

PUBLIC RECORD VERSION

Exporter Questionnaire

Product: Quenched and Tempered steel plate (Q&T steel plate)

From: Finland, Japan and Sweden

Period of Investigation: 1 January 2013 to 31 December 2013

Response due by: 7th of March 2014

Investigation case manager: Matthew Williams

Phone: +613 9244 8229

Fax: +613 9244 8902

E-mail: operations3@adcommission.gov.au

Anti-Dumping Commission website: www.adcommission.gov.au

**Return completed
questionnaire to:**

Anti-Dumping Commission
1010 La Trobe St
Docklands VIC 3008
Australia

Attention: Director Operations 3

GOODS UNDER CONSIDERATION

The goods under consideration (the goods) i.e. the goods exported to Australia, allegedly at dumped prices and/or in receipt of subsidies, are:

“Flat rolled products of alloyed steel plate commonly referred to as Quenched and Tempered (“Q&T”) steel plate (although some Q&T grades may not be tempered), not in coils, not further worked than hot rolled, of widths from 600mm up to and including 3,200mm, thickness between 4.5-110mm (inclusive), and length up to and including 14 metres, presented in any surface condition including but not limited to mill finished, shot blasted, primed (painted) or un-primed (unpainted), lacquered, also presented in any edge condition including but not limited to mill edge, sheared or profiled cut (i.e. by Oxy, Plasma, Laser, etc.), with or without any other minor processing (e.g. drilling).

Goods of stainless steel, silicon-electrical steel and high-speed steel, are excluded from the goods covered”.

Additional product information:

In support of the goods description, the application stated that Q&T steel plate comprises grades with typical mechanical properties as follows:

- *“High Hardness/Abrasion resistant Q&T steel plate (more commonly referred to as ‘Wear’ Grade Q&T steel plate) of Brinell hardness (HBW – 10/3000) range 320-640 or equivalent Rockwell C hardness range 34 – 59 or equivalent Vickers hardness range 230-670;*
- *High Strength Q&T steel plate (commonly referred to as ‘Structural/High Tensile’ Grade Q&T steel plate) of 0.2% Proof Stress of 475-890 MPa (min); and*
- *High Hardness/Impact resistant Armour Grades (more commonly referred to as ‘Armour’ Grade Q&T steel plate) of hardness up to 640 Brinell (HBW – 10/3000)”.*

To clarify the goods description the applicant stated that Q&T steel plate has chemical compositions up to:

- *Carbon Max – 0.5%;*
- *Manganese Max – 2.5%;*
- *Silicon Max – 0.65%;*
- *Sulphur Max – 0.04%;*
- *Phosphorous Max – 0.04%;*
- *Nickel Max – 3.0%;*
- *Chromium Max – 3.0%;*
- *Molybdenum Max – 2.0%;*

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- *Vanadium Max – 0.2%;*
- *Boron Max – 0.01%;*
- *Aluminium Max – 0.1%;*
- *Titanium Max – 0.1%;*
- *Copper Max – 0.5%;*
- *Niobium Max – 0.1%;*

The percentage of the above individual alloying elements may vary in accordance with each manufacturer's grade specifications and not all elements may be utilized in all Q&T steel plate grades. Additional other quantities of trace elements up to a max 0.1% each may also be utilized or found (as trace elements) in Q&T steel plate.

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INSTRUCTIONS

Why you have been asked to fill out this questionnaire?

The Anti-Dumping Commission (the Commission) is responsible for investigating the allegation that Quenched and Tempered steel plate (Q&T steel plate) has been exported to Australia from Finland, Japan and Sweden at prices less than their normal value and that the dumping has caused material injury to the Australian industry.

The Commission will use the information you provide to determine normal values and export prices over the investigation period. This information will determine whether Q&T steel plate is dumped. You may make separate submissions concerning any other matter, for example injury.

The Commission investigation will be carried out under the provisions of the Part XVB of the *Customs Act 1901*.

What happens if you do not respond to this questionnaire?

You do not have to complete the questionnaire. However, if you do not respond, do not provide all of the information sought, do not provide information within a reasonable time period, or do not allow the Commission to verify the information, we may deem you uncooperative. In that case the Commission may be required to rely on information supplied by other parties (possibly information supplied by the Australian industry). In that case we may assess a dumping margin for your company based upon normal values that may be the highest determined in your country during the investigation period.

It is in your interest, therefore, to provide a complete submission.

Due date for response

Manufacturers and exporters are requested to respond to this questionnaire and return it to the Commission within the time specified on the cover page (**14 February 2014**). There is a statutory time limit imposed for the investigation. The Commission may not be able to consider submissions received after the due date.

If you cannot lodge your submission by the due date please advise the investigation case manager as soon as possible.

Confidential and non-confidential submissions

You are required to lodge one confidential version (for official use only) and one non-confidential version (for public record) of your submission by the due date.

Please ensure that *each page* of information you provide is clearly marked either "FOR OFFICIAL USE ONLY" or "PUBLIC RECORD".

All information provided to the Commission in confidence will be treated accordingly. The non-confidential version of your submission will be placed on the public record.

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Please note, Australia's anti-dumping and countervailing legislation requires that to the extent that information given to the Commission is claimed to be confidential or whose publication would adversely affect a business or commercial interest, the person giving the information must ensure that a summary of that information contains sufficient detail to allow a reasonable understanding of the substance of the information, but does not breach confidentiality nor adversely affect those interests.

The legislation allows that a person is not required to provide a summary for the public record if the Commission can be satisfied that no such summary can be given that would allow a reasonable understanding of the substance of the information. However, such a summary would add considerably to an interested party's understanding of information contained in a document.

As provided for in Australia's anti-dumping and countervailing legislation, all submissions are required to have a bracketed explanation of deleted or blacked out information for the non-confidential version of the submission. Note that if such an explanation is not provided, the Commission may disregard the information in the submission. An example of a statement to accompany deleted/blacked out text is:

[explanation of cost allocation through the divisions].

If, for some reason, you cannot produce a non-confidential summary, please contact the investigation case manager.

Exporter's declaration

At section H, you are required to make a declaration that the information contained in your submission is complete and correct. Alternatively, if you did not export the goods during the period of investigation, you may make a declaration to that effect.

You must return a signed declaration with your response to the questionnaire.

Verification of the information that you supply

The Commission will seek to verify the information provided in your submission. Where there are a large number of exporters, the Commission may have to verify information from selected exporters only. The purpose of the visit is to verify the information submitted in response to this questionnaire. It is not meant to be a chance for you to provide new or additional information. The Commission expects your response to the questionnaire to be complete and accurate.

Verification visits take several days. We will want to examine in detail your company's records in respect of the goods and will ask for copies of documents relating to the manufacture and sale of the goods. We will need to consult with your staff, particularly your financial controller (or accountant) and your domestic and export sales people. We may also need to see your factory, in which case we will need to consult with your operational managers.

After gathering the information we will prepare a report of the visit. We will provide you with a draft of the report and then respond to any questions you have. We will ask you to prepare a non-confidential copy of the report for the public record.

If you do not manufacture the goods

You may export but not produce or manufacture the goods (for example, you are a trading company, broker, or vendor dealing in the goods).

In such cases it is important that you forward a copy of this questionnaire to the relevant manufacturers **immediately**. You should also inform the investigation case officer of the contact details for these manufacturers.

You should complete those sections of the questionnaire that you are reasonably able to complete. If, for example, you are unable to supply details of production costs, you should clearly explain why the section does not apply to your company.

If you do not export the goods

Depending on the arrangement for sale of the goods to Australia through an intermediary, the Commission will have to determine who is the exporter of the goods for the purpose of this investigation.

In any case, information (such as cost of production data) supplied by the manufacturer will be relevant to establishing the normal value of the goods. In the absence of verified information, the Commission may use other available information. This information may result in a decision less favourable to your company.

Outline of information required by this questionnaire

Section A General information relating to your company including financial reports.

Section B A complete list of your company's exports to Australia over the investigation period.

Section C A list of goods sold on the domestic market of the country of export (like goods) that may be compared to the goods under consideration (the goods).

Section D A detailed list of all of your company's sales of like goods in your domestic market.

Section E Information to allow a fair comparison between export and domestic prices.

Section F Information in relation to your company's exports of like goods to countries other than Australia.

Section G Costs to make and sell, for exports to Australia and for the domestic market.

Section H Your declaration.

Section I A checklist.

Appendix 1 A glossary of terms used in this questionnaire

Some general instructions for preparing your response

- When answering the questionnaire please carefully read all instructions. The Commission requires a response to *all* sections of this questionnaire. Please provide an explanation if a question is not relevant to your situation.
- Answer questions in the order presented in the questionnaire. Please ensure that information submitted conforms to the requested format and is clearly labelled. Please repeat the question to which you are responding and place your answer below it.
- Identify source documents and advise where they are kept. During on-site verification you should be prepared to substantiate all the information you have submitted. Every part of the response should be traceable to company documents that are used in the ordinary course of business.
- We recommend that you retain all work sheets used in answering the questionnaire, in particular those linking the information supplied with management and accounting records. This will help us to verify the information.
- Clearly identify all units of measurement and currencies used. Apply the same measurement consistently throughout your response to the questionnaire.

Instructions on providing electronic data

- It is important that information is submitted in electronic format.
- Electronic data should be emailed or submitted on a CD-ROM, in IBM/MS-DOS format, or another operating system whose disk format is compatible with this MS-DOS version.
- The data must be created as spreadsheet files, preferably in Microsoft Excel, or alternatively in an Excel compatible format (for example, Excel can normally access data in Dbase or as an ASCII file).
- The Excel files must be compatible to the USA version.
- If you cannot present electronic data in the requested format contact the investigation case officer as soon as possible.

Further information

Before you respond to the questionnaire you should read all the documentation enclosed with this application including the applicant's non-confidential submission, the booklet *Australia's Anti-Dumping and Countervailing Administration* and the Anti-Dumping Notice notifying the initiation of the investigation. We also advise that you read the attached glossary of terms.

If you require further assistance, or you are having difficulties completing your submission, please contact the investigation case manager. The Commission will need to know the reasons.

SECTION A

COMPANY STRUCTURE AND OPERATIONS

This section requests information relating to company details and financial reports.

A-1 Identity and communication

Please nominate a person within your company who can be contacted for the purposes of this investigation:

Head Office:

Name: [REDACTED]
Position in the company:
Staff Deputy General Manager,
Export Planning & Coordination Sec.,
Sales Coordination & Operation Planning Dept.
Address: 2-3, Uchisaiwai-cho 2-chome, Chiyoda-ku, Tokyo 100-0011,
Japan
Telephone: +81-3-3597-3618
Facsimile number: +81-3-3597-3781
E-mail address of contact person: [REDACTED]

Name: [REDACTED]
Position in the company:
Staff Manager,
Export Planning & Coordination Sec.,
Sales Coordination & Operation Planning Dept.
Address: 2-3, Uchisaiwai-cho 2-chome, Chiyoda-ku, Tokyo 100-0011,
Japan
Telephone: +81-3-3597-4527
Facsimile number: +81-3-3597-3781
E-mail address of contact person: [REDACTED]

Factory: Please see Annex A-1 (Steel Plate Catalogue) P.2

Address:
Telephone:
Facsimile number:
E-mail address of contact person:

A-2 Representative of the company for the purpose of investigation

If you wish to appoint a representative to assist you in this investigation, provide the following details:

Name: [REDACTED]
Address: [REDACTED]
Telephone: [REDACTED]
Facsimile/Telex number:

E-mail address of contact person: [REDACTED]

Note that in nominating a representative, the Commission will assume that confidential material relating to your company in this investigation may be freely released to, or discussed with, that representative.

A-3 Company information

1. What is the legal name of your business? What kind of entity is it (e.g. company, partnership, sole trader)? Please provide details of any other business names that you use to export and/or sell goods.

Answer ;

JFE Steel is a company existing under the laws of Japan. Its legal name is JFE Steel Kabushiki Kaisha (in Japanese) or JFE Steel Corporation (in English) . JFE Steel has no other business names it uses to export or sell goods.

2. Who are the owners and/or principal shareholders? Provide details of shareholding percentages for joint owners and/or principal shareholders (list all shareholders able to cast, or control the casting of, 5% or more of the maximum amount of votes that could be cast at a general meeting of your company).

Answer;

JFE Holdings, Inc. ("JFE Holdings") owns 100% shares in JFE Steel.

3. If your company is a subsidiary of another company, list the principal shareholders of that company.

Answer;

Below are principal shareholders of JFE Holdings.

Shareholders Name	As of September 30, 2013 Shareholding ratio (%)
The Master Trust Bank of Japan, Ltd. (trust account)	7.46
Japan Trustee Services Bank, Ltd. (trust account)	5.35

4. If your parent company is a subsidiary of another company, list the principal shareholders of that company.

Answer;

Not applicable for reason of previous response.

5. Provide a diagram showing all associated or affiliated companies and your company's place within that corporate structure.

Answer;

Confidential Annex A-3,5 refers Outline of Subsidiaries and Affiliates

6. Are any management fees/corporate allocations charged to your company by your parent or related company?

Answer;

Management Fee is charged to JFE Steel by JFE Holdings

7. Describe the nature of your company's business. Explain whether you are a producer or manufacturer, distributor, trading company, etc.

Answer;

JFE Steel manufactures and sells steel products. JFE Steel is a manufacturer.

8. If your business does not perform all of the following functions in relation to the goods under consideration, then please provide names and addresses of the companies which perform each function:

- produce or manufacture
- sell in the domestic market
- export to Australia; and

- export to countries other than Australia.

Answer;

JFE Steel is a manufacturer of goods under consideration. JFE Steel sells such goods through trading companies to customers in the domestic market, as well as in Australia and other countries. With regard to the names and addresses of trading companies, please see confidential Annex A-3.8.

9. Provide your company's internal organisation chart. Describe the functions performed by each group within the organisation.

Answer ;

Please see Confidential Annex A-3.9 Organization Chart of JFE Steel Corporation

10. Provide a copy of your most recent annual report together with any relevant brochures or pamphlets on your business activities.

Answer; Annex A.1.1 refers, and-

Please see URL

<http://www.jfe-holdings.co.jp/en/investor/library/group-today/index.html>

A-4 General accounting/administration information

1. Indicate your accounting period.

Answer;

From April 1 to March 31 .

2. Indicate the address where the company's financial records are held.

Answer;

JFE Steel Corporation Head Office2-3,

Uchisaiwai-cho 2chome Chiyoda-Ku, Tokyo, Japan

3. Please provide the following financial documents for the two most recently completed financial years plus all subsequent monthly, quarterly or half yearly statements:

- chart of accounts;

Answer;

Please see Confidential Annex A-4-3-1 Chart of Accounts.

- audited consolidated and unconsolidated financial statements (including all footnotes and the auditor's opinion);

Answer;

Please see Confidential Annex A-4-3-2.

- internal financial statements, income statements (profit and loss reports), or management accounts, that are prepared and maintained in the normal course of business for the goods under consideration.

Answer;

Please see Confidential Annex A-4-3-2.

These documents should relate to:

- the division or section/s of your business responsible for the production and sale of the goods under consideration, and
- the company.

4. If you are not required to have the accounts audited, provide the unaudited financial statements for the two most recently completed financial years, together with your taxation returns. Any subsequent monthly, quarterly or half yearly statements should also be provided.

Answer;

N/A. JFE Steel (hereinafter referred to as “JFE”) is a subsidiary of JFE Holding which produces audited financials.

5. Do your accounting practices differ in any way from the generally accepted accounting principles in your country? If so, provide details.

Answer;

Financial accounting practices of JFE are in accordance with Japanese “GAAP” practices.

6. Describe:

The significant accounting policies that govern your system of accounting, in particular:

- the method of valuation for raw material, work-in-process, and finished goods inventories (e.g. last in first out (LIFO), first in first out (FIFO), weighted average);

Answer;

The method of valuation for raw material, work-in-process and finished goods inventories are the weighted-average method.

- costing methods, including the method (e.g. by tonnes, units, revenue, direct costs etc.) of allocating costs shared with other goods or processes (such as front office cost, infrastructure cost etc.);

Answer;

JFE uses Standard Cost Accounting to track the cost of various steel products. Standard costs are calculated by product based on the budgeted costs by cost centres and by cost items, Let us explain in detail at the Section G.

- valuation methods for damaged or sub-standard goods generated at the various stages of production;

Answer;

Please see Confidential Annex A-4.6.1.

- valuation methods for scrap, by products, or joint products;

Answer;

Please see Confidential Annex A-4.6.1.

- valuation and revaluation methods for fixed assets;

Answer;

Fixed assets are valued at the acquisition cost. JFE depreciates its assets in accordance with the Japanese Corporate Tax Law. JFE uses the straight-line method of depreciation for building (except affix to building) which were acquired on or after April 1 1998, and the declining method of depreciation for all others.

- average useful life for each class of production equipment and depreciation method and rate used for each;

Answer;

JFE's useful life in accordance with Japanese Corporate Tax Law for each class of assets is listed below.

Variety of equipment	Detail	Useful life (year)	Rate
Equipment for steel making	Equipment for surface treated steel or making iron powder, processing scrap.	5	

	Equipment for manufacturing high-grade iron, raw iron, base metal, ferroalloy, materials fabrication steel ,Cast iron pipe.	9	
	Other equipment	14	

- treatment of foreign exchange gains and losses arising from transactions;

Answer;

Response provided in official use version-commercially sensitive information;

- treatment of foreign exchange gains/losses arising from the translation of balance sheet items;

Answer;

Response provided in official use version-commercially sensitive information;

- inclusion of general expenses and/or interest;

Answer;

As for general expenses, please see Confidential Annex A-4.6.2

As for interest, equipment interest is calculated on book value and long-term rate. Inventory interest is calculated on inventory value and short-term rate. Credit interest is calculated on sales and short-term rate, being average credit period expressed as % of 365 days. Other interests are calculated by tonnes.

- provisions for bad or doubtful debts;

Answer;

As for normal debts, provisions are estimated based on the actual bad-debts ratio.

- expenses for idle equipment and/or plant shut-downs;

Answer;

Response is on official use version-commercially sensitive information;

- costs of plant closure;

Answer;

Answer to above question is on official use version;. Commercially sensitive information.

- restructuring costs;

Answer;

Answer to above question is on official use version-commercially sensitive information.

- by-products and scrap materials resulting from your company's production process; and

Answer;

Confidential Annex A-4.6.1 refers-commercially sensitive information

- effects of inflation on financial statement information.

Answer;

Japan has a low rate of inflation and therefore has not developed any accounting principles to deal with the effects of inflation of on financial statement information.

7. In the event that any of the accounting methods used by your company have changed over the last two years provide an explanation of the changes, the date of change, and the reasons for it.

Answer;

Following the 2011 Japanese tax reform, JFE adopted the depreciation method in compliance with the revised Corporation Tax Act for tangible fixed assets acquired after April 1, 2012

A-5 Income statement

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Please fill in the following table. It requires information concerning all products produced and for the goods under consideration (*'goods under consideration'* (the goods) is defined in the Glossary of Terms in the appendix to this form). You should explain how costs have been allocated.

	Most recent completed financial year (specify)		Investigation period	
	All products	Goods Under Consideration	All products	Goods Under Consideration
Gross Sales (1)				
Sales returns, rebates and discounts (2)				
Net Sales (3=1-2)				
Raw materials (4)				
Direct Labour (5)				
Depreciation (6)				
Manufacturing overheads (7)				
Other operating expenses (8)				
Total cost to make (9=4+5+6+7+8)				
OPERATING INCOME (10=3-9)				
Selling expenses (11)				
Administrative & general expenses (12)				
Financial expenses (13)				
SG&A expenses (14)=(11+12=13)				
INCOME FROM NORMAL ACTIVITIES (15)=(10-14)				
Interest income (16)				
Interest expense (enter as negative) (17)				
Extraordinary gains and Losses – enter losses as negative (18)				
Abnormal gains and losses –				

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enter losses as negative (19)				
PROFIT BEFORE TAX (20)=(15+16+17+18+19)				
Tax (21)				
NET PROFIT (22)=(20-21)				

Note: if your financial information does not permit you to present information in accordance with this table please present the information in a form that closely matches the table.

Prepare this information on a spreadsheet named "**Income statement**".

This information will be used to verify the completeness of cost data that you provide in Section G. If, because of your company's structure, the allocations would not be helpful in this process, please explain why this is the case.

Answer;

Confidential Annex A-5 provided as Income statement-commercially confidential data.

A-6 Sales

State your company's net turnover (after returns and all discounts), and free of duties and taxes. Use the currency in which your accounts are kept, in the following format:

	Most recent completed financial year (specify)		Investigation period	
	Volume	Value	Volume	Value
Total company turnover (all products)				
Domestic market				
Exports to Australia				
Exports to Other Countries				
Turnover of the nearest business unit, for which financial statements are prepared, which includes the goods under consideration				
Domestic market				
Exports to Australia				
Exports to Other Countries				
Turnover of the goods under consideration				
Domestic market				
Exports to Australia				
Exports to Other Countries				

Prepare this information in a spreadsheet named "**TURNOVER**".

This information will be used to verify the cost allocations to the goods under consideration in Section G.

Also, you should be prepared to demonstrate that sales data shown for the goods is a complete record by linking total sales of these goods to relevant financial statements.

Answer:

Confidential Annex A-6 Sales provided in official use version-commercially sensitive data..

SECTION B

SALES TO AUSTRALIA (EXPORT PRICE)

This section requests information concerning your export practices and prices to Australia. You should include costs incurred beyond ex-factory. Export prices are usually assessed at free-on-board (FOB) point, but the Commission may also compare prices at the ex-factory level.

*You should report prices of **all** goods under consideration (the goods) **shipped** to Australia during the investigation period.*

The invoice date will normally be taken to be the date of sale. If you consider:

the sale date is not the invoice date (see 'date of sale' column in question B4 below) and;

an alternative date should be used when comparing export and domestic prices

*you **must** provide information in section D on domestic selling prices for a matching period - even if doing so means that such domestic sales data predates the commencement of the investigation period.*

B-1 For each customer in Australia to whom you shipped goods in the investigation period list:

name;

address;

contact name and phone/fax number where known; and

trade level (for example: distributor, wholesaler, retailer, end user, original equipment).

Answer:

Confidential Annex B-1.refers-commercially sensitive information.

B-2 For each customer identified in B1 please provide the following information.

- (a) Describe how the goods are sent to each customer in Australia, including a diagram if required.

Answer;

Confidential Annex B-2.refers-commercially sensitive information.

- (b) Identify each party in the distribution chain and describe the functions performed by them. Where commissions are paid indicate whether it is a pre or post exportation expense having regard to the date of sale.

Answer;

Confidential Annex B-2 refers-commercially sensitive information..

- (c) Explain who retains ownership of the goods at each stage of the distribution chain. In the case of delivered duty paid (DDP) sales, explain who retains ownership when the goods enter Australia.

Answer;

For FOB/FAS contract, ownership of the goods is transferred from JFE to the trading companies at Japanese port.

No contracts of JFE are based on DDP basis.

- (d) Describe any agency or distributor agreements or other contracts entered into in relation to the Australian market (supply copy of the agreement if possible).

Answer;

JFE has no other agency or distributor agreements or other contracts in relation to Australian market.

- (e) Explain in detail the process by which you negotiate price, receive orders, deliver, invoice and receive payment. If export prices are based on price lists supply copies of those lists.

Answer;

Detailed outline has been provided in response on official use version including copy agreements being commercially sensitive information .

- (f) State whether your firm is related to any of its Australian customers. Give details of any financial or other arrangements (e.g. free goods, rebates, or promotional subsidies) with the customers in Australia (including parties representing either your firm or the customers).

Answer;

JFE is not related to any of its Australian customers.

- (g) Details of the forward orders of the goods under consideration (include quantities, values and scheduled shipping dates).

Answer;

Details provided on official use version-commercially sensitive information.

- B-3** Do your export selling prices vary according to the distribution channel identified? If so, provide details. Real differences in trade levels are characterised by consistent and distinct differences in functions and prices.

Answer;

Detailed outline provided on official use version-commercially sensitive information.

