NIPPON STEEL’s Steel Products for Thermal Power Generation

- ABREX
- NSHYPER BEAM
- Hat-type and H-shape Combined High-Stiffness Steel Sheet Pile
- CORSPACE
- TITANIUM

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Thermal power generation is base load power sources that can supply a certain amount of electrical power stably and at low cost, regardless of the season, weather, time of day or night. In recent years, an increasing number of thermal power plants have striven to improve efficiency (seeking higher temperature) while addressing environmental concerns. Steel products wanted by these thermal power plants are of an extremely high standard, without exception. We have a wide range of leading-edge steel products that embody the NIPPON STEEL Group’s technologies, withstand high temperature and high pressure, and contribute to high-efficiency power generation.
Proposing NIPPON STEEL’s eco-friendly steel products for power plants

NIPPON STEEL’s top-quality steel products provide strong support for power plants.

Problem
Corrosion progresses under a salt damage environment, making it difficult to maintain.

Problem
Wear is severe due to impacts subjected during transportation and loading of coal.

Problem
Strengthening is desired, but welding load will increase.

Problem
The highly corrosive seawater environment makes it difficult to maintain.

Problem
It will take longer term to construct the conventional wall like concrete.

Problem
It is necessary to do the welding for the quite long fabrication.

Problem
A certain amount of electrical power stably and at low cost, regardless of the season, weather, time of day or night.

Problem
It can also cut running costs of repairing or exchanging components.

Problem
It can reduce the weight and prolong the life of equipment.

Problem
It is resistant to abrasion caused during transportation and loading of coal.

Problem
It will take longer in the exhaust system.

Problem
Corrosion progresses due to sulfuric/hydrochloric acid contained in exhaust.

Problem
Exhaust gas temperature occurs! 

Problem
Exhaust gas temperature occurs! 

Problem
Heat recovery equipment 

Problem
Modern smoke ~150˚C 

Problem
Exhaust gas temperature 180˚C (water cooling type) 

Problem
Modern smoke 

Problem
Condensation 

Problem
Hydrochloric acid/S

Problem
Sulfuric/hydrochloric

Problem
ABREX 400

Problem
ABREX 450

Problem
NSHYPER BEAM TM

Problem
Hat-shaped Steel Sheet Pile

Problem
Hat-type and H-shape Combined High Stiffness Steel Sheet Pile

Problem
NSHYPER BEAM TM

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NSHYPER BEAM TM

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When corrosion progresses due to sulfuric/hydrochloric acid in exhaust

**S-TEN**

Sulfuric Acid and Hydrochloric Acid Dew-point Corrosion-resistant Steel

**Application effects**

- Excellent performance under a (sulfuric acid) corrosion resistant environment of coal/heavy oil-fired power generation plant
- Longer life and more economical than stainless steel ⇒ Eco-friendly steel products with low life cycle costs
- Same mechanical properties and weldability as ordinary steel ⇒ Conforms to SM400A and SM490A
- Broad product lineup <Steel sheets, Steel plates, Steel pipes, Welding materials>
- Proven records/achievements particularly in smoke exhaustion systems

**Achievements**

- Extensive supply records — As a pioneer in developing sulfuric acid dew-point corrosion resistant steels, we have supplied these products for over 50 years.
- We have supplied over 100,000 tons of these products in the past, which are used in various facilities.
- Extensive knowledge — We conducted exposure tests under various environments. Based on these test results, we can offer optimal proposals.
- Major awards received — The Ichimura Prize in Industry for Excellent Achievement (FY2006)
- Nikkei Excellent Products and Services Award (FY2003)

**S-TEN application sites**

Effective in the sections of smoke exhaustion systems, waste incineration power generation plants, flues, etc., through which untreated gas passes.

- **S-TEN application near a furnace**
  - Main steam (to high pressure turbine)
  - Reheating steam (to intermediate-pressure turbine)

- **Dew-point corrosion area (S-TEN application example)**
  - Furnace
  - Economizer
  - Air preheater
  - Combustion air
  - Electrostatic precipitator
  - Flue gas desulfurization equipment

- **S-TEN application in a waste incineration power generation plant**
  - Boiler building
  - Dewatered cake
  - Boiler
  - Incinerator
  - Cooled reactor
  - Fuel tank
  - Slag

**Characteristic and advantages**

- Corrosion resistance is about 6 times and about 7 times better than ordinary steel and stainless steel, respectively, under a sulfuric acid corrosive environment
- About 11 times and about 4 times better than ordinary steel and stainless steel, respectively, under a hydrochloric acid corrosive environment.

