-friendly.

Typical Colors and Surface Effects

- General white (98% type)
- General white (92% type)
- General white (88% type)
- Silver-gray (88% type)
- Silver-gray (92% type)
- Silver-gray (98% type)

Typical Properties

- Coating structure (representative example)
- Measurement of diffuse reflectivity at the coating surface by non-contact type static electricity measuring apparatus. Immediately after VIEWKOTE sample (50 μm) makes contact with a piece of mastic resin (50 x 120 mm) and is then detached.

- Example: Comparison of charged voltage
- Example: Orange-Peel-Surfaced VIEWKOTE