B-4 Prepare a spreadsheet named “**Australian sales**” listing all shipments (i.e. transaction by transaction) to Australia of the goods under consideration in the investigation period. You must provide this list in electronic format. Include the following export related information:

Column heading	Explanation
Customer name	names of your customers
Level of trade	the level of trade of your customers in Australia
Model/grade/type	commercial model/grade or type
Product code	code used in your records for the model/grade/type identified. Explain the product codes in your submission.
Invoice number	invoice number
Invoice date	invoice date
Date of sale	refer to the explanation at the beginning of this section. If you consider that a date <i>other than</i> the invoice date best establishes the material terms of sale, report that date. For example, order confirmation, contract, or purchase order date.
Order number	if applicable, show order confirmation, contract or purchase order number if you have shown a date other than invoice date as being the date of sale.
Shipping terms	Delivery terms e.g. CIF, C&F, FOB, DDP (in accordance with Incoterms)
Payment terms	agreed payment terms e.g. 60 days=60 etc.
Quantity	Quantity in units shown on the invoice. Show basis e.g. kg.
Gross invoice value	gross invoice value shown on invoice <i>in the currency of sale, excluding taxes.</i>
Discounts on the invoice	if applicable, the amount of any discount deducted on the invoice on each transaction. If a % discount applies show that % discount applying in another column.
Other charges	any other charges, or price reductions, that affect the net invoice value. Insert additional columns and provide a description.
Invoice currency	the currency used on the invoice
Exchange rate	Indicate the exchange rate used to convert the currency of the sale to the currency used in your accounting system
Net invoice value in the currency of the exporting country	the net invoice value expressed in your domestic currency as it is entered in your accounting system
Rebates or other allowances	the amount of any deferred rebates or allowances paid to the importer in the currency of sale
Quantity discounts	the actual amount of quantity discounts not deducted from the invoice. Show a separate column for each type of quantity discount.
Ocean freight**	the actual amount of ocean freight incurred on each export shipment listed.
Marine insurance	Amount of marine insurance
FOB export price**	the free on board price at the port of shipment.
Packing*	Packing expenses
Inland transportation	inland transportation costs included in the selling price. For export sales this is the inland freight from factory to port in the country of export.

costs*	
Handling, loading & ancillary expenses*	handling, loading & ancillary expenses. For example, terminal handling, export inspection, wharfage & other port charges, container tax, document fees & customs brokers fees, clearance fees, bank charges, letter of credit fees, & other ancillary charges incurred in the exporting country.
Warranty & guarantee expenses*	warranty & guarantee expenses
Technical assistance & other services*	expenses for after sale services, such as technical assistance or installation costs.
Commissions*	Commissions paid. If more than one type is paid insert additional columns of data. Indicate in your response to question B2 whether the commission is a pre or post exportation expense having regard to the date of sale.
Other factors*	any other costs, charges or expenses incurred in relation to the exports to Australia (include additional columns as required). See question B5.

** FOB export price and Ocean Freight:

FOB export price: An FOB export price must be calculated for each shipment - regardless of the shipping terms. FOB price includes inland transportation to the port of exportation, inland insurance, handling, and loading charges. It excludes post exportation expenses such as ocean freight and insurance. Use a formula to show the method of the calculation on each line of the export sales spreadsheet.

Ocean freight: as ocean freight is a significant cost it is important that the actual amount of ocean freight incurred on each exportation be reported. If estimates must be made you must explain the reasons and set out the basis - estimates must reflect changes in freight rates over the investigation period.

Freight allocations must be checked for consistency.

* All of these costs are further explained in section E-1.

Answer:

Confidential Attachment B-4 refers being commercially sensitive information.

- B-5** If there are any other costs, charges or expenses incurred in respect of the exports listed above which have not been identified in the table above, add a column (see “other factors” in question B-4) for each item, and provide a description of each item. For example, other selling expenses (direct or indirect) incurred in relation to the export sales to Australia.

Answer:

There are no other costs, charges or expenses incurred other than in Confidential Attachment B-4.

B-6 For each type of discount, rebate, allowance offered on export sales to Australia:

- provide a description; and
- explain the terms and conditions that must be met by the importer to obtain the discount.

Where the amounts of these discounts, rebates etc. are not identified on the sales invoice, explain how you calculated the amount shown in your response to question B4. If they vary by customer or level provide an explanation.

Answer:

There are no discounts, rebates and allowances on export sales.

B-7 If you have issued credit notes (directly or indirectly) to the customers in Australia, in relation to the invoices listed in the detailed transaction by transaction listing in response to question B4, provide details of each credit note if the credited amount has **not** been reported as a discount or rebate.

Answer:

We have not issued credit notes to the customers in Australia.

B-8 If the delivery terms make you responsible for arrival of the goods at an agreed point within Australia (e.g. DDP), insert additional columns in the spreadsheet for all other costs incurred. For example:

Import duties	Amount of import duty paid in Australia
Inland	Amount of inland transportation expenses within Australia

transport	included in the selling price
Other costs	Customs brokers, port and other costs incurred (itemise)

Answer;

JFE has no DDP sales to Australia.

B-9 Select two shipments, in different quarters of the investigation period, and provide a complete set of all of the documentation related to the export sale. For example:

- the importer's purchase order, order confirmation, and contract of sale;
- commercial invoice;
- bill of lading, export permit;
- freight invoices in relation to movement of the goods from factory to Australia, including inland freight contract;
- marine insurance expenses; and
- letter of credit, and bank documentation, proving payment.

The Commission will select additional shipments for payment verification at the time of the visit.

Answer;

Confidential Annex B-9-1 and B-9-2 (examples) provided in official use version and Confidential B-2-E2 (Order Flow) also attached to official use version, being commercially sensitive data and information.

Section C

EXPORTED GOODS & Like goods

- C-1** Fully describe all of the goods you have exported to Australia during the investigation period. Include specification details and any technical and illustrative material that may be helpful in identifying, or classifying, the exported goods.

Answer:

Confidential Annex C-1-1(Summary) refers; Annex C-1-2(Everhard Catalogue), C-1-3(Everhard SP Catalogue), C-1-4(Everhard C and LE Series Catalogue), C-1-5(HITEN Catalogue), and C-1-6(JFE Technical Report on LE Series) are supplied for Public Record version.

- C-2** List each type of goods exported to Australia (these types should cover all types listed in spreadsheet “**Australian sales**” – see section B of this questionnaire).

Answer:

Please see Confidential Annex C-1-1.

- C-3** If you sell like goods on the domestic market, for each type that your company has exported to Australia during the investigation period, list the most comparable model(s) sold domestically;
- and provide a detailed explanation of the differences where those goods sold domestically (i.e. the like goods – see explanation in glossary) are not identical to goods exported to Australia.

EXPORTED TYPE	DOMESTIC TYPE	IDENTICAL?	DIFFERENCES
Product code of each model of the goods exported to Australia	Product code of comparable model sold on the domestic	If goods are identical indicate	Where the good exported to Australia is not identical to the like

	market of the country of export	"YES". Otherwise "NO"	goods, describe the specification differences. If it is impractical to detail specification differences in this table refer to documents which outline differences
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Answer;

Please see below. For any general understandings, please refer Consideration Report P.14.

Specific details on dimensional and grade differences are provided on Confidential annexes C.3.1; C.3.2; and C.3.3., being commercially sensitive information.

EXPORTED TYPE	DOMESTIC TYPE	IDENTICAL?	DIFFERENCES
EVERHARD for Mining / Construction Machinery Equipment	EVERHARD for Construction Machinery Equipment	"YES"	EVERHARD for Australia is for Mining / Construction Machinery Equipment. Similar usage in Domestic market is for Construction Machinery Equipment ; Though, size of EVERHARD for Domestic Construction Machinery is smaller than Australia.
HITEN for Mining / Construction Machinery Equipment	HITEN for Construction Machinery Equipment	"YES"	HITEN for Australia is for Mining / Construction Machinery Equipment. Similar usage in Domestic market is for Construction Machinery Equipment ; Though, size of HITEN for Domestic Construction Machinery is smaller than Australia.
EVERHARD for Mining / Construction Machinery Equipment	EVERHARD for Crane and Special Cars	"NO"	EVERHARD for Australia is for Mining / Construction Machinery Equipment, which is totally different from crane and special

			car. Domestic Crane and Special Car usage has additional customer specification, which is different from Australia that is JFE standard specification. And sizes for Domestic Crane and Special car is smaller, especially main thickness is 6 mm.
HITEN for Mining / Constrution Machinery Equipment	HITEN for Crane and Special Cars	"NO"	HITEN for Australia is for Mining / Constrution Machinery Equipment, which is totally different from crane and special car. Domestic Crane and Special Car usage has additional customer specification, which is different from Australia that is JFE standard specification. And sizes for Domestic Crane and Special car is smaller, especially main thickness is 6 mm.
EVERHARD for Mining / Constrution Machinery Equipment	EVERHARD for industrial machine and others	"NO"	EVERHARD for Australia is for Mining / Constrution Machinery Equipment, which is totally different from industrial machine and others. Domestic industrial machine and others usage has additional customer specification, which is different from Australia that is JFE standard specification. And sizes for Domestic industrial machine and others is smaller, especially main length is 3 to 4m and width is 1401 to 1600mm.
HITEN for Mining / Constrution Machinery Equipment	HITEN for industrial machine and others	"NO"	HITEN for Australia is for Mining / Constrution Machinery Equipment,

			which is totally different from industrial machine and others. Domestic industrial machine and others usage has additional customer specification, which is different from Australia that is JFE standard specification. And sizes for Domestic industrial machine and others is smaller, especially main length is 3 to 4m and width is 1401 to 1600mm.
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- C-4** Please provide any technical and illustrative material that may be helpful in identifying or classifying the goods that your company sells on the domestic market.

Answer:

Confidential Annex C-4 (additional specification by customers) refers being commercially sensitive information...

Section D

Domestic sales

This section seeks information about the sales arrangements and prices in the domestic market of the country of export.

*All domestic sales made during the investigation period must be listed transaction by transaction. If there is an extraordinarily large volume of sales data and you are unable to provide the complete listing electronically you **must** contact the case officer **before** completing the questionnaire. If the case officer agrees that it is not possible to obtain a complete listing he or she will consider a method for sampling that meets the Commission requirements. If agreement cannot be reached as to the appropriate method the Commission may not visit your company.*

The Commission will normally take the invoice date as being the date of sale in order to determine which sales fall within the investigation period.

If, in response to question B4 (Sales to Australia, Export Price), you have reported that the date of sale is not the invoice date and you consider that this alternative date should be used when comparing domestic and export prices –

*you **must** provide information on domestic selling prices for a matching period - even if doing so means that such domestic sales data predates the commencement of the investigation period.*

If you do not have any domestic sales of like goods you must contact the case officer who will explain the information the Commission requires for determining a normal value using alternative methods.

D-1 Provide:

- a detailed description of your distribution channels to domestic customers, including a diagram if appropriate;
- information concerning the functions/activities performed by each party in the distribution chain; and

- a copy of any agency or distributor agreements, or contracts entered into.

If any of the customers listed are associated with your business, provide details of that association. Describe the effect, if any, that association has upon the price.

Answer

Detailed outline provided in official use version being commercially sensitive information..

- D-2** Do your domestic selling prices vary according to the distribution channel identified? If so, provide details. Real differences in trade levels are characterised by consistent and distinct differences in functions and prices.

Answer;

Response provided in official use version being commercially sensitive information.

- D-3** Explain in detail the sales process, including:

- the way in which you set the price, receive orders, make delivery, invoice and finally receive payment; and the terms of the sales; and
- whether price includes the cost of delivery to customer.

If sales are in accordance with price lists, provide copies of the price lists.

Answer;

JFE determines sales price after negotiation with customers.

Shipment triggers invoicing, and for all sales the date of shipment is recorded as the invoice date. It is at invoicing that JFE recognizes a sale in their records. More detailed outline on the order process

provided in official use version including copy agreements and order flow process being Confidential annex D.3.1 and D.3.2 being commercially sensitive information.

- D-4** Prepare a spreadsheet named “**domestic sales**” listing **all** sales of like goods made during the investigation period. The listing must be provided on a CD-ROM. Include all of the following information.

Column heading	Explanation
Customer name	names of your customers. If an English version of the name is not easily produced from your automated systems show a customer code number and in a separate table list each code and name.
Level of trade	the level of trade of your domestic customer
Model/grade/type	commercial model/grade or type of the goods
Product code	code used in your records for the model/grade/type of the goods identified. Explain the product codes in your submission.
Invoice number	invoice number
Invoice date	invoice date
Date of sale	refer to the explanation at the beginning of this section. If you consider that a date <i>other than</i> the invoice date best establishes the material terms of sale and should be used, report that date. For example, order confirmation, contract, or purchase order date.
Order number	show order confirmation, contract or purchase order number if you have shown a date other than invoice date as being the date of sale.
Delivery terms	e.g. ex-factory, free on truck, delivered into store
Payment terms	payment terms agreed with the customer e.g. 60 days=60 etc.
Quantity	quantity in units shown on the invoice e.g. kg.
Gross Invoice value	gross value shown on invoice <i>in the currency of sale</i> , net of taxes.
Discounts on the Invoice	the amount of any discount deducted on the invoice on each transaction. If a % discount applies show that % discount applying in another column.
Other charges	any other charges, or price reductions, that affect the net invoice value. Insert additional columns and provide description.
Net invoice value in the currency of the exporting country	the net invoice value expressed in your domestic currency as recorded in your accounting system
Rebates or other Allowances	the actual amount of any deferred rebates or allowances in the currency of sale
Quantity discounts	the actual amount of quantity discounts not deducted from the invoice. Show a separate column for each type of quantity discount.
Packing*	packing expenses
Inland transportation Costs*	amount of inland transportation costs included in the selling price.
Handling, loading And ancillary Expenses*	handling, loading & ancillary expenses.
Warranty & Guarantee expenses*	warranty & guarantee expenses
Technical assistance	expenses for after sale services such as technical assistance or

& other services*	installation costs.
Commissions*	commissions paid. If more than one type is paid insert additional columns of data.
Other factors*	any other costs, charges or expenses incurred in relation to the domestic sales (include additional columns as required). See question D5.

Costs marked with * are explained in section E-2.

Answer

Confidential Attachment D-4 provided on official use version being commercially sensitive data..

- D-5** If there are any other costs, charges or expenses incurred in respect of the sales listed which have not been identified in the table in question D-4 above add a column for each item (see "other factors"). For example, certain other selling expenses incurred.

Answer;

There are no other costs, charges or expenses incurred other than in Confidential Attachment D-4.

- D-6** For each type of commission, discount, rebate, allowance offered on domestic sales of like goods:
- provide a description; and
 - explain the terms and conditions that must be met by the customer to qualify for payment.

Where the amounts of these discounts, rebates etc. are not identified on the sales invoice, explain how you calculated the amounts shown in your response to question D4.

If you have issued credit notes, directly or indirectly to the customers, provide details if the credited amount has **not** been reported as a discount or rebate.

Answer;

Confidential Attachment D-4 refers.

- D-7** Select two domestic sales, in different quarters of the investigation period, that are at the same level of trade as the export sales. Provide a complete set of documentation for those two sales. Include, for example, purchase order, order acceptance, commercial invoice, discounts or rebates applicable, credit/debit notes, long or short term contract of sale, inland freight contract, bank documentation showing proof of payment.

The Commission will select additional sales for verification at the time of our visit.

Answer:

Confidential Annex D-7-1; D-7-2, and D-3-2(Order Flow) refer and are included in the official use version.

Section E

Fair comparison

Section B sought information about the export prices to Australia and Section D sought information about prices on your domestic market for like goods (i.e. the normal value).

Where the normal value and the export price are not comparable adjustments may be made. This section informs you of the fair comparison principle and asks you to quantify the amount of any adjustment.

As prices are being compared, the purpose of the adjustments is to eliminate factors that have unequally modified the prices to be compared.

To be able to quantify the level of any adjustment it will usually be necessary to examine cost differences between sales in different markets. The Commission must be satisfied that those costs are likely to have influenced price. In practice, this means that the expense item for which an adjustment is claimed should have a close nexus to the sale. For example, the cost is incurred because of the sale, or because the cost is related to the sale terms and conditions.

Conversely, where there is not a direct relationship between the expense item and the sale a greater burden is placed upon the claimant to demonstrate that prices have been affected, or are likely to have been affected, by the expense item. In the absence of such evidence the Commission may disallow the adjustment.

Where possible, the adjustment should be based upon actual costs incurred when making the relevant sales. However, if such specific expense information is unavailable cost allocations may be considered. In this case, the party making the adjustment claim must demonstrate that the allocation method reasonably estimates costs incurred.

A party seeking an adjustment has the obligation to substantiate the claim by relevant evidence that would allow a full analysis of the circumstances, and the accounting data, relating to the claim.

The investigation must be completed within strict time limits therefore you must supply information concerning claims for adjustments in a timely manner. Where an exporter has knowledge of the material substantiating an adjustment claim that material is to be available at the time of the verification visit. The Commission will not consider new claims made after the verification visit.

E-1 Costs associated with export sales

(These cost adjustments will relate to your responses made at question B-4, 'Australian sales')

1. Transportation

Explain how you have quantified the amount of inland transportation associated with the export sale ("**Inland transportation costs**"). Identify the general ledger account where the expense is located. If the amount has been determined from contractual arrangements, not from an account item, provide details and evidence of payment.

Answer:

Detailed response on how transport costs are tracked and accounted for is provided on official use version being commercially sensitive information.

2. Handling, loading and ancillary expenses

List all charges that are included in the export price and explain how they have been quantified (“**Handling, loading & ancillary expenses**”). Identify the general ledger account where the expenses are located. If the amounts have been determined using actual observations, not from a relevant account item, provide details.

The various export related ancillary costs are identified in the table at question B4, for example:

- terminal handling;
- wharfage and other port charges;
- container taxes;
- document fees and customs brokers fees;
- clearance fees;
- bank charges, letter of credit fees
- other ancillary charges.

Answer:

Detailed response provided on how this expense is accounted for being commercially sensitive information.

3. Credit

The cost of extending credit on export sales is not included in the amounts quantified at question B4. However, the Commission will examine whether a credit adjustment is warranted and determine the amount. Provide applicable interest rates over each month of the investigation period. Explain the nature of the interest rates most applicable to these export sales e.g., short term borrowing in the currency concerned.

If your accounts receivable shows that the average number of collection days differs from the payment terms shown in the sales listing, *and if* export prices are influenced by this longer or shorter period, calculate the average number of collection days. See also item 4 in section E-2 below.

Answer

N/A. Interest is not considered to be a significant factor. And short term interest rate is currently 0.13% per year.

4. Packing costs

List material and labour costs associated with packing the export product. Describe how the packing method differs from sales on the domestic market, for each model. Report the amount in the listing in the column headed **‘Packing’**.

Answer

N/A. Plates do not need packing.

5. Commissions

For any commissions paid in relation to the export sales to Australia:

- provide a description; and
- explain the terms and conditions that must be met.

Report the amount in the sales listing in question B-4 under the column headed **“Commissions”**. Identify the general ledger account where the expense is located.

Answer;

Official use version has details on selling arrangements and agreements which is commercially sensitive information..

6. Warranties, guarantees, and after sales services

List the costs incurred. Show relevant sales contracts. Show how you calculated the expenses (**“Warranty & guarantee expenses”** and **“Technical assistance & other services”**), including the basis of any allocations. Include a record of expenses incurred. Technical services include costs for the service, repair, or consultation. Where these expenses are closely related to the sales in question, an adjustment will be considered. Identify the ledger account where the expense is located.

Answer

There is no technical staff involvement for export to the Australian market.

Therefore there is no technical service expense :

7. Other factors

There may be other factors for which an adjustment is required if the costs affect price comparability – these are identified in the column headed “**Other factors**”. For example, other variable or fixed selling expenses, including salesmen’s salaries, salesmen’s travel expenses, advertising and promotion, samples and entertainment expenses. Your consideration of questions asked at Section G, concerning domestic and export costs, would have alerted you to such other factors.

Answer

Official use version has detailed response being Confidential annex E.1.7 and E.2.10 being commercially sensitive information.

8. Currency conversions

In comparing export and domestic prices a currency conversion is required. Fluctuations in exchange rates can only be taken into account when there has been a ‘sustained’ movement during the period of investigation (see article 2.4.1 of the WTO Agreement). The purpose is to allow exporters 60 days to adjust export prices to reflect ‘sustained’ movements. Such a claim requires detailed information on exchange movements in your country over a long period that includes the investigation period.

Answer

Treatment of exchange rates including actual rates applied are detailed in official use version being commercially sensitive information.

Date	Rate (yen/dollar)
Jan. 2013	
Feb. 2013	
Mar. 2013	
Apr. 2013	

May. 2013	
Jun. 2013	
Jul. 2013	
Aug. 2013	
Sep. 2013	
Oct. 2013	
Nov. 2013	
Dec. 2013	

E-2 Costs associated with domestic sales

(These cost adjustments will relate to your responses made at question D-4, “**domestic sales**”)

The following items are not separately identified in the amounts quantified at question D-4. However you should consider whether any are applicable.

1. **Physical characteristics**

The adjustment recognises that differences such as quality, chemical composition, structure or design, mean that goods are not identical and the differences can be quantified in order to ensure fair comparison.

The amount of the adjustment shall be based upon the market value of the difference, but where this is not possible the adjustment shall be based upon the difference in cost plus the gross profit mark-up (i.e. an amount for selling general and administrative costs (SG&A) plus profit).

The adjustment is based upon actual physical differences in the goods being compared and upon the manufacturing cost data. Identify the physical differences between each model. State the source of your data.

Answer:

Details on dimensional, volume differences provided on official use version and JFE is claiming due allowance based on those differences being commercially sensitive information.

2. Import charges and indirect taxes

If exports to Australia:

- are partially or fully exempt from internal taxes and duties that are borne by the like goods in domestic sales (or on the materials and components physically incorporated in the goods), or
- if such internal taxes and duties have been paid and are later remitted upon exportation to Australia;

the price of like goods must be adjusted downwards by the amount of the taxes and duties.

The taxes and duties include sales, excise, turnover, value added, franchise, stamp, transfer, border, and excise taxes. Direct taxes such as corporate income tax are not included as such taxes do not apply to the transactions.

Adjustment for drawback is not made in every situation where drawback has been received. Where an adjustment for drawback is appropriate you must provide information showing the import duty borne by the domestic sales. (That is, it is not sufficient to show the drawback amount and the export sales quantity to Australia. For example, you may calculate the duty borne on domestic sales by quantifying the total amount of import duty paid and subtracting the duty refunded on exports to all countries. The difference, when divided by the domestic sales volume, is the amount of the adjustment).

In substantiating the drawback claim the following information is required:

- a copy of the relevant statutes/regulations authorising duty exemption or remission, translated into English;

- the amount of the duties and taxes refunded upon *exportation* and an explanation how the amounts were calculated and apportioned to the exported goods;
- an explanation as to how you calculated the amount of duty payable on imported materials is borne by the goods sold *domestically* but is not borne by the exports to Australia;

Substitution drawback systems

Annex 3 of the WTO Agreement on Subsidies provides: *“Drawback systems can allow for the refund or drawback of import duties on inputs which are consumed in the production process of another product and where the export of this latter product contains domestic inputs having the same quality and characteristics as those substituted for the imported inputs”*

If such a scheme operates in the country of export adjustments can also be made for the drawback payable on the substituted domestic materials, provided the total amount of the drawback does not exceed the total duty paid.

Answer:

There is no provision for duty drawback on goods exported to Australia. JFE pays the gap of consumption tax that generated in the purchases and sales. JFE's financial statement and any annex don't include consumption tax.

Please see Confidential Annex E-2-2

3. Level of trade

Question D-4 asks you to indicate the level of trade to the domestic customer. To claim an adjustment for level of trade differences you will need to quantify the amount by which level of trade influences price.

Trade level is the level a company occupies in the distribution chain. The trade level to which that company in turn sells the goods and the functions carried out distinguish a level of trade. Examples are producer, national distributor, regional distributor, wholesaler, retailer, end user, and original equipment.

It may not be possible to compare export prices and domestic prices at the same level of trade. Where relevant sales of like goods at the next level of trade must be used to determine normal values an adjustment for the difference in level of trade may be required where it is shown that the difference affects price comparability.

The information needs to establish that there are real trade level differences, not merely nominal differences. Real trade level differences are characterised by a consistent pattern of price differences between the levels and by a difference in functions performed. If there is no real trade level differences all sales are treated as being at the same level of trade.

A real difference in level of trade (may be adjusted for using either of the following methods:

- (a) *costs arising from different functions*: the amount of the costs, expenses etc. incurred by the seller in domestic sales of the like goods resulting from activities that would not be performed were the domestic sales made at the same level as that of the importer.

This requires the following information:

- a detailed description of each sales activity performed in selling to your domestic customers (for example sales personnel, travel, advertising, entertainment etc.);
- the cost of carrying out these activities in respect of like goods;
- for each activity, whether your firm carries out the same activity when selling to importers in Australia;
- an explanation as to why you consider that you are entitled to a level of trade adjustment.

or

(b) *level discount*: the amount of the discount granted to purchasers who are at the same level of trade as the importer in Australia. This is determined by an examination of price differences between the two levels of trade in the exporter's domestic market, for example sales of like goods by other vendors or sales of the same general category of goods by the exporter. For this method to be used it is important that a clear pattern of pricing be established for the differing trade levels. Such pattern is demonstrated by a general availability of the discounts to the level - isolated instances would not establish a pattern of availability.