**Conceptual diagram of S-TEN application**

**Compare with corrosion of other products**

**Compare corrosion rate - sulfonic acid immersion test results**

- SUS316
- SUS304
- Comparator product
- S-TEN
- SS400

**Compare corrosion rate - hydrochloric acid immersion test results**

- SUS316
- SUS304
- S-TEN
- SS400

**To meet the needs for high strength and weldability of steel products**

**BT-HT**

High-tensile steel plate for building structure

- High-tensile steel with excellent weldability. Improved tensile strength to realize thinner plates and reduce the amount of steel materials used.

**TMCP (Thermo-Mechanical Control Process)** manufacturing enables manufacturing of steel plates with superior weldability, using a low carbon equivalent value.
- It improves efficiency in constructing structures and ensures safety/reliability.
- In addition to plants, it has been used in the Tokyo Skytree and various other buildings.
When corrosion progresses under a salt damage environment, it makes it difficult to maintain

CORSPACE™
Corrosion Resistance Steel for Repainting Cycle Extension

It provides excellent corrosion resistance in a coastal salt damage environment.
It can also cut LCC by extending the painting cycle and reducing the amount of paint used.

Exposure test results

CORSPACE can reduce the maintenance load by extending the painting cycle and cut costs by using a smaller amount of paint.
As the above exposure test results show, corrosion resistance is excellent, and the peeled area can be substantially smaller than ordinary steel.
It has been used in an unloader (in photograph) and boiler building of a thermal power plant.

When wear is severe due to impacts subjected during transportation and loading of coal, iron ore, etc.

ABREX™
Abrasion Resistant Steel Plate

It is resistant to abrasion caused during transportation and loading of coal.
It can reduce the weight and prolong the life of equipment.
It can also cut running costs of repairing or exchanging components.

Scratching wear resistance comparison (against ordinary steel)

ABREX is very hard steel and highly abrasion resistant, and realizes a structure with 3 to 5 times longer life and lighter weight than ordinary steel.
With its excellent workability and weldability, it is widely used throughout the world as a corrosion resistant component of construction machines and various types of other industrial machinery.

When the highly corrosive seawater environment makes it difficult to maintain

TITANIUM
High corrosion resistance, light weight, high specific strength

It is comparable to platinum in seawater.
It is vital to condensers and plate-type heat exchangers of coastal power plants.

Plate-type heat exchanger

We have steel plates and steel sheets available for welded pipes and tube plates of condensers and multitubular auxiliary heat exchangers. We also have steel sheets for plate-type auxiliary heat exchangers. We offer a wide production range from thin sheets to thick plates to meet various needs.

When fabrication work lengthens due to welding

NSHYPER BEAM™
NSHYPER BEAM™ is our original Rolled H-shapes having large sizes and wider size availabilities. By using it as an alternative for Built-up H-shapes, you can reduce costs and shorten fabrication processes because there is no need of welding.

Maximum size: D:1000mm x W:400mm
Number of sizes: 609 (S355JR, J0, J2, K2)

Hat-type and H-shape Combined High Stiffness Steel Sheet Pile

Hat-shaped Steel Sheet Pile

High rigidity enables construction of thinner wall structures with outstanding water-shielding performance, space saving, low noise, and low vibration construction is possible.

Large sectional area of the Hat-type sheet pile realizes superior drivability.
No reduction is required in sectional properties to consider the possible lack of shear force transmission at the interlocks, which is true for U-type steel sheet piles.
Amount of steel per unit wall can be reduced, resulting in improved total cost.

It is easy to fabricate with intermittent fillet welding which can be carried out at the site or the nearby yard or shop.
It is possible to use low-cost H-shape up to 70% of weight as well as avoiding use of expensive connectors to connect a sheet pile and a section.
An ordinary vibratory hammer is directly applicable for driving.

There are various other products available, including 9%Cr, SA516, and SB480.