Answer;

Official use version has response on level of trade details being commercially sensitive information and is considered to be the basis for claiming due allowance for level of trade factors.

4. Credit

The cost of extending credit on domestic sales is not included in the amounts quantified at question D-4. However, the Commission will examine whether a credit adjustment is warranted and determine the amount. An adjustment for credit is to be made even if funds are not borrowed to finance the accounts receivable.

The interest rate on domestic sales in order of preference is:

- the rate, or average of rates, applying on actual short term borrowing's by the company; or
- the prime interest rate prevailing for commercial loans in the country for credit terms that most closely approximate the credit terms on which the sales were made; or
- such other rate considered appropriate in the circumstances.

Provide the applicable interest rate over each month of the investigation period.

Answer

JFE has used the prime rate of 0.13% at the first half of 2013.

If your accounts receivable shows that the average number of collection days differs from the payment terms shown in the sales listing, and if domestic prices are influenced by this longer or shorter period, calculate the average number of collection days.

Where there is no fixed credit period agreed at the time of sale the period of credit is determined on the facts available. For example, where payment is made using an open account system¹, the average credit period may be determined as follows:

1. *Calculate an accounts receivable turnover ratio*

This ratio equals the total credit sales divided by average accounts receivable. (It is a measure of how many times the average receivables balance is converted into cash during the year).

In calculating the accounts receivable turnover ratio, credit sales should be used in the numerator whenever the amount is available from the financial statements. Otherwise net sales revenue may be used in the numerator.

An average accounts receivable over the year is used in the denominator. This may be calculated by:

- using opening accounts receivable at beginning of period plus closing accounts receivable at end of period divided by 2, or
- total monthly receivables divided by 12.

2. *Calculate the average credit period*

¹ Under an open account system, following payment the balance of the amount owing is carried into the next period. Payment amounts may vary from one period to the next, with the result that the amount owing varies.

The average credit period equals 365 divided by the accounts receivable turnover ratio determined above at 1.

The resulting average credit period should be tested against randomly selected transactions to support the approximation.

Answer

JFE's resulting average credit period is about ■ days.

The following items are identified in the amounts quantified at question D-4:

5. Transportation

Explain how you have quantified the amount of inland transportation associated with the domestic sales ("**Inland transportation Costs**"). Identify the general ledger account where the expense is located. If the amount has been determined from contractual arrangements, not from an account item, provide details and evidence of payment.

Answer:

Confidential annex E.2.5 refers and the official use version has detailed outline on how this expense is tracked and accounted for being commercially sensitive information. JFE is claiming due allowance on this expense item.

6. Handling, loading and ancillary expenses

List all charges that are included in the domestic price and explain how they have been quantified ("**Handling, loading and ancillary Expenses**"). Identify the general ledger account where the expense is located. If the amounts have been determined using actual observations, not from a relevant account item, provide details.

Answer:

Official use version explains how this expense is accounted for.

7. Packing

List material and labour costs associated with packing the domestically sold product. Describe how the packing method differs from sales on the domestic market, for each model. Report the amount in the listing in the column headed “Packing”.

Answer:

N/A. Plates do not need packing.

8. Commissions

For any commissions paid in relation to the domestic sales:

- provide a description
- explain the terms and conditions that must be met.

Report the amount in the sales listing under the column headed “Commissions”. Identify the general ledger account where the expense is located.

Answer:

Official use version has details on commissions allowed being commercially sensitive information..

9. Warranties, guarantees, and after sales services

List the costs incurred. Show relevant sales contracts. Show how you calculated the expenses (“**Warranty & Guarantee expenses**” and “**Technical assistance & other services**”), including the basis of any allocations. Include a record of expenses incurred. Technical services include costs for the service, repair, or consultation. Where these expenses are closely related to the sales in question, an adjustment will be considered. Identify the ledger account where the expense is located.

Answer:

Detail on related expense is provided in official use version being commercially sensitive information and JFE consider this expense to be a due allowance.

10. Other factors

There may be other factors for which an adjustment is required if the costs affect price comparability – these are identified in the column headed “**Other factors**”. List the factors and show how each has been quantified in per unit terms. For example:

- *inventory carrying cost*: describe how the products are stored prior to sale and show data relating to the average length of time in inventory. Indicate the interest rate used;
- *warehousing expense*: an expense incurred at the distribution point;
- *royalty and patent fees*: describe each payment as a result of production or sale, including the key terms of the agreement;
- *advertising*; and
- *bad debt*.

Answer:

Confidential annex E.1.7 and E.2.10 provided in official use version refer and JFE consider the related expense to be a due allowance..

E-3 Duplication

In calculating the amount of the adjustments you must ensure that there is no duplication.

For example:

- adjustments for level of trade, quantity or other discounts may overlap, or
- calculation of the amount of the difference for level of trade may be based upon selling expenses such as salesperson’s salaries, promotion expenses, commissions, and travel expenses.

Separate adjustment items must avoid duplication.

An adjustment for quantities may not be granted unless the effect on prices for quantity differences is identified and separated from the effect on prices for level of trade differences.

Answer;

No intentional duplication on expenses and claimed due allowances.

Section F

Export sales to countries other than Australia (third country sales)

Your response to this part of the questionnaire may be used by the Commission to select sales to a third country that may be suitable for comparison with exports to Australia.

Sales to third countries may be used as the basis for normal value in certain circumstances. The Commission may seek more detailed information on particular third country sales where such sales are likely to be used as the basis for determining normal value.

F-1 Using the column names and column descriptions below provide a summary of your export sales to countries other than Australia.

Column heading	Explanation
Country	Name of the country that you exported like goods to over the investigation period.
Number of customers	The number of different customers that your company has sold like goods to in the third country over the investigation period.
Level of trade	The level of trade that you export like goods to in the third country.
Quantity	Indicate quantity, in units, exported to the third country over the investigation period.
Unit of quantity	Show unit of quantity e.g. kg
Value of sales	Show net sales value to all customers in third country over the investigation period
Currency	Currency in which you have expressed data in column SALES
Payment terms	Typical payment terms with customer(s) in the country e.g. 60 days=60 etc.
Shipment terms	Typical shipment terms to customers in the third country e.g. CIF, FOB, ex-factory, DDP etc.

Supply this information in spreadsheet file named **“Third country”**

Answer:

Confidential Attachment F-1 refers being commercially sensitive information.

F-2 Please identify any differences in sales to third countries which may affect their comparison to export sales to Australia.

Answer:

Sales to Australian customers are substantially high priced and comprise a relatively bigger volume on a per customer basis.

Section G

Costing information and constructed value

The information that you supply in response to this section of the questionnaire will be used for various purposes including:

- testing the profitability of sales of like goods on the domestic market;*
- determining a constructed normal value of the goods under consideration (the goods) - i.e. of the goods exported to Australia; and*
- making certain adjustments to the normal value.*

You will need to provide the cost of production of both the exported goods (the goods) and for the like goods sold on the domestic market. You will also need to provide the selling, general, and administration costs relating to goods sold on the domestic market; the finance expenses; and any other expenses (e.g. non-operating expenses not included elsewhere) associated with the goods.

In your response please include a worksheet showing how the selling, general, and administration expenses; the finance expenses; and any other expenses have been calculated.

If, in response to question B4 (Sales to Australia, Export Price) you:

- reported that the date of sale is not the invoice date and consider that this alternative date should be used when comparing domestic and export prices, and*
- provided information on domestic selling prices for a matching period as required in the introduction to Section D (Domestic Sales)*

you must provide cost data over the same period as these sales even if doing so means that such cost data predates the commencement of the investigation period.

At any verification meeting you must be prepared to reconcile the costs shown to the accounting records used to prepare the financial statements.

G-1. Production process and capacity

1. Describe the production process for the goods. Provide a flowchart of the process. Include details of all products manufactured using the same production facilities as those used for the goods. Also specify all scrap or by-products that result from producing the goods.

Answer;

Confidential Annex G-1 refers.

G-2. Provide information about your company's total production in the following table:

	PREVIOUS FINANCIAL YEAR	MOST RECENT FINANCIAL YEAR	Investigation Period
A – Production capacity (e.g. kg, tonnes)*			
B – Actual production in volume (e.g. kg, tonnes)			
C – Capacity utilisation (%) (B/A x 100)			

* rather than showing a 'name-plate' optimal capacity it is more meaningful to show the maximum level of production that may reasonably be attained under normal operating conditions. For example assuming: normal levels of maintenance and repair; a number of shifts and hours of operation that is not abnormally high; and a typical production mix.

Provide this information on a spreadsheet named "**Production**".

Answer:

Confidential Annex G-2 refers.

G-3. Cost accounting practices

1. Outline the management accounting system that you maintain and explain how that cost accounting information is reconciled to your audited financial statements.

Answer.

JFE Steel has provided a flowchart and outline of the functions of its cost accounting system in Annex G-3.1 JFE Steel employs a standard cost accounting system with product costs calculated on a process cost basis. The cost accounting system draws cost and production information from other database system. Production information from the Monthly Production Report as described in Annex G-3.1 In addition, the cost accounting system draws cost and consumption volume information from the following system.

- Raw Materials System for raw material cost/expenses,
- Personnel/labour System for labour cost,
- Energy System for energy consumption volume record by department,
- Procurement System for material cost/expenses,
- Subcontract System for subcontract expenses, and
- Fixed asset System for depreciation

The cost accounting system reconciles to the monthly financial statement data through the calculation of the cost of sales and inventory values. For example, Sales data from “Collecting Receivables System” is fed to the Cost Accounting System and the standard cost of sales is delivered from the sales quantity and standard unit cost. The total standard cost of sales plus all cost variances is the total cost of sales.

- 2 Is your company's cost accounting system based on standard (budgeted) costs? State whether standard costs were used in your responses to this questionnaire. If they were state whether all variances (i.e. differences between standard and actual production costs) have been allocated to the goods - and describe how those variances have been allocated.

Answer;

Yes. JFE's cost accounting system is based on standard (budgeted) costs. Standard costs are used in our responses to this questionnaire and all variances have been fully allocated to all products based on the ratio of standard cost value by product. The ratios are calculated by Works. Confidential Annexes G-3-2-1, G-3-2-2 and G-3-2-3.refer.

- 3 Provide details of any significant or unusual cost variances that occurred during the investigation period.

Answer;

N/A (There is no significant or unusual cost variances that occurred during the investigation period.)

- 4 Describe the profit/cost centres in your company's cost accounting system.

Answer;

Please see Confidential Annex G-3-4.

- 5 For each profit/cost centre describe in detail the methods that your company normally uses to allocate costs to the goods under consideration. In particular specify how, and over what period, expenses are amortised or depreciated, and how allowances are made for capital expenditures and other development costs.

Answer;

Detailed outline provided in official use version being commercially sensitive information..

- 6 Describe the level of product specificity (models, grades etc.) that your company's cost accounting system records production costs.

Answer:

Our company's cost accounting and product specificity unites are at the nine digit level. Confidential Annex G-6.refers

- 7 List and explain all production costs incurred by your company which are valued differently for cost accounting purposes than for financial accounting purposes.

Answer:

N/A

There are no costs which are valued differently for cost accounting purposes than for financial accounting purposes

- 8 State whether your company engaged in any start-up operations in relation to the goods under consideration. Describe in detail the start-up operation giving dates (actual or projected) of each stage of the start-up operation.

Answer:

JFE is not engaged in any start-up operation in relation to the goods under consideration.

- 9 State the total cost of the start-up operation and the way that your company has treated the costs of the start-up operation in its accounting records.

Answer:

Refer response to above question

- G-4 Cost to make and sell on domestic market

This information is relevant to testing whether domestic sales are in the ordinary course of trade.²

1. Please provide (in the format shown in the table below) the actual unit cost to make and sell each model/type* (identified in section C) of the like goods sold on the domestic market. Provide this cost data for each quarter over the investigation period. If your company calculates costs monthly, provide monthly costs.
2. Indicate the source of cost information (account numbers etc.) and/or methods used to allocate cost to the goods. Provide documentation and worksheets supporting your calculations.

Answer:

Please see Confidential Annex G-4 “Domestic CTMS”, and Confidential Annex G-4-1 ,and Confidential Annex G-3-2-3 and Confidential Annex G-4 “SGA & Financial Cost “are vouchers of it being commercially sensitive data.

	Quarter X	Quarter X	Quarter X	Quarter X
Like Domestic Model/Type – from spreadsheet LIKEGOOD				
Material Costs ¹				
Direct Labour				
Manufacturing Overheads				
Other Costs ²				
Total Cost to Make				
Selling Costs				
Administration Costs				
Financial Costs				
Delivery Expenses ³				

² The Commission applies the tests set out in s.269TAAD of the Customs Act 1901 to determine whether goods are in ordinary course of trade. These provisions reflect the WTO anti-dumping agreement – see Article 2.2.1.

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Other Costs ³				
Unit Cost to Make and Sell				

Prepare this information in a spreadsheet named "**Domestic CTMS**".

¹ Identify each cost separately. Include indirect material costs as a separate item only if not included in manufacturing overheads.

² Relating to costs of production only; identify each cost separately.

³ Identify each cost separately. Please ensure non-operating expenses **that relate to the goods under consideration** are included. Where gains/losses due to foreign currency exchange are incurred, please provide detail of the amounts separately for transaction and translation gains/losses.

Provide this information for each quarter (or month if your company calculates costs on a monthly basis) over the period of the investigation.

Provide the information broken down into fixed and variable costs, and indicate the % total cost represented by fixed costs.

If you are unable to supply this information in this format, please contact the case officer for this investigation at the address shown on the cover of this questionnaire.

Please specify unit of currency.

G-5 Cost to make and sell goods under consideration (goods exported to Australia)

The information is relevant to calculating the normal values based on costs. It is also relevant to calculating certain adjustments to the normal value.

	Quarter X	Quarter X	Quarter X	Quarter X
Model/Type exported to Australia – from spreadsheet LIKEGOOD				
Material Costs ¹				
Direct Labour				
Manufacturing Overheads				
Other Costs ²				
Total Cost to Make				
Selling Costs				
Administration Costs				
Financial Costs				
Delivery Expenses ³				
Other Costs ³				
Unit Cost to Make and Sell				

Prepare this information in a spreadsheet named "**Australian CTMS**".

Answer;

Please see Confidential Annex G-5 “Australian CTMS”. And Confidential Annex G-3-2-3 and Confidential Annex G-4 “SGA & Financial Cost” and Confidential Annex G-4-1 are vouchers of it, being commercially sensitive information.

¹ Identify each cost separately. Include indirect material costs as a separate item only if not included in manufacturing overheads.

² Relating to costs of production only; identify each cost separately.

³ Identify each cost separately. Please ensure non-operating expenses **that relate to the goods** are included. Where gains/losses due to foreign currency exchange are incurred, please provide detail of the amounts separately for transaction and translation gains/losses.

Provide this information for each quarter (or month if your company calculates costs on a monthly basis) over the period of the investigation.

Provide the information broken down into fixed and variable costs, and indicate the % total cost represented by fixed costs.

If you are unable to supply this information in this format, please contact the case officer for this investigation at the address shown on the cover of this questionnaire.

Please specify unit of currency.

- 1 Where there are cost differences between goods sold to the domestic market and those sold for export, give reasons and supporting evidence for these differences.

Answer:

Confidential annex G.3.2.3 refers and conclusion is provided in official use version being commercially sensitive information.

- 2 Give details and an explanation of any significant differences between the costs shown, and the costs as normally determined in accordance with your general accounting system. Reference should be made to any differences arising from movements in inventory levels and variances arising under standard costing methods.

Answer:

N/A(There is no significant differences). .

- 3 In calculating the unit cost to make and sell, provide an explanation if the allocation method used (e.g. number, or weight etc.) to determine the unit cost differs from the prior practice of your company.

Answer;

The allocation method used to determine the unit cost doesn't differ from the prior practice of our company.

G-6 Major raw material costs

List major raw material costs, which individually account for 10% or more of the total production cost.

Purchase Price

Major raw material	Million Yen
Iron	
Coal	
Total	

Term: Investigato in Period

For these major inputs:

- identify materials sourced in-house and from associated entities;
- identify the supplier; and

Supplier	Million Yen
Total	

- show the basis of valuing the major raw materials in the costs of production you have shown for the goods (e.g. market prices, transfer prices, or actual cost of production).

Answer;

The basis of valuing the major raw materials is Market prices
--

Where the major input is produced by an associate of your company the Commission will compare your purchase price to a normal market price. If the associate provides information on the cost of production for that input such cost data may also be considered.

Normal market price is taken to be the price normally available in the market (having regard to market size, whether the input is normally purchased at 'spot prices' or under long term contracts etc.).

The term associate is defined in section 269TAA of the *Customs Act*. Included in that definition are companies controlled by the same parent company (a company that controls 5% or more of the shares of another is taken to be an associated company); companies controlled by the other company; and companies having the same person in the board of directors.

Important note: If the major input is sourced as part of an integrated production process you should provide detailed information on the full costs of production of that input.

Section H

Exporter's declaration

☐ I hereby declare that...JFE Steel Corporation.....
did, during the period of investigation export the goods under
consideration and have completed the attached questionnaire and,
having made due inquiry, certify that the information contained in this
submission is complete and correct to the best of my knowledge and
belief.

☐ I hereby declare that..... (company)
did not, during the period of investigation, export the goods under
consideration and therefore have not completed the attached
questionnaire.

Name : 

Signature :

Position in

**Company : Staff Deputy General Manager, Export
Planning & Coordination Sec., Sales Coordination &
Operation Planning Dept.**

Date :

Section I

Checklist

This section is an aid to ensure that you have completed all sections of this questionnaire.

Section	Please tick if you have responded to all questions
Section A – general information	☐
Section B – export price	☐
Section C – like goods	☐
Section D – domestic price	☐
Section E – fair comparison	☐
Section F – exports to third countries	☐
Section G – costing information	☐
Section H – declaration	☐

Electronic Data	Please tick if you have provided spreadsheet
INCOME STATEMENT	☐
TURNOVER – sales summary	☐
AUSTRALIAN SALES – list of sales to Australia	☐
DOMESTIC SALES – list of all domestic sales of like goods	☐
THIRD COUNTRY – third country sales	☐
PRODUCTION – production figures	☐
DOMESTIC COSTS – costs of goods sold domestically	☐
AUSTRALIAN COSTS – costs of goods sold to Australia	☐

Appendix

Glossary of terms

This glossary is intended to provide you with a basic understanding of technical terms that appear in the questionnaire.

Adjustments

To enable a fair comparison between the export price and the normal value Australian legislation provides for the adjustment of the domestic price paid for like goods. Adjustments are made to account for sales occurring at different times, specification differences, and differences in the terms or circumstances of the sales. The adjustment to the normal value may be upward or downward. Areas where you believe an adjustment is necessary should be identified. Section E of the questionnaire refers.

Examples of adjustments that may be made include: *sales occurring at different times* (it is sometimes necessary to compare domestic and export sales made at different times - in these circumstances an adjustment may be made to reflect price movements during that time); *specification differences; packaging; taxes; level of trade; advertising; servicing/warranty; inland freight; warehousing; export charges; credit terms; duty drawback; commissions.*

Adjustments may also be required where the normal value is based upon costs to make and sell.

Arms length

Sales are not considered to be at "arms length" on your domestic market if there is any consideration payable for the goods other than their price, or there is an association between the buyer and the seller which affects the price, or there will be a reimbursement, compensation or benefit for, or in respect of, the price.

Constructed value

In cases where domestic prices paid for the goods under consideration in the country of export cannot be used for the determination of normal value, i.e. when there are no or insufficient sales or where such sales were not made in the ordinary course of trade, normal value may be based on a constructed value. Constructed value is calculated on the basis of the cost of production of the goods under consideration plus a reasonable amount for selling, general and administration costs, and for profits, that are associated with sales on the domestic market of the country of export.

Cost of production/manufacturing

The cost of production or manufacture consists of all manufacturing costs associated with the goods. It is the sum of direct materials, direct labour and factory overheads.

Cost to make and sell

The cost to make and sell is the sum of the cost of production or manufacture, and the selling, general and administration costs associated with the sale of those goods.

Country of origin

The country in which the last significant process in the manufacture or production of the goods was performed.

Date of sale

The Commission will normally use the invoice date as recorded in the exporter or producer's records. Another date may be used if this better reflects the material terms of sale. The questionnaire directs attention to matching data sets of domestic and export sales where some other date is used, as well as matching cost information.

Direct labour cost

Direct labour is categorised as a variable cost, i.e. the value varies with the level of production.

Dumping

Dumping occurs when the products of one country are exported to another country at a price less than their normal value.

Dumping margin

Where the export price is less than the normal value the dumping margin is the amount of the difference. It can be expressed as a value or as a percentage of the export price.

Export price

The export price of the goods is usually the price paid or payable to the exporter in arms length transactions, in most instances calculated at the free-on-board (FOB) level.

Exporting country

The country of export is normally the country of origin from which the goods are shipped. The country of export may be an intermediate country, except where the products are merely transhipped through that country, or the products concerned are not produced in that country, and there is no comparable price in that country.

Factory overheads

Factory overheads consist of variable costs e.g. power, supplies, indirect labour and fixed costs e.g. factory rent, factory insurance, factory depreciation etc.

Goods under consideration (the goods)

The goods to which the application for anti-dumping action relates. That is, the goods that you have exported to Australia allegedly at dumped prices.

Incoterms

The following abbreviations are commonly used (comment is provided concerning costs that are normally borne by the seller):

EXW	ex works (the seller's minimum obligation as costs relate to goods being made available at the sellers premises)
FCA	free carrier (main carriage not paid by seller. Pay costs until such time that the goods have been delivered at the named point into custody of a carrier named by the seller. Customs formalities, taxes etc. paid if required)
FAS	free alongside ship (main carriage not paid by seller. Deliver the goods alongside the ship)

FOB	free on board (main carriage not paid by seller. Deliver the goods on board, provide export clearance if required, pay loading costs to the point the goods have passed the ship's rail, pay customs formalities, taxes etc. payable upon exportation)
CFR	cost and freight (main carriage paid by seller. Pay all costs until delivered as well as freight, loading and unloading, pay customs formalities, taxes etc. payable upon exportation)
CIF	cost, insurance and freight (main carriage paid by seller. Pay all costs as under CFR as well as marine insurance) the terms CFR and CIF are only used where goods are carried by sea or waterway transport
CPT	carriage paid to
CIP	carriage and insurance paid to the terms CPT and CIP are used as alternatives to CFR and CIF where the goods are carried by air, road, rail etc.
DAF	delivered at frontier (goods carried by rail or road and cleared for export at the named place at the frontier. Pay costs until delivered at the frontier plus any discharge costs incurred to place the goods at the customer's disposal)
DES	delivered ex ship (goods made available to the buyer on board the ship uncleared for import at the named port of destination. Pay all costs incurred in placed at the disposal of the buyer, pay customs formalities, taxes etc. payable upon exportation, and where necessary for transit through another country)
DDU	delivered duty unpaid (pay all costs for carriage to the agreed point, pay customs formalities, taxes etc. payable upon exportation, and where necessary for transit through another country)
DDP	delivered duty paid (goods made available at the named place in the country of importation – all risks and costs being incurred by the seller including duties, taxes etc. incurred upon importation)

Investigation period

A period defined by the Commission over which importations of the goods are examined.

Like goods

Like goods are goods sold on the domestic market of the country of export (or to a third country) that are identical in all respects to the goods under consideration or that, although not alike in all respects have characteristics closely resembling those of the goods under consideration. The term 'like goods' also refers to the goods produced by the Australian industry allegedly being injured by dumped imports.

Normal value

Australian legislation sets out several ways to assess "normal value".

The preferred method is to use the price paid for like goods sold for domestic consumption in the country of export. Usually, these sales are made by you, but there may be circumstances where it is appropriate to use sales made by other sellers on the domestic market.

Sale prices must be at arms length and in the ordinary course of trade. In the absence of relevant or suitable domestic sales, the normal value may be determined by constructing a price based upon all costs to make and sell the goods. Profit may also be included if the sales on the domestic market are profitable. Alternatively the normal value may be ascertained using the price paid for like goods sold in the ordinary course of trade at arms length to customers in a country other than Australia, however this option is rarely used.

Finally, when a normal value cannot be ascertained by any of the above methods, or if no information is provided, the Commission will determine the normal value by considering all the relevant information, including the applicant's information. This allows the applicant's information to be used where sufficient information has not been furnished or is not available.

Where domestic price generally, and the trade of the exporting country are determined or substantially influenced by the government of the exporting country, an alternative/surrogate market economy is selected by the Commission and the normal value is determined as if the surrogate country were the export source.

Ordinary course of trade

Testing for "ordinary course of trade" includes a comparison of the selling price and the unit cost to make and sell for the same period. If sales in respect of a substantial quantity of goods over an extended period of time, usually 12 months, do not recover all costs and these losses are not likely to be recovered within a reasonable period of time, (again usually 12 months) then the sales are regarded as being not in the ordinary course of trade.

There may be circumstances where it is appropriate to use a period other than 12 months in assessing whether sales are in the ordinary course of trade.

Unprofitable sales are to be taken to have occurred in substantial quantities during an extended period where the unprofitable sales amount to 20% or more of the total volume of sales of the goods by the exporter over the period. An extended period of time is usually taken to be a period not less than 12 months. Where unprofitable sales are rejected, normal value is based upon remaining profitable sales provided they occur in sufficient number. Where all sales have been made at a loss, or profitable sales are insufficient, the normal value may be constructed from costs to make and sell.

Selling, general and administration expenses (SG&A)

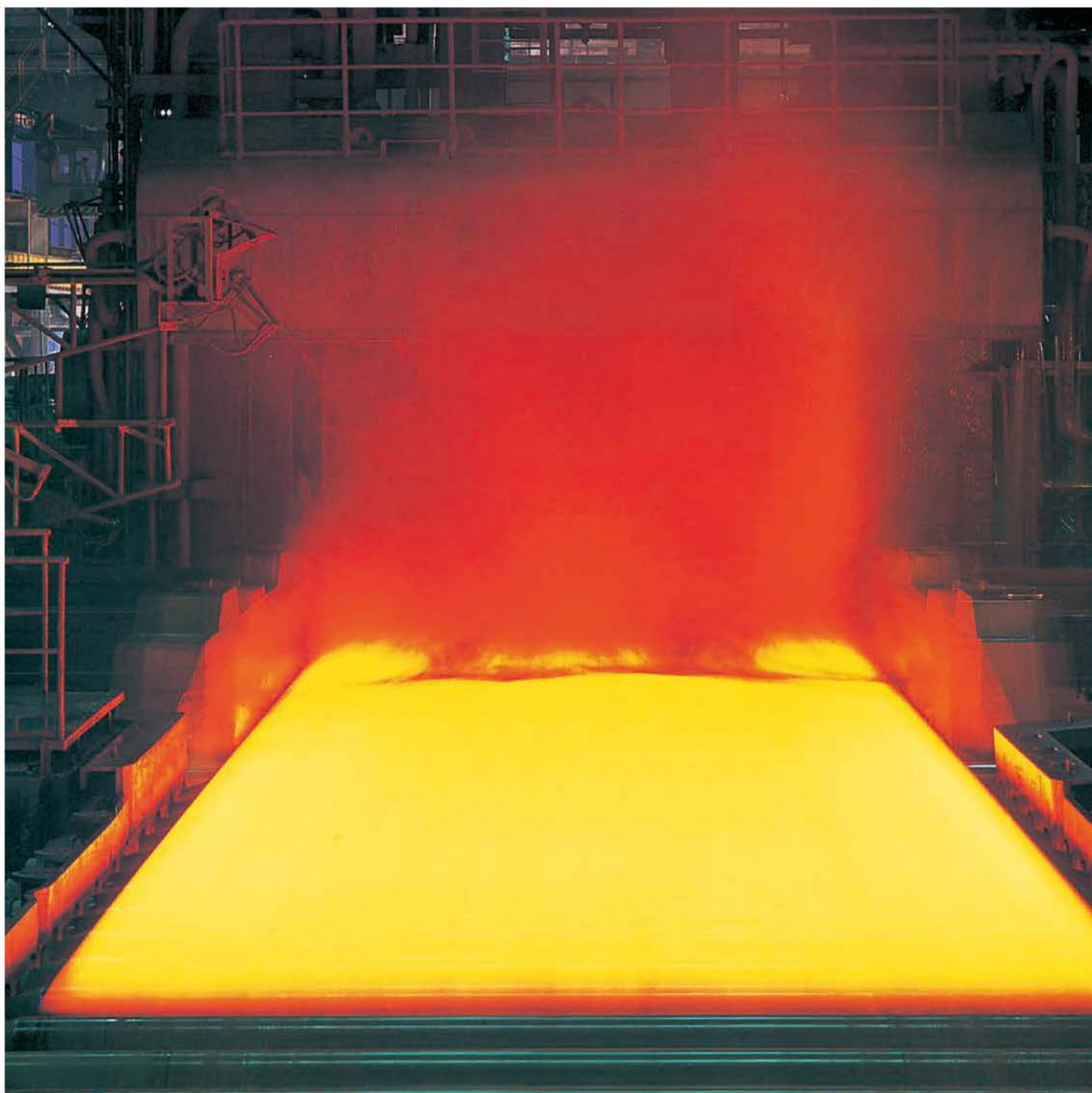
The selling, general and administration expenses includes all selling, distribution, general and administration expenses including finance costs that would be incurred if the goods were sold for domestic consumption in the country of export. The amounts are determined in each case using all the available information and may include expenses incurred in:

- . domestic sales of like goods;

- . sale of goods of the same general category by the exporter; or
- . sales in the industry in the country of export.

The expenses must, however, reflect the selling, general and administration costs of the goods. Administrative and selling expenses include: director's fees, management salaries and benefits, office salaries and benefits, office supplies, insurance, promotion, entertainment, depreciation and corporate overheads.

STEEL PLATE



JFE Steel Corporation



JFE Steel Co. has exerted the utmost effort to supply high-quality steel plates in response to customer's requirements throughout a history of more than 90 years. JFE Steel is continuously improving its production equipment, expanding product types, and intensifying quality control.

JFE Steel has 3 world-leading plate mills; they are East Japan Works (Keihin), West Japan Works (Kurashiki), and West Japan Works (Fukuyama). Manufacturing various kinds of steel plate products with the maximum width of 5,350mm (one of the largest-in-the-world), and the maximum thickness of 360mm, JFE has responded to the requirements of domestic and overseas customers.

A state-of-the-art, 4-high plate mill, was followed by the installation of a series of new facilities such as a modern heat-treatment facility, a ladle-refining station, and an on-line accelerated cooling system. These investments have permitted JFE Steel to maintain the world's highest technological level in steel plate production.

Being the first in Japan to adopt a computer-aided plate production system consistently from order to shipment, JFE Steel has gained high reliance of the customer by controlling all plate manufacturing processes completely.

With the expansion of products, a wide variety of steel plates are now being produced and marketed in addition to ordinary carbon steel plates. These include high-tensile strength steel plates with a tensile strength up to 980N/mm², steel plates for low-temperature uses, steel plates for boilers and pressure vessels, Ni type high atmospheric corrosion resistant steel plates, abrasion resistant steel plates, stainless steel plates and various types of clad steel plates. JFE Steel's high-quality steel plates are always available to meet the customers' needs.



East Japan Works (Keihin)



West Japan Works (Kurashiki)



West Japan Works (Fukuyama)

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JFE'S STEEL PLATES

1 The world's largest class steel plates are available.

Max. thickness 360mm, Max. length 27,000mm, Max width 5,350mm, Max. mass 70 tons.

2 High quality products and a wide range of types are available.

JFE's steel plates are supported by world leading technologies and extensive experience. In addition to producing plates specified by domestic and overseas industrial standards, JFE Steel produces a wide variety of unique steel plates.

These include high-tensile strength steel plates, steel plates for low-temperature use, atmospheric corrosion resistant steel plates, abrasion resistant steel plates, corrosion resistant steel plates in various corrosive environments, stainless steel plates and clad steel plates with various cladding materials.

3 The newest controlled rolling and on-line accelerated cooling technology.

JFE Steel has adopted powerful rolling machines for controlled rolling and highly efficient on-line accelerated cooling facilities, and developed world leading TMCP technology.

JFE Steel produces and supplies sophisticated high strength steel plates with high toughness and good weldability through TMCP technology. These products are widely applied in various fields focusing on ships, bridges and building.

4 The surface appearance is excellent.

Slabs are thoroughly cleaned before rolling, and scale is completely removed by high-pressure water jets during rolling. These operations produce rolled plates with clean and attractive surfaces. Heat treatment is performed in oxygen-free atmosphere where plates free from scale are produced.

5 Excellent dimensional accuracy and uniformity

JFE Steel produces steel plates by computer-controlled plate mills providing plates with excellent dimensional accuracy and uniformity.

JFE Steel adopts world leading technology to minimize plate crown and variation of thickness along the longitudinal direction, and succeeds in achieving optimum rolled shape.

6 Optimum delivery control

JFE Steel has extensive computer control systems from order receipt to shipment. Order information from the customer is exactly inputted to each production process, enabling products to be delivered meeting requirements correctly and with minimum lead time.

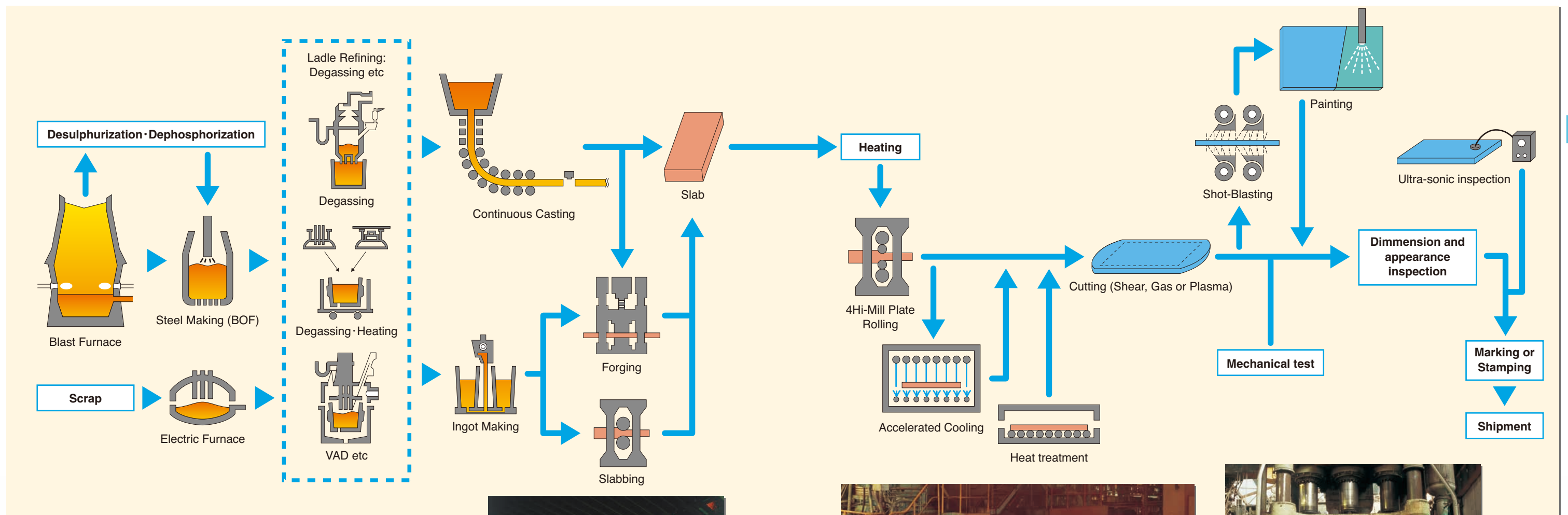
MANUFACTURING SHOPS AND MAJOR EQUIPMENT

Facility		Keihin	Kurashiki	Fukuyama
Blast furnace		1 unit	3 units	4 units
Basic oxygen furnace		2 units	6 units	5 units
Electric arc furnace		1 unit	1 unit	—
Ladle refining system		1 set	1 set	1 set
Continuous casting machine		3 units	5 units	6 units
Reheating furnace	Continuous type	2 units	2 units	2 units
	Batch type	2 units	3 units	3 units
Rolling mill		1 unit (5,500mm width)	1 unit (5,500mm width)	2 units (4,700mm width)
Accelerated cooling system		1 unit	1 unit	1 unit
Shearing machine		1 set	1 set	1 set
Heat treatment furnace		2 units	4 units	1 units
Quenching system		1 unit	2 units	—
Shot blast and painting system		1 set	3 sets	1 set
Stainless steel pickling system		—	—	1 units
Stainless steel heat treatment furnace		—	—	1 unit
Stainless steel grinding machine		—	2 sets	3 sets
Clad slab assembly system		—	—	1 set



Rolling Mill

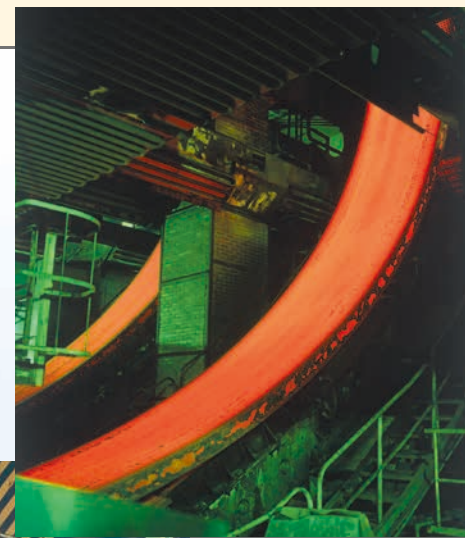
MANUFACTURING PROCESS FLOW



Blast furnace



Oxygen converter



Continuous casting machine



Rolling Mill



Super-OLAC (Online accelerated cooling equipment)



6000t Forging press



Heat treatment system

JFE'S PLATE PRODUCTS SPECIFIED BY TYPICAL STANDARDS

Type of steel		JIS		ASTM	API	BS	DIN	WES**	Ship's class Standard***	JFE Standard
Steel Plates for Structural Use	Carbon-Manganese Steel	G3101	SS330	A36	API 2H-42	EN10025 S185 S235 S275 EN10113 S275			A B D E	
			SS400	A131	2W-42					
		G3106	SM400	A283						
		G3131	SPHC	A529						
			SPHD	A573 Gr. 58						
			SPHE							
		G3136	SN400							
	490N/mm ² Class	G3106	SM490	A572	API 2H-50	EN10025 S355			A32,36,40 D32,36,40	HBL325
			SM490Y	A573	2W-50	E295				
	540N/mm ² Class	G3136	SN490	A633		EN10225 S355			E32,36,40	
Steel Plates for Boiler and Pressure Vessel	High Tensile Strength Steels			A709 Gr. 50 A841		EN10113 S355				
		G3106	SM520	A572 Gr. 60 Gr. 65	API 2W-60	EN10225 S400 EN10113 S420 EN10225 S460	HW 355		A43 D43 E43 F43	JFE-HITEN540S HBL355 HBL385
	590N/mm ² Class	G3106	SM570*	A678 Gr. C Gr. D A841		EN10025 E335 EN10113 S460 EN10137 S460	HW 450 HW450CF		A47 D47 E47 F47	JFE-HITEN570U2 JFE-HITEN570E JFE-HITEN590S JFE-HITEN590SL JFE-HITEN590AZ JFE-HITEN590 JFE-HITEN590U2 JFE-HITEN590E
						EN10137 S500	HW 490 HW 490CF		A51 D51 E51 F51	JFE-HITEN610 JFE-HITEN610U2 JFE-HITEN610E SA440U
	690N/mm ² Class					EN10025 E360 EN10137 S550 S620	HW 550 HW 620		A56 D56 E56 A63,63N D63,63N E63	JFE-HITEN690S JFE-HITEN690 JFE-HITEN690M JFE-HITEN710 JFE-HITEN710M
	780N/mm ² Class	G3128	SHY685 SHY685N SHY685NS	A514 A709 Gr. 100		EN10137 S690	HW 685		A70,70N D70,70N E70,70N F70,70N	JFE-HITEN780EX JFE-HITEN780S JFE-HITEN780LE JFE-HITEN780M
	980N/mm ² Class					EN10137 S890 S960	HW 885			JFE-HITEN980S JFE-HITEN980
	Ni-alloy Steels	1.5%Ni Steel					LT360			JFE-LT 1.5Ni-TM
		2.5%Ni Steel	G3127 SL2N255	A203 Gr. A Gr. B					KL2N30	
		3.5%Ni Steel	G3127 SL3N255	A203 Gr. D Gr. E	EN10028 12Ni14				KL3N32	
			SL3N275							
			SL3N440							
Steel Plates for Low Temperature Use	Al-Killed Steels	G3127	SL9N520	A353		EN10028 X8Ni 9			KL9N60	
			SL9N590	A553 I		EN10028 X7Ni 9				
	High Tensile Strength Steels	G3126	SLA325A			EN10028 P275 'L' P355 'L'			KL24 KL33 KL37	
			SLA325B			EN10113 S275 'L' S355 'L' S420 'L'				JFE-LT415TM
			SLA360							
			SLA410							
						EN10028 P460 'L'	LT450			JFE-HITEN590U2L JFE-HITEN590L JFE-HITEN610U2L JFE-HITEN610L JFE-HITEN690L JFE-HITEN710L JFE-HITEN780L JFE-HITEN780FL JFE-HITEN780ML
							LT490			
							LT550			
							LT685			

Type of steel		JIS		ASTM	API	BS	DIN	WES**	Ship's class Standard***	JFE Standard
Atmospheric Corrosion Resistant Steel Plates	400N/mm ² Class	G3114	SMA400							
	490N/mm ² Class	G3114	SMA490	A242Type2 A588						
	590N/mm ² Class	G3114	SMA570*							
	Ni Type High Corrosion Resistant Steel									JFE-ACL400Type1 JFE-ACL400Type2 JFE-ACL490Type1 JFE-ACL490Type2 JFE-ACL570Type1 JFE-ACL570Type2
Steel Plates for Boiler and Pressure Vessel	Carbon Steel	G3103	SB410 SB450 SB480	A285 A515		EN10028 P235GH P265GH			KP42 KP46 KP49	
		G3115	SPV235	A516 Gr. 55		EN10028 P295GH			KPV24	
	Carbon Manganese Steel	G3118	SGV410	Gr. 60 Gr. 65						
	High Tensile Strength Steels	490N/mm ² Class	G3115 SPV315 G3118 SGV480 G3124 SEV245	A299 A455 A516 Gr. 70 A537 Cl. 1 A841		EN10028 P355N			KPV32	
		540N/mm ² Class	G3115 SPV355 G3124 SEV295	A612		EN10028 P355GH	HW 355		KPV36	
	590N/mm ² Class	G3115 SPV450 G3124 SEV345	A537 Cl. 2 A738 Gr. B A841			EN10028 P460N	HW 450		KPV46	JFE-HITEN570U2 JFE-HITEN570E JFE-HITEN590 JFE-HITEN590U2 JFE-HITEN590E
		G3115 SPV490					HW 490		KPV50	JFE-HITEN610 JFE-HITEN610U2 JFE-HITEN610E
	690N/mm ² Class			A543 Cl. 1			HW 620			JFE-HITEN690M
	780N/mm ² Class			A517 A543 Cl. 2			HW 685			JFE-HITEN780M
	980N/mm ² Class						HW 885			JFE-HITEN980
	Mo Steel	G3103	SB450M SB480M	A204			EN10028 16Mo3		KPA46 KPA49 KPA56	
	Mn-Mo, Mn-Mo-Ni Steel	G3119 SBV G3120 SQV	A302 A533							
	Cr-Mo Steel	G4109	SCMV	A542 A387		EN10028 Steel 621	EN10028 13CrMo4-5 10CrMo9-10 11CrMo9-10			
Stainless Steel Plates		G4304	SUS	A240						
Clad Steel Plates		G3601	SUS	A263, A264						
		G3603	Ti							

* JFE supplies high tensile strength steel plates based on JIS SM570 with high weldability, which are SM570TMC, SMA570WTMC, SM570TMC-LB, SMA570WTMC-LB, SM570-EX, SM570-EG respectively.
TMC: Produced by TMCP, with high weldability
EX: With high weldability
EG: For high heat input welding

** When ordered by WES Designation, the corresponding JFE-HITEN approved by WES is applied.
Please refer to details on 「Approved or Authorized Products」. (P.34)

*** Ship's society approval is shown on 「Approved or Authorized Products」. (P.32)

APPLICATIONS

BRIDGES

◆ Typical Plate Products

Steel Plates for Structural Use : JIS, ASTM etc
 High Tensile Strength Steel Plates : JFE-HITEN
 Atmospheric Corrosion Resistant Steel Plates :
 JIS G3114 SMA, JFE-ACL
 Seawater Corrosion Resistant Steel Plates : JFE-MARIN



SHIPS

◆ Typical Plate Products

Steel Plates for Hull Structural Use :
 All Ship's Class Standards
 High Tensile Strength Steel Plates : JFE-HITEN
 Steel Plates for Low Temperature Use :
 JFE-LT, JFE-HITEN-L



BUILDINGS

◆ Typical Plate Products

Steel Plates for Structural Use : JIS, ASTM etc
 Atmospheric Corrosion Resistant Steel Plates :
 JIS G3114 SMA, JFE-ACL
 Steel Plates for Building : HBL, SA440U, HBL-FR, JFE-LY



OFFSHORE STRUCTURES

◆ Typical Plate Products

Steel Plates for Structural Use :
 JIS, ASTM, API, EN, Ship's Class Standard etc.
 High Tensile Strength Steel Plates : JFE-HITEN
 High Tensile Strength Steel Plates for Low
 Temperature Use : JFE-HITEN-L



HYDRO POWER STATIONS



◆ Typical Plate Products

Steel Plates for Hull Structural Use : JIS, ASTM etc.
 High Tensile Strength Steel Plates : JFE-HITEN
 Atmospheric Corrosion Resistant Steel Plates :
 JIS G3114 SMA
 Abrasion Resistant Steel Plates : JFE-EH
 Seawater Resistant Steel Plates : JFE-MARIN
 Corrosion Resistant Steel Plates : JFE-ASA

STORAGE TANKS



◆ Typical Plate Products

Steel Plates for Pressure Vessels : JIS, ASTM etc.
 High Tensile Strength Steel Plates : JFE-HITEN
 Atmospheric Corrosion Resistant Steel Plates :
 JIS G3114 SMA
 Steel Plates for Low Temperature Use :
 JFE-LT, JFE-HITEN-L
 Stainless Steel Plates : JIS, ASTM

BOILERS AND PRESSURE VESSELS



◆ Typical Plate Products

Carbon Steel Plates for Boilers : JIS, ASTM etc.
 Alloy Steel Plates for Boilers :
 Mo Steel, Cr-Mo Steel, Ni-Cr-Mo Steel
 Steel Plates for Pressure Vessels : JIS, ASTM etc.
 Clad Steel Plates : JIS, ASTM etc.
 Stainless Steel Plates : JIS, ASTM

MACHINERY



◆ Typical Plate Products

Steel Plates for Structural Use : JIS, ASTM etc.
 High Tensile Strength Steel Plates : JFE-HITEN
 Abrasion Resistant Steel Plates : JFE-EH

JFE STANDARDS

Type	Brand	Feature	Outline of Products
High Tensile Strength Steel Plates	JFE-HITEN540S JFE-HITEN570U2 JFE-HITEN570E JFE-HITEN590 JFE-HITEN590U2 JFE-HITEN590E JFE-HITEN590S JFE-HITEN590SL JFE-HITEN610 JFE-HITEN610U2 JFE-HITEN610E JFE-HITEN690 JFE-HITEN690M JFE-HITEN690S JFE-HITEN710 JFE-HITEN710M JFE-HITEN780M JFE-HITEN780EX JFE-HITEN780S JFE-HITEN780LE JFE-HITEN980 JFE-HITEN980S	Tensile Strength (TS): Over 540N/mm ² Over 570N/mm ² Over 570N/mm ² Over 590N/mm ² Over 590N/mm ² Over 590N/mm ² Over 590N/mm ² Over 590N/mm ² Over 610N/mm ² Over 610N/mm ² Over 610N/mm ² Over 690N/mm ² Over 690N/mm ² Over 690N/mm ² Over 710N/mm ² Over 710N/mm ² Over 780N/mm ² Over 780N/mm ² Over 780N/mm ² Over 780N/mm ² Over 780N/mm ² Over 980N/mm ² Over 980N/mm ²	Since 1952 JFE Steel has continued the research and development of JFE-HITEN steel plates which have good weldability and high tensile strength up to 980N/mm ² class. These products have been extensively used for storage tanks, spherical gas holders, bridges, penstocks, motorcars, ships, buildings, machineries, steel towers, civil construction equipment, low-temperature vessels, as well as mining and farming machines. Most notably, JFE Steel has developed its "U1, U2" series and "EX" HITEN which enable relaxing the pre-heating before welding, "E" series HITEN for high heat-input welding, and HITEN "LE" for civil construction machinery which excels in low-temperature toughness. JIS SM570 with high weldability, produced by TMCP, has also been developed. These products, thereby, win high popularity among many engineering fields.
Atmospheric Corrosion Resistant Steel Plates	JFE-ACL400 Type1 JFE-ACL400 Type2 JFE-ACL490 Type1 JFE-ACL490 Type2 JFE-ACL570 Type1 JFE-ACL570 Type2	Ni Type High Corrosion Resistant Steel Plates for Seaside use	In addition to conventional atmospheric corrosion resistant steels, JFE Steel has developed corrosion resistant steels for sea side areas, where ordinary atmospheric corrosion steel is not practical without painting, because of salty exposure. These steels are the standard type (Type1), which includes 1.5%Ni-Mo, and higher resistant type (Type2) including 2.5%Ni. For the purposes of preventing stain by watery rust at the initiation of exposure in atmospheric environment, JFE markets the rust stability accelerating paint "CUPTEN COAT M"and "e-RUS".

Type	Brand	Feature	Outline of Products																												
Steel Plates for Low Temperature Use	JFE-LT415TM JFE-LT1.5Ni-TM JFE-HITEN590U2L JFE-HITEN590L JFE-HITEN610U2L JFE-HITEN610L JFE-HITEN690L JFE-HITEN710L JFE-HITEN780L JFE-HITEN780FL JFE-HITEN780ML	Al-killed Steel 1.5%Ni Steel TS : Over590N/mm ² : Over590N/mm ² : Over610N/mm ² : Over610N/mm ² : Over690N/mm ² : Over710N/mm ² : Over780N/mm ² : Over780N/mm ² : Over780N/mm ²	Steel plates for low temperature services are generally applied to low temperature vessels, offshore structures, such as jack-up rigs operating in low temperature regions, among others. Regarding low temperature vessels, the steel plates suitable for liquefied gas temperature are specified by some official standards or private standards. "Evaluation of criterion of rolled steels for low temperature application" was enacted by Japan Welding Engineering Society in Japan, with its basic rules adopted to JIS standard. Steel plates for low temperature services are specified also by ASTM, ASME, BS, DIN and ship class such as NK. JFE Steel supplies steel plates in conformance with the above standards, and furthermore has developed the original steel plates and obtained the qualification from authorized associations. <table><tr><th colspan="2">Liquefied</th><th colspan="2">Applicable Steel Grades</th></tr><tr><td rowspan="2">-50°F</td><td>Ammonia -33.4°C</td><td rowspan="2">JFE-HITEN-L SLA235 SLA325 JFE-LT1.5Ni-TM</td><td rowspan="2">-46°C</td></tr><tr><td>Propane -45°C</td></tr><tr><td rowspan="2">-75°F</td><td>Propylene -47.7°C</td><td rowspan="2">SL2N SL3N</td><td rowspan="2">-60°C</td></tr><tr><td>Hydrogen sulfide -59.5°C</td></tr><tr><td rowspan="4">-150°F</td><td>CO₂ gas -78.5°C</td><td rowspan="4">SL9N</td><td rowspan="4">-101°C</td></tr><tr><td>Acetylene -84°C</td></tr><tr><td>Ethane -88.3°C</td></tr><tr><td>Ethylene -104°C</td></tr><tr><td rowspan="4">-320°F</td><td>Methane -163°C</td><td rowspan="4">SL9N</td><td rowspan="4">-196°C</td></tr><tr><td>Oxygen -183°C</td></tr><tr><td>Argon -186°C</td></tr><tr><td>Fluorine -187°C</td></tr></table>	Liquefied		Applicable Steel Grades		-50°F	Ammonia -33.4°C	JFE-HITEN-L SLA235 SLA325 JFE-LT1.5Ni-TM	-46°C	Propane -45°C	-75°F	Propylene -47.7°C	SL2N SL3N	-60°C	Hydrogen sulfide -59.5°C	-150°F	CO ₂ gas -78.5°C	SL9N	-101°C	Acetylene -84°C	Ethane -88.3°C	Ethylene -104°C	-320°F	Methane -163°C	SL9N	-196°C	Oxygen -183°C	Argon -186°C	Fluorine -187°C
Liquefied		Applicable Steel Grades																													
-50°F	Ammonia -33.4°C	JFE-HITEN-L SLA235 SLA325 JFE-LT1.5Ni-TM	-46°C																												
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-320°F	Methane -163°C	SL9N	-196°C																												
	Oxygen -183°C																														
	Argon -186°C																														
	Fluorine -187°C																														
Abrasion Resistant Steel Plates	JFE-EH360 JFE-EH360LE JFE-EH400 JFE-EH500 JFE-EH500LE JFE-EH360A JFE-EH500A JFE-EH-SP	High hardness HB 360-500	Many components of civil engineering equipment, industrial machinery, and transportation equipment require abrasion resistance. To date, these components were composed of special steel plates, high carbon steel plates or high tensile strength steel plates. To cover all these steel materials, JFE Steel developed its first in the world steel plate exclusively for abrasion resistance, "JFE-EH (EVERHARD)" which is enjoying high popularity in the market. JFE-EH is given the required hardness by conditioning carbon and other special elements as well as by special heat treatment. In addition to Standard Type and Alloy Type, recently, JFE Steel has successfully developed"SP", of which resistance is over that of 500grade, and "LE" that has good low temperature toughness. The use of these steel plates can extend the life of machines, and shorten repair time, and thereby saving expenses and costs.																												

Type	Brand	Feature	Outline of Products
TMCP Type High Strength Steel Plates for Building Structure	HBL325 HBL355 HBL385	High standard strength and Low yield ratio in thickness 40~100mm of HBL325, 355 and 19~100mm of HBL385	HBL325, 355 has higher yield strength than that of JIS Standard in 40 to 100mm of thickness, authorized by minister of Land, Infrastructure, and Transport, and high plastic deformability is achieved by low yield ratio. In addition, JFE Steel has developed higher strength steel HBL385.
High-Performance 590N/mm ² High Strength Steel Plates for Building Structure	SA440 SA440U	High standard strength Good plastic deformability High toughness High weldability	"SA440U" is the 590N/mm ² class steel for building structure, which enables relaxing the preheating before welding, drastically, compared to conventional "SA440".
Fire Resistant Steel Plates for Building Structure	HBL325FR HBL355FR	Elevated temperature strength guaranteed	Conforming to JIS G3106 and G3136 in ambient temperature, and guaranteeing yield strength more than 2/3 of specified yield strength at 600°C, even in TMCP-type HBL325, and 355.
Low Yield Strength Steel Plates for Building Structure	JFE-LY100 JFE-LY160 JFE-LY225	Excellent deforming ability enables the absorption of earthquake energy.	Extremely low yield strength steels for earthquake damper which have high energy absorbing capacity and can be selected from three kinds of standard strength options. LY160 is special grade by JFE Steel.
Seawater Resistant Steel Plates	JFE-MARIN400 JFE-MARIN490 JFE-MARIN490Y	For welded structure use	JFE developed unique steel plates having high sea water resistance, named "JFE-MARIN" for use in offshore or so called "water front" structure, bridges and ships, particularly in such portion as requiring resistance against corrosion due to sea water.
Corrosion Resistant Steel Plates	JFE-ZP	For galvanizing pots	JFE's corrosion resistant steel plates provide corrosion resistance to various corrosive environments, and have been extensively used in various fields such as chemical planting, galvanizing, or ship building industries, etc.
	JFE-ASA400 JFE-ASA440	For sulfuric acid corrosion resistance	
	JFE-AH 1, 2	HIC resistance	
	JFE-NAC 5	For deck plates for tanker	
Pure Iron Plates for Magnetic Shielding	JFE-EFE	High purity and superior magnetization characteristic	Demonstrates excellent magnetization property, because of its high purity.
Steel Plates for Mold Use	JFE-MD1 JFE-MD2 JFE-MD3	Good machinability and workability with stability of fatigue and heat impact properties	Pre-hardened steels with reasonable chemical compositions and heat-treatment have 3 grades of hardness. They have good machinability, workability and stable performance in fatigue or heat impact in such temperature range as plastic forging.

Type	Brand	Feature	Outline of Products
High Strength Steel Plates for Hot-dip Zinc-coated Tower	JFE-HITEN590AZ	Tensile strength : over 590N/mm ²	High tensile strength steel plates for electric power transmitting towers, well designed to prevent galvanizing crack.
Longitudinally Profiled Steel Plates (LP Plates)	Ship's class standard A, B, D A32, D32, E32 A36, D36, E36 JIS Standard SS400 SM400, 490, 490Y SM520, 570Q SM570TMC SMA400, 490, 570	Thickness of this plate is continuously and linearly varied in length direction.	"LP Plates" are manufactured by advanced rolling technology and contributes to cost reduction in the fields of ships or bridge construction. There are 6 shape types in LP Plates. So, please consult with us the actual sizes required individually. Main size availability is as follows: Width 5,000mm and under Max. thickness difference 30mm Max. taper in thickness 8mm/M Min. thickness 10mm Total length 6~20m Product weight 6~20T
Steel Plates for Rockets	JFE-HT140NP JFE-HT210P	Alloying steel plates for rocket chamber	"140NP" includes 4Ni-1.8Cr-0.5Mo-V, and "210P" includes 18Ni-9Co-5Mo-0.5Ti-Al-Zn-B, respectively. Both provide ultra high strength and elevated temperature resistance.

Note: Chemical compositions described in this catalogue are values by ladle analysis.

High Tensile Strength Steel Plates

JFE-HITEN590, 690 Series

Designation (Thickness mm)	Heat Treatment	Chemical Composition (%)																Tensile Test					Bending Test (180°)		Impact Test (2mmV Charpy)				
		C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	B	Ceq		P _{CM}			Yield Point or Proof Stress		Tensile Strength (N/mm ²)	Elongation			Bending Radius		Test Temperature		Absorbed Energy
														Thickness (mm)					Thickness (mm)	(N/mm ²)		Thickness (mm)	(%)	Test Specimen	Thickness (mm)	(^{Test Specimen No. 1})	Thickness (mm)	(°C)	
JFE-HITEN590 (6~150)	QT	≤0.16	0.15/0.55	≤1.50	≤0.025	≤0.015	≤0.30	≤1.00	≤0.30	≤0.30	≤0.08	—	—	t≤50 50<t≤75 75<t	≤0.44 ≤0.46 ≤0.48	≤0.26 ≤0.28 ≤0.28		—	≥450	590/710	t≤16 16<t≤50 20<t	≥20 ≥28 ≥20	No. 5 No. 5 No. 4	—	1.5t	12<t	−10	≥47	
JFE-HITEN610 (6~150)	QT	≤0.16	0.15/0.55	≤1.50	≤0.025	≤0.015	≤0.30	≤1.00	≤0.30	≤0.30	≤0.08	—	—	t≤50 50<t≤75 75<t	≤0.45 ≤0.47 ≤0.49	≤0.26 ≤0.28 ≤0.28		t≤75 75<t	≥490 ≥470	610/730	t≤16 16<t≤50 20<t	≥19 ≥27 ≥19	No. 5 No. 5 No. 4	—	1.5t	12<t≤32 32<t	−10 −15	≥47 ≥47	
JFE-HITEN690 (6~100)	QT	≤0.16	≤0.35	≤1.20	≤0.025	≤0.015	≤0.40	≤1.00	≤0.70	≤0.50	≤0.08	—	≤0.005	t≤50 50<t	≤0.54 ≤0.58	— —		t≤75 75<t	≥590 ≥570	690/820	t≤16 16<t≤50 20<t	≥17 ≥25 ≥17	No. 5 No. 5 No. 4	t≤32 32<t	1.5t 2.0t	12<t≤32 32<t≤50 50<t	−15 −20 −30	≥47 ≥47 ≥47	
JFE-HITEN710 (6~100)	QT	≤0.16	≤0.35	≤1.20	≤0.025	≤0.015	≤0.40	≤1.00	≤0.70	≤0.50	≤0.08	—	≤0.005	t≤50 50<t	≤0.55 ≤0.59	— —		t≤75 75<t	≥620 ≥600	710/840	t≤16 16<t≤50 20<t	≥17 ≥25 ≥17	No. 5 No. 5 No. 4	t≤32 32<t	1.5t 2.0t	12<t≤32 32<t≤50 50<t	−15 −20 −30	≥47 ≥47 ≥47	
JFE-HITEN690M (6~100)	QT	≤0.14	≤0.35	≤1.20	≤0.015	≤0.015	≤0.40	0.30/1.30	≤0.70	≤0.50	≤0.05	—	≤0.005	t≤50 50<t	≤0.53 ≤0.57	— —		t≤75 75<t	≥590 ≥570	690/820	t≤16 16<t≤50 20<t	≥17 ≥25 ≥17	No. 5 No. 5 No. 4	t≤32 32<t	1.5t 2.0t	12<t≤32 32<t≤50 50<t	−15 −20 −30	≥47 ≥47 ≥47	
JFE-HITEN710M (6~100)	QT	≤0.14	≤0.35	≤1.20	≤0.015	≤0.015	≤0.40	0.30/1.30	≤0.70	≤0.50	≤0.05	—	≤0.005	t≤50 50<t	≤0.53 ≤0.57	— —		t≤75 75<t	≥620 ≥600	710/840	t≤16 16<t≤50 20<t	≥17 ≥25 ≥17	No. 5 No. 5 No. 4	t≤32 32<t	1.5t 2.0t	12<t≤32 32<t≤50 50<t	−15 −20 −30	≥47 ≥47 ≥47	

JFE-HITEN780 Series and JFE-HITEN980

Designation (Thickness mm)	Heat Treatment	Chemical Composition (%)																Tensile Test					Bending Test (180°)		Impact Test (2mmV Charpy)				
		Thickness (mm)	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	B	Ceq			P _{CM}	Yield Point or Proof Stress		Tensile Strength (N/mm ²)	Elongation			Bending Radius		Test Temperature		Absorbed Energy
															Thickness (mm)				Thickness (mm)	(N/mm ²)		Thickness (mm)	(%)	Test Specimen	Thickness (mm)	($\frac{\text{Test Specimen No. 1}}{\text{mm}}$)	Thickness (mm)	(°C)	
JFE-HITEN780M (6~150)	QT	t ≤100 100<t	≤0.14 ≤0.18	≤0.35 ≤0.35	≤1.20 ≤1.20	≤0.015 ≤0.015	≤0.015 ≤0.015	≤0.50 ≤0.50	0.30/1.50 0.30/1.50	≤0.70 ≤0.80	≤0.60 ≤0.60	≤0.05 ≤0.05	—	≤0.005 ≤0.005	t≤50 50<t≤100 100<t	≤0.53 ≤0.57 ≤0.62	≤0.30 ≤0.32 —	t≤75 75<t	≥685 ≥665	780/930	t≤16 16<t≤50 20<t	≥16 ≥24 ≥16	No. 5 No. 5 No. 4	t≤32 32<t	1.5t 2.0t	12<t≤32 32<t≤50 50<t	−20 −25 −35	≥47 ≥47 ≥47	
JFE-HITEN980 (6~120)	QT	—	≤0.14	≤0.35	≤1.20	≤0.010	≤0.005	≤0.70	≤4.00	≤0.80	≤0.80	≤0.15	≤0.02	≤0.005	t≤50 50<t≤100 100<t	≤0.59 ≤0.62 ≤0.71	≤0.29 ≤0.33 ≤0.36	t≤75 75<t≤100 100<t	≥885 ≥865 ≥865	950/1130 950/1130 930/1110	t≤16 16<t≤50 20<t	≥12 ≥19 ≥12	No. 5 No. 5 No. 4	t≤32 32<	2.0t 2.5t	12<t	−60	≥47	

High Tensile Strength Steel Plates with High Weldability

Designation (Thickness mm)	Heat Treatment	Chemical Composition (%)															Tensile Test						Bending Test (180°)		Impact Test (2mmV Charpy)				
		C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	B	Ceq			P _{CM}		Yield Point or Proof Stress		Tensile Strength (N/mm ²)	Elongation			Bending Radius		Test Temperature		Absorbed Energy
														Thickness (mm)					Thickness (mm)	(N/mm ²)		Thickness (mm)	(%)	Test Specimen	Thickness (mm)	Test Specimen No. 1	Thickness (mm)	(°C)	
JFE- HITEN570U2 (6~100)	QT	≤0.09	0.15/ 0.55	≤1.60	≤0.025	≤0.010	≤0.30	≤0.30	≤0.30	≤0.30	≤0.06	≤0.03	—	—	—	≤0.20		t≤16 16<t≤40 40<t≤75 75<t	≥460 ≥450 ≥430 ≥420	570/700	t≤16 16<t≤50 20<t	≥20 ≥28 ≥20	No.5 No.5 No.4	t≤32 32<t	1.5t 2.0t	12<t	—5	≥47	
JFE- HITEN590U2 (6~75)	QT	≤0.09	0.15/ 0.55	1.20/ 1.60	≤0.025	≤0.010	≤0.30	≤0.30	≤0.30	≤0.30	≤0.06	≤0.03	—	—	—	≤0.20		—	≥450	590/710	t≤16 16<t≤50 20<t	≥20 ≥28 ≥20	No.5 No.5 No.4	t≤32 32<t	1.5t 2.0t	6≤t≤20 20<t≤32 32<t≤50 50<t	5 —5 —10 —20	≥47** ≥47 ≥47 ≥47	
JFE- HITEN610U2 (6~75)	QT	≤0.09	0.15/ 0.55	1.20/ 1.60	≤0.025	≤0.010	≤0.30	≤0.30	≤0.30	≤0.30	≤0.06	≤0.03	—	—	—	≤0.20		—	≥490	610/730	t≤16 16<t≤50 20<t	≥19 ≥27 ≥19	No.5 No.5 No.4	t≤32 32<t	1.5t 2.0t	6≤t≤20 20<t≤32 32<t≤50 50<t	0 —5 —15 —25	≥47** ≥47 ≥47 ≥47	
JFE- HITEN780EX (6~60)	QT	≤0.09	≤0.55	0.60/ 1.50	≤0.015	≤0.010	≤0.50	0.30/ 1.50	≤0.80	≤0.60	≤0.05	≤0.03	≤0.005	t≤34 34<t≤60	≤0.53* ≤0.57*	≤0.23 ≤0.25		t≤50 50<t≤60	≥685 ≥665	780/930 760/910	t≤16 16<t≤50 20<t	≥16 ≥24 ≥16	No.5 No.5 No.4	t≤32 32<t	1.5t 2.0t	12<t≤32 32<t≤60	—20 —25	≥47 ≥47	

* WES+Cu/13 (Cu≥0.30)
** 6≤t≤8 24J (1/2 Size)
8<t≤10.5 35J (3/4 Size)
10.5<t<12 39J (3/4 Size)

High Tensile Strength Steel Plates for High Heat-input Welding

Designation (Thickness mm)	Heat Treatment	Chemical Composition (%)															Tensile Test						Bending Test (180°)		Impact Test (2mmV Charpy)		
		C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	B	P _{CM}	Yield Point or Proof Stress		Tensile Strength (N/mm ²)	Elongation			Bending Radius		Test Temperature		Absorbed Energy		
															Thickness (mm)			(N/mm ²)	Thickness (mm)	(%)	Test Specimen	Thickness (mm)	Test Specimen No. 1	Thickness (mm)		(°C)	(J)
JFE- HITEN570E (6~100)	QT	≤0.09	0.15/ 0.55	≤1.60	≤0.020	≤0.010	≤0.30	≤0.30	≤0.30	≤0.30	≤0.06	≤0.03	—	≤0.20		t≤16 16<t≤40 40<t≤75 75<t	≥460 ≥450 ≥430 ≥420	570/700	t≤16 16<t≤50 20<t	≥20 ≥28 ≥20	No.5 No.5 No.4	t≤32 32<t	1.5t 2.0t	12<t	—5	≥47	
JFE- HITEN590E (6~75)	QT	≤0.09	0.15/ 0.55	1.00/ 1.60	≤0.020	≤0.010	≤0.30	≤0.30	≤0.30	≤0.30	≤0.06	≤0.03	—	≤0.20		—	≥450	590/710	t≤16 16<t≤50 20<t	≥20 ≥28 ≥20	No.5 No.5 No.4	t≤32 32<t	1.5t 2.0t	6≤t≤20 20<t≤32 32<t≤50 50<t	5 —5 —10 —20	≥47** ≥47 ≥47 ≥47	
JFE- HITEN610E (6~75)	QT	≤0.09	0.15/ 0.55	1.00/ 1.60	≤0.020	≤0.010	≤0.30	≤0.30	≤0.30	≤0.30	≤0.06	≤0.03	—	≤0.20		—	≥490	610/730	t≤16 16<t≤50 20<t	≥19 ≥27 ≥19	No.5 No.5 No.4	t≤32 32<t	1.5t 2.0t	6≤t≤20 20<t≤32 32<t≤50 50<t	0 —5 —15 —25	≥47** ≥47 ≥47 ≥47	

** 6≤t≤8 24J (1/2 Size)
8<t≤10.5 35J (3/4 Size)
10.5<t<12 39J (3/4 Size)

* C+Mn/6+(Cu+Ni)/15+(Cr+Mo+V)/5	** 6≤t<8.5 19J (1/2 Size)	*** 6≤t<8.5 20J (1/2 Size)
	8.5≤t≤12 24J (3/4 Size)	8.5≤t≤12 30J (3/4 Size)

Ni Type High Atmospheric Corrosion Resistant Steel Plates

High Tensile Strength Steel Plates for Civil Engineering and Industrial Machinery /
Ni Type High Atmospheric Corrosion Resistant Steel Plates

Steel Plates for Low Temperature Service

Designation (Thickness mm)	Heat Treatment	Chemical Composition (%)													Tensile Test					Bending Test (180°)	Impact Test (2mmV Charpy)	
		C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	Ti		Yield Point or Proof Stress (N/mm ²)	Tensile Strength (N/mm ²)	Elongation			Bending Radius (Test Specimen No.1)	Test Temperature (°C)	Absorbed Energy (J)
																	Thickness (mm)	(%)	Test Specimen			
Al-killed Type JFE- LT415TM (6~50)	TMCP	≤0.14	≤0.50	0.80/ 1.60	≤0.025	≤0.010	≤0.40	≤1.00	—	—	≤0.08	≤0.02	≤0.015		≥415	550/690	t≤16 16<t 20<t	≥20 ≥28 ≥20	No.5 No.5 No.4	—	—60	≥41
1.5Ni Type JFE- LT1.5Ni-TM (6~40)	TMCP	≤0.10	≤0.40	0.80/ 1.60	≤0.025	≤0.010	≤0.30	1.10/1.60	≤0.30	≤0.20	≤0.08 Sol.Al≤0.08	≤0.02 Ca≤0.005	≤0.015		≥365	490/610	t≤16 16<t 20<t	≥20 ≥28 ≥20	No.5 No.5 No.4	1.5t	—110	≥27*
																					*6≤t<8.5 14J (1/2 Size)	*8.5≤t<11 22J (3/4 Size)

High Tensile Strength Steel Plates for Low Temperature Service

Designation (Thickness mm)	Heat Treatment	Chemical Composition (%)															Tensile Test						Bending Test (180°)		Impact Test (2mmV Charpy)	
		C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	B	Ceq	P _{CM}		Yield Point or Proof Stress		Tensile Strength (N/mm ²)	Elongation			Bending Radius		Test Temperature (°C)	Absorbed Energy (J)
																	Thickness (mm)	(N/mm ²)		Thickness (mm)	(%)	Test Specimen	Thickness (mm)	(Test Specimen No. 1)		
JFE-HITEN590L (6~50)	QT	≤0.16	≤0.55	≤1.50	≤0.025	≤0.010	Ni,Cr,Mo,V etc. are added as required.								≤0.44	—	—	≥450	590/710	t≤16 16<t≤20 20<t	≥20 ≥28 ≥20	No.5 No.5 No.4	—	1.5t	According to WES3003	
JFE-HITEN610L (6~50)	QT	≤0.16	≤0.55	≤1.50	≤0.025	≤0.010	Ni,Cr,Mo,V etc. are added as required.								≤0.45	—	—	≥490	610/730	t≤16 16<t≤20 20<t	≥19 ≥27 ≥19	No.5 No.5 No.4	—	1.5t	According to WES3003	
JFE-HITEN590U2L (6~75)	QT	≤0.09	0.15/ 0.55	≤1.60	≤0.025	≤0.010	≤0.30	≤0.70	≤0.30	≤0.30	≤0.06	≤0.03	—	—	≤0.20	—	≥450	590/710	t≤16 16<t≤20 20<t	≥20 ≥28 ≥20	No.5 No.5 No.4	—	1.5t	According to WES3003		
JFE-HITEN610U2L (6~75)	QT	≤0.09	0.15/ 0.55	≤1.60	≤0.025	≤0.010	≤0.30	≤0.70	≤0.30	≤0.30	≤0.06	≤0.03	—	—	≤0.20	—	≥490	610/730	t≤16 16<t≤20 20<t	≥19 ≥27 ≥19	No.5 No.5 No.4	—	1.5t	According to WES3003		
JFE-HITEN690L (6~32)	QT	≤0.15	≤0.55	≤1.20	≤0.025	≤0.010	≤0.50	≤1.00	≤0.80	≤0.50	≤0.08	—	≤0.005	≤0.51	—	—	≥570	690/800	t≤16 16<t≤20 20<t	≥18 ≥26 ≥18	No.5 No.5 No.4	—	1.5t	According to WES3003		
JFE-HITEN710L (6~40)	QT	≤0.15	≤0.55	≤1.20	≤0.025	≤0.010	≤0.50	≤1.00	≤0.80	≤0.60	≤0.08	—	≤0.005	≤0.52	—	—	≥615	710/840	t≤16 16<t≤20 20<t	≥17 ≥25 ≥17	No.5 No.5 No.4	—	1.5t	According to WES3003		
JFE-HITEN780L (6~50)	QT	≤0.15	≤0.35	≤1.20	≤0.025	≤0.010	≤0.50	≤1.50	≤0.80	≤0.60	≤0.08	—	≤0.005	≤0.53	—	—	≥685	780/930	t≤16 16<t≤20 20<t	≥16 ≥24 ≥16	No.5 No.5 No.4	—	1.5t	According to WES3003		
JFE-HITEN780FL (6~40)	QT	≤0.16	≤0.60	≤1.00	≤0.025	≤0.010	0.15/ 0.50	—	≤1.20	≤0.60	≤0.10	Zr≤0.10	≤0.005	—	—	—	≥685	780/930	t≤16 16<t≤20 20<t	≥16 ≥24 ≥16	No.5 No.5 No.4	—	1.5t	According to WES3003		
JFE-HITEN780ML (6~200)	QT	≤0.16	≤0.35	≤1.20	≤0.020	≤0.010	≤0.50	≤4.00	≤1.00	≤0.60	≤0.10	—	≤0.005	—	—	t≤50 50<t	≥685	780/930 760/910	t≤16 16<t≤20 20<t	≥16 ≥24 ≥16	No.5 No.5 No.4	t<32 32≤t	1.5t 2.0t	—60	(12<t) ≥34	

Abrasion Resistant Steel Plates

Standard Type

Designation (Thickness mm)	Chemical Composition (%)										Hardness Test	
	C	Si	Mn	P	S	Cr	Mo	V	Ti	B		Surface Brinell Hardness (3000)
JFE-EH360 (6~50)	≤0.20	≤0.55	≤1.60	≤0.030	≤0.030	≤0.40	—	—	0.005/ 0.020	≤0.004		≥361
JFE-EH400 (6~50)	≤0.25	≤0.55	≤1.60	≤0.030	≤0.030	≤0.80	—	—	0.005/ 0.020	≤0.004		≥401
JFE-EH500 (6~50)	≤0.35	≤0.55	≤1.60	≤0.030	≤0.030	≤0.80	—	—	0.005/ 0.020	≤0.004		≥477

Alloying Type

Designation (Thickness mm)	Chemical Composition (%)											Hardness Test	Impact Test (2mmV Charpy)		
	C	Si	Mn	P	S	Cr	Mo	V	Ti	B		Surface Brinell Hardness (3000)	Test Temperature		Absorbed Energy
													Thickness (mm)	(°C)	
JFE-EH360A (6~100)	≤0.20	≤0.55	≤1.60	≤0.030	≤0.030	0.40/ 1.20	0.10/ 0.50	≤0.10	≤0.020	≤0.004		≥361	13<t≤50	0	≥21
JFE-EH500A (6~100)	≤0.35	≤0.55	≤1.60	≤0.030	≤0.030	0.40/ 1.20	0.10/ 0.50	≤0.10	≤0.020	≤0.004		≥477	13<t≤25	0	≥21

High Toughness Type

Designation (Thickness mm)	Chemical Composition (%)												Hardness Test	Impact Test (2mmV Charpy)			
	C	Si	Mn	P	S	Cr	Mo	V	Ti	B	Ceq		Surface Brinell Hardness (3000)	Test Temperature		Absorbed Energy	
											Thickness (mm)			Thickness (mm)	(°C)		(J)
JFE-EH360LE (6~32)	≤0.17	≤0.55	≤1.60	≤0.020	≤0.010	≤0.40	≤0.35	—	≤0.020	≤0.004	6≤t≤19 19<t	≤0.40* ≤0.43*		361/ 440	12<t	−40	≥27
JFE-EH500LE (6~32)	≤0.29	≤0.55	≤1.60	≤0.020	≤0.010	≤0.40	≤0.35	—	≤0.020	≤0.004	6≤t≤19 19<t	≤0.55* ≤0.58*		477/ 556	12<t	−40	≥21

* Ceq.=C+Mn/6+ (Cu+Ni) /15+ (Cr+Mo+V) /5

Super Abrasion Resistant Type

Designation (Thickness mm)	Chemical Composition (%)										Hardness Test	
	C	Si	Mn	P	S	Cr	Mo	V	Ti	B		Surface Brinell Hardness (3000)
JFE-EH-SP (6~65)	≤0.35	≤0.55	≤1.60	≤0.030	≤0.030	0.50/ 1.50	Other elements are added as required.					≥401

Steel Plates for Frame of Building

TMCP Steel Plates

Designation (Thickness mm)	Heat Treatment	Chemical Composition (%)														Tensile Test					Through Thickness Tensile Test	Impact Test (2mmV Charpy)		
		C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	Ceq	P _{CM}		Yield Point or Proof Stress (N/mm ²)	Tensile Strength (N/mm ²)	Elongation			Yield Ratio (%)	Reduction of area (%)	Test Temperature (℃)	Absorbed Energy (J)
																		Thickness (mm)	(%)	Test Specimen				
HBL325B (40.1~100)	TMCP	t≤50 : ≤0.18 50<t : ≤0.20	≤0.55	≤1.60	≤0.030	≤0.015	Other elements can be added as required.						t≤50 : ≤0.38 50<t : ≤0.40	t≤50 : ≤0.24 50<t : ≤0.26	325/ 445	490/ 610	t≤50 40<t	≥21 ≥23	No.1A No.4	≤80	—	0	≥27	
HBL325C (40.1~100)					≤0.020	≤0.008															≥25(Ave.of 3Tests) ≥15(Each Value)			
HBL355B (40.1~100)	TMCP	≤0.20	≤0.55	≤1.60	≤0.030	≤0.015	Other elements can be added as required.						t≤50 : ≤0.40 50<t : ≤0.42	t≤50 : ≤0.26 50<t : ≤0.27	355/ 475	520/ 640	t≤50 40<t	≥19 ≥21	No.1A No. 4	≤80	—	0	≥27	
HBL355C (40.1~100)					≤0.020	≤0.008															≥25(Ave.of 3Tests) ≥15(Each Value)			
HBL385B (19~100)	TMCP	≤0.20	≤0.55	≤1.60	≤0.030	≤0.015	Other elements can be added as required.						t≤50 : ≤0.40 50<t : ≤0.42	t≤50 : ≤0.26 50<t : ≤0.27	385/ 505	550/ 670	t≤50 40<t t<38	≥26 ≥20 ≥15	No.5 No.4 No.1A	≤80	—	0	≥70	
HBL385C (19~100)					≤0.020	≤0.008															≥25(Ave.of 3Tests) ≥15(Each Value)			

High Performance 590N/mm² Steel Plates for Frame of Building

Designation (Thickness mm)	Heat Treatment	Chemical Composition (%)														Tensile Test					Through Thickness Tensile Test	Impact Test (2mmV Charpy)			
		C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	Ceq	P _{CM}			Yield Point or Proof Stress (N/mm ²)	Tensile Strength (N/mm ²)	Elongation			Yield Ratio (%)	Reduction of area (%)	Test Temperature (°C)	Absorbed Energy (J)
																			Thickness (mm)	(%)	Test Specimen				
SA440B-U (19~100)	QT	≤0.12	≤0.55	≤1.60	≤0.030	≤0.008	Other elements can be added as required.						t≤40 : ≤0.44 40<t : ≤0.47	≤0.22		440/ 540	590/ 740	t≤50 40<t	≥26 ≥20	No.5 No.4	≤80	—	0	≥47	
SA440C-U (19~100)					≤0.020	≤0.008																≥25(Ave.of 3Tests) ≥15(Each Value)			

Fire Resistant Steel Plates for Frame of Building

Designation (Thickness mm)	Heat Treatment	Equivalent Standard	Proof Stress(0.2% strain) at 600℃ (N/mm ²)		
			t≤40	40<t≤75	75<t≤100
HBL325B-FR HBL325C-FR (40.1～100)	TMCP	Authorized by Minister of Land,Infrastructure and Transport	—	≥217	
HBL355B-FR HBL355C-FR (40.1～100)	TMCP	Authorized by Minister of Land,Infrastructure and Transport	—	≥237	
SN400B,C-FR SM400A,B-FR (6～100)	AR or N	JIS G3136 JIS G3106	≥157	≥143	
SN490B,C-FR SM490A,B-FR (6～100)	AR or N	JIS G3136 JIS G3106	≥217	≥197	
SM520B-FR (6～100)	AR or N	JIS G3106	≥237	≥233	≥217

Low Yield Strength Steel Plates for Frame of Building

Designation (Thickness mm)	Tensile Test					Impact Test (2mmV Charpy)		
	Lower Yield Point or Proof Stress (N/mm ²)	Tensile Strength (N/mm ²)	Yield Ratio (%)	Elongation (%)		Test Temperature (℃)		Absorbed Energy (J)
JFE-LY100 (6～60)	80/120	200/300	≤60	≥50	No.5	12<t	0	≥27
JFE-LY160 (6～60)	140/180	220/320	≤80	≥45	No.5	12<t	0	≥27
JFE-LY225 (6～60)	205/245	300/400	≤80	≥40	No.5	12<t	0	≥27

Sea Water Corrosion Resistant Steel Plates

Designation (Thickness mm)	Heat Treatment	Chemical Composition (%)												Tensile Test						Bending Test (180°)	Impact Test (2mmV Charpy)			
		C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V or Nb	Al		Yield Point or Proof Stress		Tensile Strength (N/mm ²)	Elongation			Bending Radius Test Specimen No. 1	Test Temperature		Absorbed Energy	
														Thickness (mm)	(N/mm ²)		Thickness (mm)	(%)	Test Specimen		Thickness (mm)	(°C)	Grade	(J)
JFE-MARIN400 (6~40)	AR or N	≤0.15	≤1.00	≤1.40	≤0.030	≤0.020	0.20/ 0.60	≤0.50	0.50/ 1.50	—	≤0.10	≤0.55		6 ≤ t ≤ 16 16 < t ≤ 40	≥ 245 ≥ 235	400/ 510	6 ≤ t ≤ 16 16 < t ≤ 40	≥ 18 ≥ 22	No.1A No.1A	1.0t	12 < t	0	A B C	— ≥ 27 ≥ 47
JFE-MARIN490 (6~40)	AR、N or TMCP	≤0.15	≤1.00	≤1.50	≤0.030	≤0.020	0.20/ 0.60	≤0.50	0.50/ 1.50	—	≤0.10	≤0.55		6 ≤ t ≤ 16 16 < t ≤ 40	≥ 325 ≥ 315	490/ 610	6 ≤ t ≤ 16 16 < t ≤ 40	≥ 17 ≥ 21	No.1A No.1A	1.5t	12 < t	0	A B C	— ≥ 27 ≥ 47
JFE-MARIN490Y (6~40)	AR、N or TMCP	≤0.15	≤1.00	≤1.50	≤0.030	≤0.020	0.20/ 0.60	≤0.50	0.50/ 1.50	—	≤0.10	≤0.55		6 ≤ t ≤ 16 16 < t ≤ 40	≥ 365 ≥ 355	490/ 610	6 ≤ t ≤ 16 16 < t ≤ 40	≥ 17 ≥ 21	No.1A No.1A	1.5t	12 < t	0	A B	— ≥ 27

Corrosion Resistant Steel Plates

Melted Zinc Corrosion Resistant Steel Plates

Designation (Thickness mm)	Heat Treatment	Chemical Composition (%)				
		C	Si	Mn	P	S
JFE-ZP (6~100)	AR	≤0.13	≤0.03	≤0.50	≤0.030	≤0.030

Sulfuric Acid Resistant Steel Plates

Designation (Thickness mm)	Heat Treatment	Chemical Composition (%)												Tensile Test						Bending Test (180°)
		C	Si	Mn	P	S	Cu	Ni	Cr	Mo	Sb	Sn		Yield Point or Proof Stress		Tensile Strength (N/mm²)	Elongation			Bending Radius Test Specimen No. 1
														Thickness (mm)	(N/mm²)		Thickness (mm)	(%)	Test Specimen	
JFE-ASA400D (6~50)	AR or N	≦0.14	≦0.55	0.30/ 0.70	≦0.030	≦0.020	0.25/ 0.50	≦0.50	—	—	0.05/ 0.20	≦0.10		t≦16 16<t≦40 40<t	≧245 ≧235 ≧215	≧400	t≦16 16<t	≧18 ≧21	No.1A No.1A	1.5t
JFE-ASA400H (6~50)	AR or N	≦0.14	≦0.55	0.30/ 0.70	≦0.030	≦0.020	0.25/ 0.50	≦0.50	0.50/ 1.00	≦0.10	—	—		t≦16 16<t≦40 40<t	≧245 ≧235 ≧215	≧400	t≦16 16<t	≧18 ≧21	No.1A No.1A	1.5t
JFE-ASA400W (6~50)	AR or N	≦0.14	≦0.55	0.30/ 0.70	≦0.030	≦0.020	0.25/ 0.50	≦0.50	0.50/ 1.00	≦0.10	0.05/ 0.20	≦0.10		t≦16 16<t≦40 40<t	≧245 ≧235 ≧215	≧400	t≦16 16<t	≧18 ≧21	No.1A No.1A	1.5t
JFE-ASA440D (6~25.4)	AR or N	≦0.17	≦0.55	0.30/ 0.70	≦0.030	≦0.020	0.25/ 0.50	≦0.50	—	—	0.05/ 0.20	≦0.10		—	≧265	≧440	t≦16 16<t	≧17 ≧21	No.1A No.1A	1.5t
JFE-ASA440H (6~25.4)	AR or N	≦0.17	≦0.55	0.30/ 0.70	≦0.030	≦0.020	0.25/ 0.50	≦0.50	0.50/ 1.00	≦0.10	—	—		—	≧265	≧440	t≦16 16<t	≧17 ≧21	No.1A No.1A	1.5t
JFE-ASA440W (6~25.4)	AR or N	≦0.17	≦0.55	0.30/ 0.70	≦0.030	≦0.020	0.25/ 0.50	≦0.50	0.50/ 1.00	≦0.10	0.05/ 0.20	≦0.10		—	≧265	≧440	t≦16 16<t	≧17 ≧21	No.1A No.1A	1.5t

Hydrogen Induced Crack Resistant Steel Plates

Designation (Thickness mm)	Heat Treatment	Chemical Composition (%)							Tensile Test			Bending Test (180°)
		C	Si	Mn	P	S	Cu	others	Yield Point or Proof Stress (N/mm ²)	Tensile Strength (N/mm ²)	Elongation (%)	Bending Radius Test Specimen No. 1
JFE-AH1 (6~200)	According to required Specification	According to required Specification				≤0.005	0.25/ 0.40	—	According to required Specification			According to required Specification
JFE-AH2 (6~200)	According to required Specification	According to required Specification				<0.001	—	Ca Treatment	According to required Specification			According to required Specification

Pure Iron Plates for Magnetic Shielding

Designation (Thickness mm)	Chemical Composition (%)				
	C	Si	Mn	P	S
JFE-EFE (6~260)	≤0.01	≤0.05	≤0.20	≤0.015	≤0.015

Steel Plates for Mold

Designation (Thickness mm)	Chemical Composition (%)							
	C	Si	Mn	P	S	Cr	Mo	V
JFE-MD1 (6~265)	0.52/ 0.58	0.15/ 0.35	0.60/ 0.90	≤0.030	≤0.035	—	—	—
JFE-MD3 (6~260)	0.37/ 0.44	0.15/ 0.35	0.55/ 0.90	≤0.030	≤0.035	0.85/ 1.25	0.15/ 0.35	—
JFE-MD5 (6~260)	0.28/ 0.33	0.15/ 0.35	0.40/ 0.90	≤0.030	≤0.035	0.80/ 1.50	0.15/ 0.40	0.05/ 0.07

Steel Plates for Hot-dip Zinc-coated Tower Structure

Designation (Thickness mm)	Chemical Composition (%)											Tensile Test					Impact Test (2mmV Charpy)		
	C	Si	Mn	P	S	Cu, Ni, Cr, Mo, V, Nb, Ti	Zr	B	Ceq	CEZ*		Yield Point or Proof Stress (N/mm²)	Tensile Strength (N/mm²)	Elongation			Test Temperature		Absorbed Energy
														Thickness (mm)	(%)	Test Specimen	Thickness (mm)	(°C)	
JFE-HITEN 590AZ (6~25)	≤0.12	≤0.40	≤2.00	≤0.030	≤0.015	Added as required on condition that Nb+V+Ti≤0.15	≤0.040	≤0.0002	≤0.40	≤0.44		≥440	590/740	t≤16 16<t	≥19 ≥26	No. 5 No. 5	12<t	−5	≥47

*CEZ(Carbon Equivalent Zinc)=C+Si/17+Mn/7.5+Cu/13+Ni/17+Cr/4.5+Mo/3+V/1.5+Nb/2+Ti/4.5+420B

Steel Plates for Rocket

Designation (Thickness mm)	Chemical Composition (%)														Thickness (mm)	Tensile Test			Bending Test (180°)	Hardness Test
	C	Si	Mn	P	S	Ni	Cr	Co	Mo	Ti	Al	Zn	B	V		0.2%Proof Stress (Kgf/mm ²)	Tensile Strength (Kgf/mm ²)	Elongation (%)	Bending Radius Test Specimen No. 1	HRC
JFE-HT140NP (2~30)	0.14/ 0.18	≤0.35	0.60/ 0.90	≤0.010	≤0.010	3.90/ 4.30	1.60/ 2.00	—	0.45/ 0.65	—	—	—	—	0.07/ 0.13	2.0≤t≤2.5 t=4.0 6.5≤t≤15.0 t=30.0	— ≤90 ≤90 —	≤125 ≤105 ≤105 ≤120	≥8 ≥13 ≥13 ≥9	7.5t 2.0t 3.0t 3.0t	≤39 ≤34 ≤34 ≤37
JFE-HT210P (by agreement)	≤0.005	≤0.05	≤0.07	≤0.005	≤0.005	17.50/ 18.50	≤0.50	8.30/ 9.30	4.70/ 5.50	0.40/ 0.60	0.05/ 0.10	0.01/ 0.04	0.001/ 0.005	—	—	185/ 205	190/ 215	≥7	—	—



SHIP'S CLASS STANDARD

Hull Structural Steel Plates

Society	Grade
ABS	A, B, D, E AH32, DH32, EH32, FH32 AH36, DH36, EH36, FH36 AH40, DH40, EH40, FH40 AQ43, DQ43, EQ43
BV	A, B, D, E AH32, DH32, EH32, FH32 AH36, DH36, EH36, FH36 AH40, DH40, EH40, FH40
CCS	A, B, D, E A32, D32, E32, F32 A36, D36, E36, F36 A40, D40, E40, F40
CR	A, B, D, E AH32, DH32, EH32, FH32 AH36, DH36, EH36, FH36 AH40, DH40, EH40, FH40
DNV	NV A, NV B, NV D, NV E NV A27S, NV D27S, NV E27S NV A32, NV D32, NV E32, NV F32 NV A36, NV D36, NV E36, NV F36 NV A40, NV D40, NV E40, NV F40 NV D420, NV E420, NV F420
GL	A, B, D, E A32, D32, E32, F32 A36, D36, E36, F36 A40, D40, E40, F40
KR	RA, RB, RD, RE RA32, RD32, RE32 RA36, RD36, RE36 RA40, RD40, RE40 RA43, RD43, RE43, RF43 RA47, RD47, RE47
LR	A, B, D, E AH27S, DH27S, EH27S AH32, DH32, EH32, FH32 AH36, DH36, EH36, FH36 AH40, DH40, EH40, FH40 DH42, EH42 DH46, EH46 DH50, EH50 DH55, EH55 DH62, EH62 DH69, EH69
RS	A, B, C, D AH32, DH32, EH32, FH32 AH36, DH36, EH36, FH36 AH40, DH40, EH40, FH40

Society	Grade
NK	KA, KB, KD, KE KA32, KD32, KE32, KF32 KA36, KD36, KE36, KF36 KA40, KD40, KE40, KF40 KA43, KD43, KE43, KF43 KA47, KD47, KE47, KF47 KA51, KD51, KE51, KF51 KA56, KD56, KE56 KA63, KD63, KE63 KA63N, KD63N KA70, KD70, KE70, KF70 KA70N, KD70N, KE70N, KF70N
RINA	A, B, D, E A32, D32, E32, F32 A36, D36, E36, F36 A40, D40, E40, F40
ZC	A, B, D, E A32, D32, E32 A36, D36,E36

Steel Plates for Low Temperature Services

Society	Grade
ABS	V-OXX VH-OXX
DNV	NV2-2 NV2-3 NV2-4 NV2-4L NV4-2 NV4-3 NV4-4 NV4-4L NV 9Ni
LR	LT-AH27S, DH27S, EH27S, FH27S LT-AH32, DH32, EH32, FH32 LT-AH36, DH36, EH36, FH36 LT-AH40, DH40, EH40, FH40 3.5Ni 9Ni
NK	KL24A, KL24B KL33 KL37 K5T-50Q KL2N30 KL3N32 KL9N60

Steel Plates for Boiler & Pressure Vessels

Society	Grade
ABS	MA, MB, MC, MD, ME, MF, MG H, I, J
BV	360, 410, 460, 510 0.3Mo 1Mn0.5Mo
CR	1-410, 1-450, 1-480 2-450, 2-480 0-235, 0-315, 0-355
DNV	NV360-0A, -0N, -1FN NV410-0A, -0N,- 1FN NV490-0N, -1FN NV510-1FN NV 0.3Mo NV 1Cr0.5Mo NV 2.25Cr1Mo
GL	H1,H2 17Mn4,19Mn6 13CrMo4-5 10CrMo9-10
KR	RSP42, 46, 49 RSP46A, 49A RPV24, 32, 36, 46, 50
LR	360AR, 410AR, 460AR 360, 410, 460, 490 360FG, 410FG, 460FG, 490FG
NK	KP42, KP46, KP49 KPA46, KPA49 KPV24, KPV32, KPV36, KPV46 KPV50

Stainless Steel Plates

Society	Grade
DNV	304L, 304LMod 316L, 316LMod, 316LN 317L, 317LMod 321 347
LR	304L, 304LMod, 304LN 316L, 316LMod, 316LN 317L, 317LN
NK	304, 304Mod, 304Mod1 304L, 304LMod 309S, 310S 316, 316Mod 316L, 316LMod, 316LN 317 317L, 317LMod, 317LN 321 347 Ni5Mo, Ni5

Japan Welding Engineering Society (WES)

Without Heat Treatment

JFE Brand	WES3001	
	Grade	Thickness (mm)
JFE-HITEN540S	HW355RA	≦30
JFE-HITEN590SB	HW450NA	≦26
JFE-HITEN590	HW450QB	≦100
JFE-HITEN590L	HW450QB	≦50
JFE-HITEN590U2	HW450QB	≦75
JFE-HITEN590E	HW450QB	≦75
JFE-HITEN590U2L	HW450QB	≦75
JFE-HITEN610	HW450QB	≦100
JFE-HITEN610U2	HW490QB	≦75
JFE-HITEN610E	HW490QB	≦75
JFE-HITEN610U2L	HW490QB	≦75
JFE-HITEN610L	HW450QB	≦50
JFE-HITEN690	HW550QB	≦50
JFE-HITEN690L	HW550QB	≦40
JFE-HITEN710	HW620QB	≦50
JFE-HITEN780F	HW685QB	≦50
JFE-HITEN780M	HW685QB	≦100
JFE-HITEN980	HW885QB	≦100

JFE Brand	WES3009	
	Grade	Thickness (mm)
JFE-HITEN590U2	HW450QCF	≦75
JFE-HITEN610U2	HW490QCF	≦75
JFE-HITEN590E	HW450QCF	≦75
JFE-HITEN610E	HW490QCF	≦75
JFE-HITEN590U2L	HW450QCF	≦75
JFE-HITEN610U2L	HW490QCF	≦75

JFE Brand	WES3003
JFE-HITEN590L	LT450-VI-65G-25A
JFE-HITEN590U2L	LT450-75-50G
JFE-HITEN610L	LT490-Ⅲ-80G-50A LT490-Ⅳ-70G-40A LT490-V-60G-20A LT490-VI-60G-20A
JFE-HITEN610U2L	LT490-75-50G
JFE-HITEN690L	LT550-Ⅰ-120G-90A LT550-Ⅱ-120G-80A LT550-Ⅳ-80G-40A
JFE-HITEN710L	LT63-Ⅰ-90G-60A LT63-Ⅲ-80G-50A LT63-V-70G-40A
JFE-HITEN780L	LT70-Ⅱ-60G-40A LT70-Ⅳ-50G-30A LT70-VI-50G-30A
JFE-HITEN780FL	LT685-V-90G-40A
JFE-LT1.5Ni-TM	LT370-V-140G-120A

		Product Length: m																					
Width (mm) Thickness (mm)	1000 ~ 1400	1401 ~ 1600	1601 ~ 1800	1801 ~ 2000	2001 ~ 2200	2201 ~ 2400	2401 ~ 2600	2601 ~ 2800	2801 ~ 3000	3001 ~ 3200	3201 ~ 3400	3401 ~ 3600	3601 ~ 3800	3801 ~ 4000	4001 ~ 4200	4201 ~ 4400	4401 ~ 4600	4601 ~ 4800	4801 ~ 5000	5001 ~ 5200	5201 ~ 5300	5301 ~ 5350	
																	22	22	19	16	13.5	13.5	
6.0~6.9																			22	20	16	13.5	13.5
7.0~9.0	25																		22	20	16	13.5	13.5
9.1~11.9																			20	20	20	16	
12.0~13.9																					22	16	
14.0~25.0																			25			16	
25.1~28.0	27																25					16	
28.1~32.0											25				24	23	20	16					
32.1~38.0											25		24	23	22	21	20	19	18	16			
38.1~45.0												24	23	23	20	19	19	18	17	16	16	16	
45.1~50.0	25								23	22	21	20	20	18	17	16	16	15	14	14	14		
50.1~55.0							24	24	21	21	20	19	18	18	16	16	15	14	14	13	13	13	
55.1~60.0							24	22	21	19	19	17	16	16	15	14	13	13	12	12	12	11	
60.1~65.0					24	23	21	20	18	18	17	16	15	15	14	13	12	12	11	11	10	9.5	
65.1~70.0				24	24	22	21	19	18	17	16	15	14	14	13	12	12	11	11	10	10	9.5	
70.1~75.0	24	23	24	23	21	20	18	17	15	15	15	14	13	13	12	11	11	10	10	9.2	9	8.5	
75.1~80.0	23	23	22	21	21	19	18	17	15	14	14	13	12	12	11	11	10	10	9.6	9.2	9	8.5	
80.1~90.0	20	20	20	19	19	17	16	15	14	13	12	11	11	10	10	9.7	9.2	8.8	8.5	8.2	8	7.5	
90.1~100.0	18	18	18	17	17	15	14	13	12	11	11	10	10	9.6	9.1	8.7	8.3	8	7.6	7.3			
100.1~110.0	16	16	16	16	15	14	13	12	11	10	10	9.7	9.1	9	8.3	8	7.6	7.2	7	6.7 5.8			
110.1~120.0	15	15	15	14	14	13	12	11	10	10	9.4	8.8	8.4	8	7.6	7.2	6.9 6.0	6.6 5.8	6	6			
120.1~130.0	14	14	14	13	13	12	11	10	9.8	9.2	8.6	8.2	7.7	7.3	7.0	6.7 5.8	6	6	5.1	5.3			
130.1~140.0	13	13	13	12	12	11	10	9.7	9	8.5	8	7.5	7.1	7	6	6	5.1	5.1	5.1	5.3			
140.1~150.0	12	12	12	11	11	10	9.7	9.1	8.4	7.9	7.4	7	6.7 5.8	6	6	5	5	5					
150.1~160.0	11	11	11	10	10	9.9	9.1	8.5	7.9	7.4	7.0 6.0	6.6 5.7	6	6	5	5							
160.1~170.0	10	10	10	10	10	9.3	8.6	8	7.4	6.7 6.0	6.6 5.7	6	5.1	5	5	4.4							
170.1~180.0	10	10	10	9	9.4	8.8	8.1	7.6	7.1	6.6 5.8	6.2	5.1	5	5	4.4	Not available							
180.1~190.0	9	9	9	9	8.9	8.3	7.7	7.1	6.7 5.8	5.4	5.1	4.8	4.5	4.3									
190.1~200.0	9	8.2	8.2	8	8.5	7.9	7.3	6.8 5.9	5.5	5.1	4.8	4.6	4.3	4.1									

1. In case of the diagonal-lined column

A	B
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, "A" shows the maximum product length.
And the product length between "B" and 6.1m can not be provided.
2. The minimum product size is as follows: 1m wide and 3m long.
3. Please consult with JFE prior to ordering the product width between 5,201 and 5,350mm.
4. 30m length for limited thickness and width is available. Please consult with us.
5. For carbon steel plates for machine structural use,and for chromium-molybdenum steel plates,the minimum width is 1,500mm.

AVAILABLE SIZES

Heat Treated

		Product Length: m																							
Width (mm)	Thickness (mm)	1000	1601	1801	2001	2201	2401	2601	2801	3001	3201	3401	3601	3801	4001	4201	4401	4601	4801	5001	5201	5301			
		~1600	~1800	~2000	~2200	~2400	~2600	~2800	~3000	~3200	~3400	~3600	~3800	~4000	~4200	~4400	~4600	~4800	~5000	~5200	~5300	~5350			
6.0~6.9												22	20	15	13										
7.0~7.9													24	22	20	15	Not available								
8.0~8.9															22	18	16	13	11						
9.0~9.9																	22	20	16	12					
10.0~11.9																				22	20	18	Negotiable range		
12.0~13.9																					22				
14.0~26.0												25													
26.1~28.0																									
28.1~30.0																			24	24	22				
30.1~35.0																24	24	23	22	21	21	20			
35.1~40.0																	24	23	22	21	20	19			
40.1~45.0																		23	22	20	19	18			
45.1~50.0																			23	22	20	19			
50.1~60.0																				24	24	22		20	
60.1~70.0			23	20	24	22	20	19	17	16	15	14	14	13	12	12	11	11	10	10	10				
70.1~80.0	22	20	18	21	19	18	16	15	14	13	13	12	11	11	10	10	9.7	9.3	8.9	8.7					
80.1~90.0	20	18	16	19	17	16	14	13	13	12	11	10	10	9.8	9.4	8.9	8.5	8.3	7.9						
90.1~100.0	18	16	14	17	15	14	13	12	11	10	10	9.8	9.3	8.8	8.4	8.0	7.7	7.3	7.0						
100.1~110.0	16	14	13	15	14	13	12	11	10	9.9	9.4	8.8	8.4	8.0	7.6	7.3	6.9	6.6	6.4	6.2	6.0	5.8			
110.1~120.0	15	13	12	14	13	11	11	10	9.7	9.1	8.5	8.1	7.7	7.3	6.9	6.6	6.3	6.0	5.7	5.4	5.2	5.0			
120.1~130.0	13	12	11	13	11	11	10	9.5	8.9	8.3	7.9	7.3	7.0	6.7	6.4	6.1	5.8	5.5	5.2	5.0					
130.1~140.0	11	10	9.7	11	10	9.7	9.4	8.7	8.2	7.7	7.2	6.8	6.5	6.2	5.9	5.6	5.3	5.0	4.8						
140.1~150.0	10	10	9.6	10	9.7	9.4	8.7	8.1	7.6	7.1	6.7	6.4	6.1	5.8	5.5	5.2	4.9								
150.1~160.0	9.7	9.7	9.0	9.7	9.6	8.8	8.2	7.6	7.1	6.7	6.3	6.0	5.7	5.4	5.1	4.8									
160.1~170.0	9.4	9.4	8.4	9.7	9.0	8.3	7.7	7.1	6.7	6.3	6.0	5.7	5.4	5.1	Not available										
170.1~180.0	8.9	8.9	7.9	9.1	8.5	7.8	7.3	6.8	6.3	6.0	5.7	5.4	5.1												
180.1~190.0	8.4	8.4	7.5	8.6	8.0	7.4	6.8	6.3	6.0	5.7	5.4	5.1													
190.1~200.0	7.9	7.9	7.1	8.2	7.6	7.0	6.5	6.0	5.7	5.4	5.1	4.8													

1. In case of the diagonal-lined column , "A" shows the maximum product length.
And the product length between "B" and 6.1m can not be provided.
2. The minimum product size is as follows: 1m wide and 3m long.
3. Please consult with JFE prior to ordering the product width between 5,201 and 5,350mm.
4. 30m length for limited thickness and width is available. Please consult with us.
5. For carbon steel plates for machine structural use, and for chromium-molybdenum steel plates, the minimum width is 1,500mm.

Abrasion Resistant Steel Plates

		Product Length: m																				
Width (mm) Thickness (mm)	1500 ~ 1800	1801 ~ 2000	2001 ~ 2200	2201 ~ 2400	2401 ~ 2600	2601 ~ 2800	2801 ~ 3000	3001 ~ 3200	3201 ~ 3400	3401 ~ 3600	3601 ~ 3800	3801 ~ 4000	4001 ~ 4200	4201 ~ 4400	4401 ~ 4600	4601 ~ 4800	4801 ~ 5000	5001 ~ 5200	5201 ~ 5300			
6.0~6.9	18	16	14	12	12	10	Not available															
7.0~7.9	18	16	14	12	12	10																
8.0~8.9	18	16	14	12	12	10																
9.0~9.9	18	16	14	12	12	10																
10.0~11.9	22	20	18	16	14	14	12	Not available														
12.0~12.9	22	20	18	16	14	14	12															
13.0~13.9	22	20	18	16	14	14	12															
14.0~22.0	22	20	18	16	14	14	12															
22.1~24.0	24	22	22	20	18	16	14	12	Not available													
24.1~26.0		24	22	22	20	18	16	14												12		
26.1~28.0			24	24	22	22	20	18												16	14	12
28.1~30.0						24	22	20												20	18	18
30.1~35.0							24	22	22	22	20	20	20	18	18	18	Not available					
35.1~40.0				25				24	22	22	22	20	20	20	19	18						
40.1~45.0									24	23	22	20	19	19	18	17				16	16	
45.1~50.0								23	22	20	20	18	17	17	16	15				15	14	
50.1~60.0		23	23	21	24	22	20	19	18	17	16	15	14	14	13	13	12	11	Not available			
60.1~70.0	22	19	20	18	20	19	17	16	15	14	14	13	12	12	11	11	10	10				
70.1~80.0	19	17	17	16	18	16	15	14	13	13	12	11	11	10	10	9.7	9.3	8.9				
80.1~90.0	17	15	15	14	16	14	13	13	12	11	11	10	9.8	9.4	8.9	8.6	8.2	7.9				
90.1~100.0	15	13	14	12	14	13	12	11	10	10	10	9.3	8.8	8.4	8.0	7.7	7.4	7.1				

AVAILABLE SIZES

Extra-Heavy Steel Plates

Without Heat Treatment

Product Length: m							
Width (mm) Thickness (mm)	1000~2500	2501~3000	3001~3500	3501~4000	4001~4500	4501~5000	5001~5300
~100							
101~125						14.3	13.5
126~150	15.0			14.9	13.2	11.9	11.2
151~175			14.6	12.7	11.3	10.2	9.6
176~200		14.9	12.7	11.1	9.9	8.9	8.4
201~225		13.2	11.3	9.9	8.8	7.9	7.5
226~250	14.3	11.9	10.2	8.9	7.9	7.1	6.7
251~275	13.0	10.8	9.3	8.1	7.2	6.5	6.1
276~300	11.9	9.9	8.5	7.4	6.6	5.9	5.6
301~325	11.0	9.1	7.8	6.8	6.1	5.5	Not available
326~360	10.2	8.5	7.3	6.4	5.7	5.1	

1. Maximum weight of product is 70t.

Heat Treated

		Product Length: m						
Width (mm)		1000～2500	2501～3000	3001～3500	3501～4000	4001～4500	4501～5000	5001～5300
Thickness (mm)								
～100								
101～125								
126～150		13.5				13.2	11.9	11.2
151～175					12.7	11.3	10.2	9.6
176～200				12.7	11.1	9.9	8.9	8.4
201～225		13.2		11.3	9.9	8.8	7.9	7.5
226～250		11.9		10.2	8.9	7.9	7.1	6.7
251～275	13.0	10.8	9.3	8.1	7.2	6.5	6.1	
276～300	11.9	9.9	8.5	7.4	6.6	5.9	5.6	
301～325	11.0	9.1	7.8	6.8	6.1	5.5	Not available	
326～360	10.2	8.5	7.3	6.4	5.7	5.1		

1. Please consult with JFE prior to ordering the product,whose width is over 5,000mm.

Please consult with JFE about applicable specification or designation.

Stainless Steel Plates

Austenitic Stainless Steel Plates- I (SUS304, 304L)

		Product Length: m													
Width (mm)	1000 ~1199	1200 ~1600	1601 ~1800	1801 ~2000	2001 ~2200	2201 ~2400	2401 ~2600	2601 ~2800	2801 ~3000	3001 ~3200	3201 ~3400	3401 ~3600	3601 ~3800	3801 ~4000	
Thickness (mm)															
6.0~6.9												Not available			
7.0~7.9															
8.0~8.9															
9.0~9.9	13.5														
10.0~14.9															
15.0~19.9															
20.0~24.9												12.5	12.0	11.0	10.5
25.0~29.9								12.5	11.5	11.0	10.5	9.5	9.0	8.5	
30.0~34.9	13.0					12.5	11.5	11.0	10.0	9.5	9.0	8.5	7.5	7.0	
35.0~39.9					12.0	11.0	10.0	9.5	9.0	8.0	7.5	7.0	6.5	6.0	
40.0~49.9				11.5	10.5	9.5	8.5	8.0	7.5	7.0	6.5	6.0	5.0	5.0	
50.0~59.9	12.0	11.0	10.0	9.0	8.0	7.0	6.5	6.0	5.5	4.5	4.5	4.0	4.0	4.0	
60.0~69.9	10.5	9.5	8.5	7.5	7.0	6.0	5.5	5.5	3.5	3.5	3.5				
70.0~79.9	9.5	8.0	7.0	6.5	6.0	5.5	3.0	3.0	3.0						
80.0~89.9	8.0	7.0	6.5	5.5	5.5	3.0	3.0	3.0	3.0						
90.0~99.9	7.0	6.5	5.5	5.0											
100.0~130.0	7.0	5.5	4.5												

Notes: 1. Minimum size is 1m wide and 2m long.
2. The maximum product thickness for shipbuilding use are listed on the right table.

◆Max.thickness for shipbuilding use (mm)		
NK	LR	NV
55	55	50

Austenitic Stainless Steel Plates- II (SUS316, 316L)

		Product Length: m															
Width (mm)	1000 ~1199	1200 ~1600	1601 ~1800	1801 ~2000	2001 ~2200	2201 ~2400	2401 ~2600	2601 ~2800	2801 ~3000	3001 ~3200	3201 ~3400	3401 ~3600	3601 ~3800	3801 ~4000			
Thickness (mm)												Not available					
6.0~6.9	13.5																
7.0~7.9																	
8.0~8.9																	
9.0~9.9																	
10.0~14.9																	
15.0~19.9																	
20.0~24.9												12.5	12.0	11.0	10.5		
25.0~29.9	13.0							12.5	11.5	11.0	10.5	9.5	9.0	8.5			
30.0~34.9								12.5	11.5	11.0	10.0	9.5	9.0	8.5	7.5	7.0	
35.0~39.9								12.0	11.0	10.0	9.5	9.0	8.0	7.5	7.0	6.5	6.0
40.0~49.9								11.5	10.5	9.5	8.5	8.0	7.5	7.0	6.5	6.0	5.0
50.0~59.9	12.0	11.0	10.0	9.0	8.0	7.0	6.5	6.0	5.5	4.5	4.5	4.0	4.0	4.0			
60.0~69.9	10.5	9.5	8.5	7.5	7.0	6.0	5.5	5.5	3.5	3.5	3.5	Not available					
70.0~80.0	9.0	8.0	7.0	6.5	6.0	5.5	3.0	3.0	3.0	3.0							

Notes: 1. Minimum size is 1m wide and 2m long.
2. The maximum product thickness for shipbuilding use are listed on the right table.

◆Max.thickness for shipbuilding use (mm)		
NK	LR	NV
55	55	50

Austenitic Stainless Steel Plates-Ⅲ (SUS317L)

		Product Length: m													
Width (mm)	1000 ~1199	1200 ~1600	1601 ~1800	1801 ~2000	2001 ~2200	2201 ~2400	2401 ~2600	2601 ~2800	2801 ~3000	3001 ~3200	3201 ~3400	3401 ~3600	3601 ~3800	3801 ~4000	
Thickness (mm)															
6.0~6.9	13.5							Not available							
7.0~7.9															
8.0~8.9															
9.0~9.9															
10.0~14.9															
15.0~19.9				12.5	11.5	10.5	10.0	9.0	8.5	7.5	7.5	7.5	7.0		
20.0~24.9			12.5	11.0	10.0	9.0	8.5	8.0	7.5	6.0	6.0	6.0	6.0	5.5	
25.0~29.9	13.0	11.5	10.5	9.0	8.5	7.5	7.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	
30.0~34.9	13.0	10.0	9.0	8.0	7.0	6.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
35.0~39.9	11.5	8.5	7.5	7.0	6.0	3.5	3.5	3.5	3.5	3.5	3.5	Not available			
40.0~50.0	9.0	7.0	6.0	5.5	3.0	3.0	3.0	3.0	3.0						

Notes: 1. Minimum size is 1m wide and 2m long.
2. The maximum plate thickness for shipbuilding use are listed in the right table.

◆Max.thickness for shipbuilding use (mm)		
NK	LR	NV
55	55	50

Austenitic Stainless Steel Plates-Ⅳ (SUS310S)

		Product Length: m													
Width (mm)	Thickness (mm)	1000 ~1600	1601 ~1800	1801 ~2000	2001 ~2200	2201 ~2400	2401 ~2600	2601 ~2800	2801 ~3000	3001 ~3200	3201 ~3400	3401 ~3600	3601 ~3800	3801 ~4000	
6.0~6.9															
7.0~7.9															
8.0~8.9															
9.0~9.9		13.5													
10.0~14.9										12.5	11.5	11.0	10.0	10.0	9.5
15.0~19.9					12.5	11.5	10.5	10.0	9.0	8.5	7.5	7.5	7.5	7.0	
20.0~25.0				12.5	10.0	9.0	8.5	8.0	7.5	6.0	6.0	6.0	5.9	5.5	
		Not available													

Notes: 1. Minimum size is 1m wide and 2m long.
2. The maximum plate thickness for shipbuilding use are listed in the right table.

◆Max.thickness for shipbuilding use (mm)	
NK	
25	

Ferritic and Martensitic Stainless Steel Plates (SUS410、410L、410S、430)

		Product Length: m														
Width (mm)	Thickness (mm)	1000 ~1199	1200 ~1600	1601 ~1800	1801 ~2000	2001 ~2200	2201 ~2400	2401 ~2600	2601 ~2800	2801 ~3000	3001 ~3200	3201 ~3400	3401 ~3600	3601 ~3800	3801 ~4000	
6.0~6.9	13.5											Not available				
7.0~7.9																
8.0~8.9																
9.0~9.9																
10.0~14.9															13.0	12.5
15.0~19.9											12.5	11.5	11.0	10.5	10.0	9.5
20.0~24.9								12.5	11.5	10.5	10.0	9.5	8.5	8.5	8.0	7.5
25.0~29.9		12.5	12.5	12.5	12.5	11.5	10.5	9.5	9.0	8.0	7.5	7.0	7.0	6.5	6.0	
30.0~34.9	12.5	12.5	12.0	10.5	9.5	9.0	8.0	7.5	7.0	6.5	6.0	6.0	5.5	5.0		
35.0~39.9	12.5	11.5	10.5	9.0	8.5	7.5	7.0	6.5	6.0	5.5	5.0	5.0	4.5	4.5		
40.0~50.0	12.5	9.0	8.0	7.0	6.5	6.0	5.5	5.0	4.0	4.0	4.0	4.0	Not available			

Notes: 1. Minimum size is 1m wide and 2m long.

Clad Steel Plates

Stainless Clad Steel Plates : One side cladding (Austenitic, ferritic and Martensitic stainless steel)

		Product Length: m													
Width (mm) Thickness (mm)	1000 ~1500	1501 ~1800	1801 ~2000	2001 ~2200	2201 ~2400	2401 ~2600	2601 ~2800	2801 ~3000	3001 ~3200	3201 ~3400	3401 ~3600	3601 ~3800	3801 ~4000	4001 ~4200	4201 ~ (5000)
6.0~8.0	13														Not available
8.1~10.0	15														
10.1~16.0	17	17	17	17	17	17	17	17	17	17	17	17	16	15	Negotiable range
16.1~18.0	17	17	17	17	17	17	17	17	17	17	16	15	14	14	
18.1~20.0	17	17	17	17	17	17	17	17	16	15	14	14	14	14	
20.1~22.0	17	17	17	17	17	17	17	16	15	14	14	14	14	14	
22.1~24.0	17	17	17	17	17	16	15	14	14	14	14	14	14	14	
24.1~26.0	17	17	17	17	16	15	14	14	14	14	14	14	14	14	
26.1~28.0	17	17	17	17	15	14	14	14	14	14	14	14	14	14	
28.1~30.0	17	17	17	16	14	14	14	14	14	14	14	14	14	14	
30.1~32.0	16	16	16	15	14	14	14	14	14	14	14	14	14	14	
32.1~34.0	15			14	14	14	14	14	14	14	14	14	14	14	
34.1~36.0	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
36.1~38.0	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
38.1~40.0	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
40.1~50.0	14	14	14	14	14	14	14	14	14	13	12		11		
50.1~60.0	14	14	14	14	14	14	13	12		11	10		9.5	9	
60.1~70.0	14	14	14	14	13	12	11		10	9.5	9	8.5	8	7.5	
70.1~80.0	14	14	13		12	11	10	9.5	9	8		7		6.5	
80.1~90.0	14	14	12	11	10	9.5	9	8		7		6.5	6		
90.1~100.0	12		11	10	9	8.5	8	7.5	7	6.5	6	5.5		5	
100.1~119.0	11	10.5	9.5	8.5	8	7	6.5	6		5.5	5		4.5	Not available	
119.1~150.0	Negotiable range														

Notes: 1. Thickness is a total of base metal and cladding metal.
2. Minimum cladding metal thickness is 1.5 mm. For less than 2mm in thickness, please consult with JFE.
3. Thickness of cladding metal depends on total thickness of clad plate. Please consult with JFE for more detail.
4. Minimum size is 1m wide and 3m long.
5. Above size is restricted in case of a heat treated product.
6. For dimensions other than above, please consult with JFE.

Titanium Clad Steel Plates

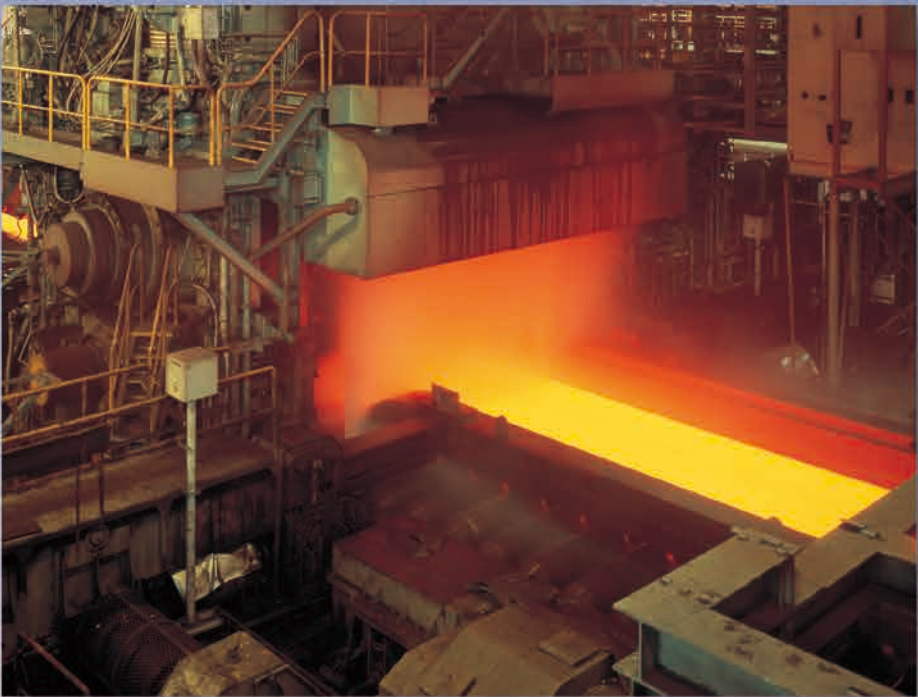
Product Length: m								
Width (mm) Thickness (mm)	1000 ~2000	2001 ~2500	2501 ~3000	3001 ~3200	3201 ~3400	3401 ~3600	3601 ~3800	3801 ~3900
5.0~ 5.9	Negotiable range							
6.0~ 8.0	10			Not available				
8.1~10.0			9					
10.1~12.0	11							
12.1~16.0							9	8
16.1~20.0								7
20.1~24.0						9	7	6
24.1~28.0				9		8	6	5
28.1~30.0	10					7.5		
30.1~32.0			8			6	5.5	Not available
32.1~34.0			9					
34.1~36.0					6			
36.1~38.0								
38.1~40.0			7.5					

Notes: 1. Thickness is a total of base metal and clad metal.
2. Maximum dimension of product varies according to its application. Please consult with JFE for each case.

When placing an order for steel plate with JFE, please specify the following items ;

- | | |
|---|--|
| 1 | Standard and Grade or Brand name |
| 2 | Dimensions |
| 3 | Quantity |
| 4 | Specific requirements ;
Chemical composition, Mechanical property, Ultra-sonic inspection, Heat treatment, Marking, Packaging, etc |
| 5 | Forming and Welding ;
Cold, and/or hot working, Heat treatment, Welding method, etc |
| 6 | Witness inspection, if required ;
Mill certificate, Third party's certificate, Necessity of witness and its contents |
| 7 | Delivery requirements ;
First and final delivery date, Starting date of work, Date of receiving inspection, Final planning date of work, Destination, etc |
| 8 | Other information that may be significant for manufacturing the ordered product |

If you have any question upon placing an order, please contact JFE's head office or other JFE offices.



JFE Steel Corporation

<http://www.jfe-steel.co.jp/en/>

TOKYO HEAD OFFICE	Hibiya Kokusai Building, 2-3 Uchisaiwaicho 2-chome, Chiyodaku, Tokyo 100-0011, Japan Phone : (81)3-3597-3111 Fax : (81)3-3597-4860
NEW YORK OFFICE	JFE Steel America, Inc., New York Office 600 Third Avenue, 12th Floor, New York, NY 10016, U.S.A. Phone : (1)212-310-9320 Fax : (1)212-308-9292
HOUSTON OFFICE	JFE Steel America, Inc., Houston Office 10777 Westheimer, Suite 230, Houston, TX 77042, U.S.A. Phone : (1)713-532-0052 Fax : (1)713-532-0062
BRISBANE OFFICE	JFE Steel Australia Resources Pty Ltd. Level 19, CPA Centre, 307 Queen St, Brisbane, QLD 4001, Australia Phone : (61)7-3229-3855 Fax : (61)7-3229-4377
RIO DE JANEIRO OFFICE	JFE Steel do Brasil LTDA / JFE Steel Corporation, Rio de Janeiro Office Praia de Botafogo, 228 Setor B, Salas 508 & 509, Botafogo, CEP 22250-040, Rio de Janeiro-RJ, Brazil Phone : (55)21-2553-1132 Fax : (55)21-2553-3430
LONDON OFFICE	JFE Steel Europe Limited 15th Floor, The Broadgate Tower, 20 Primrose Street, London EC2A 2EW, U.K. Phone : (44)20-7426-0166 Fax : (44)20-7247-0168
DUBAI OFFICE	JFE Steel Corporation, Dubai Office P.O.Box 261791 LOB19-1208, Jebel Ali Free Zone Dubai, U.A.E. Phone : (971)4-884-1833 Fax : (971)4-884-1472
NEW DELHI OFFICE	JFE Steel India Private Limited 1101, 11th Floor, Unitech's Signature Tower, Tower-A, South City-I, NH-8, Gurgaon, Haryana, 122002, India Phone : (91)124-426-4981 Fax : (91)124-426-4982
MUMBAI OFFICE	JFE Steel India Private Limited Mumbai Office 308, A Wing, 215 Atrium, Andheri - Kurla Road, Andheri (East), Mumbai - 400093, Maharashtra, INDIA Phone : (91)22-3076-2760 Fax : (91)22-3076-2764
SINGAPORE OFFICE	JFE Steel Asia Pte. Ltd. 16 Raffles Quay, No. 15-03, Hong Leong Building, 048581, Singapore Phone : (65)6220-1174 Fax : (65)6224-8357
BANGKOK OFFICE	JFE Steel (Thailand) Ltd. / JFE Steel Corporation, Bangkok Office 22nd Floor, Abdulrahim Place 990, Rama IV Road, Bangkok 10500, Thailand Phone : (66)2-636-1886 Fax : (66)2-636-1891
VIETNAM OFFICE	JFE Steel Corporation, Vietnam Office Unit 1401, 14th Floor, Kumho Asiana Plaza, 39 Le Duan Street, Dist 1, HCMC, Vietnam Phone : (84)8-3825-8576 Fax : (84)8-3825-8562
JAKARTA OFFICE	JFE Steel Corporation, Jakarta Office 16th Floor Summitmas II, JL Jendral Sudirman Kav. 61-62, Jakarta 12190, Indonesia Phone : (62)21-522-6405 Fax : (62)21-522-6408
MANILA OFFICE	JFE Steel Corporation, Manila Office 23rd Floor 6788 Ayala Avenue, Oledan Square, Makati City, Metro Manila, Philippines Phone : (63)2-886-7432 Fax : (63)2-886-7315
SEOUL OFFICE	JFE Steel Korea Corporation 6th Floor, Geumgang-Tower, 889-13, Daechi-dong, Gangnam-gu, Seoul, 135-570, Korea Phone : (82)2-3468-4130 Fax : (82)2-3468-4137
BEIJING OFFICE	JFE Steel Corporation Beijing 1720 Beijing Fortune Building No.5, Dongsanhuan North Road, Chaoyang District, Beijing, 100004, P.R.China Phone : (86)10-6590-9051 Fax : (86)10-6590-9056
SHANGHAI OFFICE	JFE Consulting (Shanghai) Co., Ltd. Room 801, Building A, Far East International Plaza, 319 Xianxia Road, Shanghai 200051, P.R.China Phone : (86)21-6235-1345 Fax : (86)21-6235-1346
GUANGZHOU OFFICE	JFE Consulting (Guangzhou) Co., Ltd./ JFE Steel Corporation, Guangzhou Office Room 3901, Citic Plaza, 233 Tian He North Road, Guangzhou 510613, P.R.China Phone : (86)20-3891-2467 Fax : (86)20-3891-2469

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JFE

JFE Group
TODAY
2013

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Corporate Vision

The JFE Group —
contributing to society with the world's
most innovative technology.

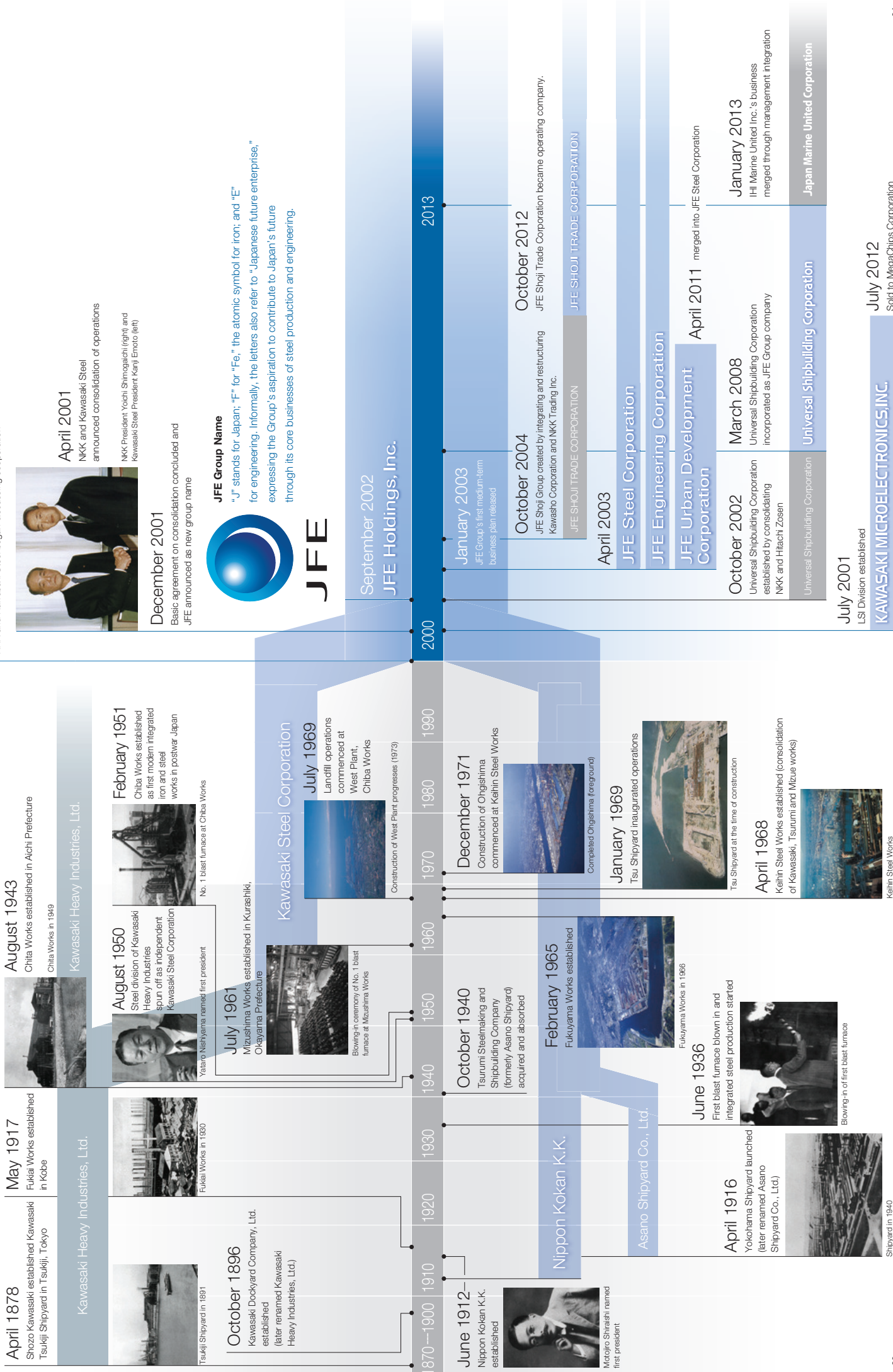
Corporate Values

Challenging Spirit, Flexibility, Sincerity

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JFE Group History



Keihin District's 100th Anniversary: Through the Morning Mist, A New Era Dawns

The Keihin District of JFE Steel East Japan Works marked its 100th anniversary in June 2012. Working in cooperation with local residents and other stakeholders, JFE Steel continues to tackle new challenges as a pillar of Japanese manufacturing.





Myanmar's Bridge to the Future

JFE Engineering is contributing to economic development in emerging countries by helping to upgrade infrastructure, such as highway and railroad bridges. Over the years, JFE Engineering has been actively constructing bridges in Myanmar, including the soon-to-be-completed Malun Bridge. Residents have eagerly awaited completion of this key infrastructure, which is expected to support Myanmar's burgeoning economy.





Kawasho Foods' GEISHA brand canned products in Ghana



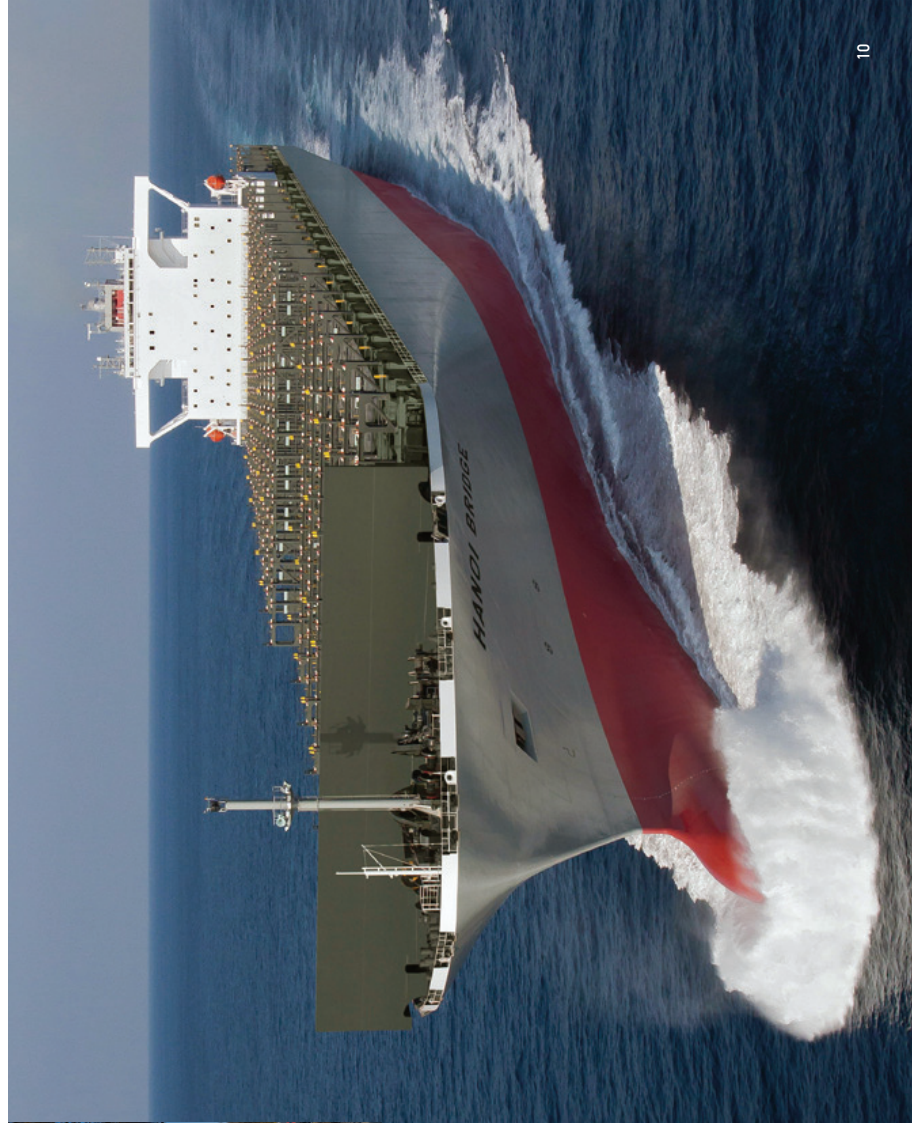
JFE Shoji Trade's new Turkish liaison office is in Istanbul.

Seizing Demand in Emerging Countries

JFE Shoji Trade opened its Istanbul Liaison Office in 2013 and is now working to develop business opportunities in the Turkish market. Capitalizing on this advantageous geopolitical location, JFE Shoji Trade is also pursuing opportunities for business in markets of the Middle East, Africa and Russia. In Myanmar, the recently opened Yangon Branch provides a base for JFE Shoji Trade to cultivate new business in this fast-growing emerging economy.

Initiatives to Reduce Environmental Load

Japan Marine United's efforts to realize greener transportation include this large freighter, which is capable of transporting 8,600 containers while generating a significantly reduced environmental load. Employing a variety of innovative technologies, the company focused especially on reducing nitrogen oxide from the ship's engine exhaust gas.





To Our Stakeholders

Hajime Bada

President and CEO, JFE Holdings, Inc.

Looking Back at Fiscal 2012

Despite robust demand for reconstruction after the Great East Japan Earthquake, slowdowns in emerging economies and the impact of the European debt problem created a difficult business environment in fiscal 2012 (ended March 2013). The economic outlook remains uncertain, although the excessively strong yen's pullback and rising share prices since the start of calendar 2013 are fueling hopes for a recovery.

Amid this challenging environment, the JFE Group reduced costs by 120.0 billion yen in its steel business and strengthened initiatives for improved earnings in fiscal 2012. The Group also focused on developing business in fast-growing markets overseas and responded to diverse needs in the environmental and energy fields.

Thanks to such efforts, the Group achieved consolidated ordinary income of 52.2 billion yen, roughly unchanged from the previous fiscal year, and operated in the black at the consolidated net income level.

Growth Initiatives

In the face of a stubbornly difficult business environment, the JFE Group solidified its structure for the next phase of growth.

•JFE Shoji Trade Becomes Wholly Owned Subsidiary (October 2012)

JFE Shoji Trade was converted into a wholly owned subsidiary to leverage its marketing know-how as a trading company and raise the Group's overall presence in global markets, including by implementing projects in Japan and overseas, cultivating new customers and procuring raw materials.

•Japan Marine United Established (January 2013)

Universal Shipbuilding and IHI Marine United were integrated to establish a leading position in terms of total capabilities in the global shipbuilding industry, a key strategy for the JFE Group's new growth stage.

Other Measures

JFE implemented an array of further initiatives to strengthen its corporate structure for sustainable growth. These included more robust measures for corporate social responsibility (CSR), corporate governance and environmental management, as well as securing and nurturing more diversified human resources, solidifying its financial position and returning profits to shareholders.

Initiatives of Each Company

JFE Steel

JFE Steel aims to solidify its reputation as the world's leading global steel supplier and become a company that can be truly proud of its global status.

•Enhance the JFE brand through greater customer satisfaction

- Develop new products that become products of choice.
- Strengthen integrated service and technological support covering everything from initial planning and design to manufacturing, delivery and quality assurance.

•Actively develop overseas markets

- Complete production capacity expansion at Guangzhou JFE Steel Sheet in China.
- Construct and begin operating a continuous galvanizing line at JFE Steel Galvanizing (Thailand).
- Deepen partnership with JSW Steel in India.
- Strengthen partnership with Sahaviriya Steel Industries in Thailand.

•Strengthen cost competitiveness and raise productivity, mainly in upstream operations.

JFE Engineering

JFE Engineering is developing business mainly in the environmental and energy fields.

•Deliver large waste-to-energy plants in Japan and overseas

- Japan: Niigata, Mitaka and Chofu
- Overseas: Tsingtao and Shanghai in China

•Promote electrical power development projects

- Construct and operate mega-scale solar photovoltaic power plants in seven areas of Japan.
- Received order for geothermal binary-cycle power plant in Ibusuki, Kagoshima Prefecture.
- Biomass power plant

•Accelerate overseas business development

- In Myanmar, launched a feasibility study of waste-to-energy plant and received order for an elevated bridge.
- In Indonesia, received order for steam supply facilities for a geothermal power plant.

JFE Shoji Trade

The JFE Shoji Group is pioneering new markets for the entire JFE Group, aiming to become a company that constantly creates new value.

•Japan

Raise customer satisfaction through proactive sales.

•Overseas

- Cultivate new markets.
- Establish new bases in Myanmar and Turkey.
- Improve the profitability of steel processing centers and adapt the structure in accordance with needs of local markets.
- Operation of 15 steel processing centers worldwide, including a new facility in India.



The JFE Group continues to thoroughly implement compliance, the basis of trusting relationships, as well as address environmental issues and strengthen safety, aiming to ensure both sustainable growth and maximized corporate value for stakeholders.

Exploring Broader Applications for Steel and Related Materials

Nippon Kokan and Kawasaki Steel joined forces as the JFE Group under the holding company JFE Holdings in 2002. In the years since, the JFE Group has contributed to society with some of the world's most advanced technologies. Going forward, the Group aims to build on its reputation for excellence in an increasingly broad range of fields.

Holding Company

JFE Holdings, Inc.

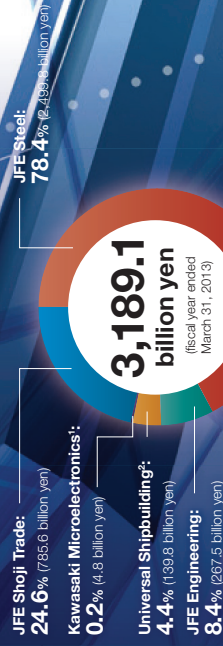
Maximizing Corporate Value Strategically

JFE Holdings formulates strategies and manages fund raising as the holding company of the JFE Group. It also handles information disclosure as a listed company. Consolidating these functions enables Group companies to devote their full attention to strengthening competitiveness and expanding profitability.

Corporate Data (As of April 1, 2013)

Head Office: 2-2-3 Uchisaiwaicho, Chiyoda-ku, Tokyo 100-0011
Phone: +81-3-3597-4321 (main)
Establishment: September 27, 2002
Paid-in Capital: 147.1 billion yen
URL: www.jfe-holdings.co.jp/en

Group Sales Breakdown



1: JFE Holdings sold all shares of Kawasaki Microelectronics to MegaChips Corporation on July 1, 2012.
 2: Universal Shipbuilding and HI Marine United were integrated as Japan Marine United on January 1, 2013.

Steel Business

JFE Steel Corporation "Only One" and "Number One" Products

JFE Steel is one of the world's leading integrated steel producers. A strong international player with a sophisticated production system consisting of two major steelworks, one each in eastern and western Japan, JFE Steel engages in production and sales of unique "Only One" and market-leading "Number One" branded products, plus a wide range of other added-value products incorporating the company's cutting-edge technologies and development know-how.



Engineering Business

JFE Engineering Corporation Innovative Technologies for Energy and the Environment

JFE Engineering technologies enhance the effective use of resources for clean energy. In addition to its core businesses in environmental infrastructure and energy, JFE Engineering offers specialized expertise in the fields of industrial machinery and steel structures such as bridges.



Trading Business

JFE SHOJI TRADE CORPORATION Creating Value as the Core Trading Company

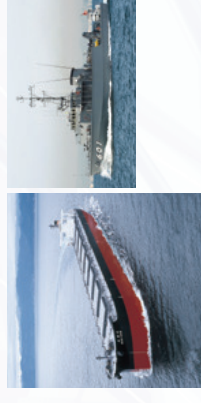
JFE Shoji Trade engages in trading in Japan and the import and export of products centering on steel materials, as well as steel raw materials, non-ferrous metals, chemicals, fuels, materials and machinery, and marine vessels. The company also has business in the foods and electronics fields.



Shipbuilding Business

Japan Marine United Corporation Meeting Needs with Green Technologies

Japan Marine United operates seven shipyards/works and two technical research centers as a leader in the construction and repair of large merchant ships, including tankers, bulk carriers, container ships and specialty vessels, such as multipurpose anchor-handling tug supply vessels (AHTSs), minesweepers and icebreakers.





Focusing on Technology 10 Years Ahead As a World-leading Steel Supplier

As a steelmaker with world-leading production facilities and expertise in the development of innovative technologies, JFE Steel responds to global market demands for high-end steel by developing products that offer unique characteristics and superior functionality. In addition to providing stable supplies of high-end steel products in Japan, the company is increasingly expanding its high-quality steel production and distribution networks overseas in partnership with leading steelmakers. JFE Steel also remains committed to enhancing communities and society through proactive solutions for environmental protection.



Eiji Hayashida
President & CEO

JFE Group TODAY 2013

JFE Steel Corporation

Two Major Steelworks with Large-scale Blast Furnaces

JFE Steel boasts an impressive production network in Japan that is divided roughly into two major steelworks. The East Japan Works comprises the Chiba District, where the company built Japan's first integrated coastal steelworks in the early 1950s, and the Keihin District, located on the 5.5 million m² Ohgishima man-made island in Tokyo Bay. The West Japan Works includes the Fukuyama District and Kurashiki District, both of which feature expansive sites and proximity to deep harbors. The East and West steelworks are equipped with large, world-class blast furnaces that account for 33 million tons of combined annual capacity for crude steel production. The production network also includes the Chita Works, a world-leading steelworks for the production of specialty steel pipes and tubes, including tubular goods for the oil industry and line pipes.

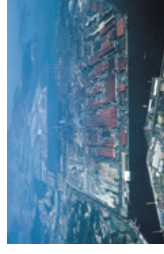


No. 3 hot strip mill line of East Japan Works (Chiba District)

JFE Steel Manufacturing Bases



West Japan Works



Fukuyama District



Kurashiki District

Chita Works



East Japan Works



Chiba District



Keihin District

Building the JFE Brand

Through Customer Satisfaction

JFE Steel is strengthening its integrated service and technology support — from planning and product design to manufacturing, delivery and quality assurance — to achieve customer satisfaction on levels that assure JFE remains the brand of choice.



Guangzhou JFE Steel Sheet



Guangzhou JFE Steel Sheet coil yard



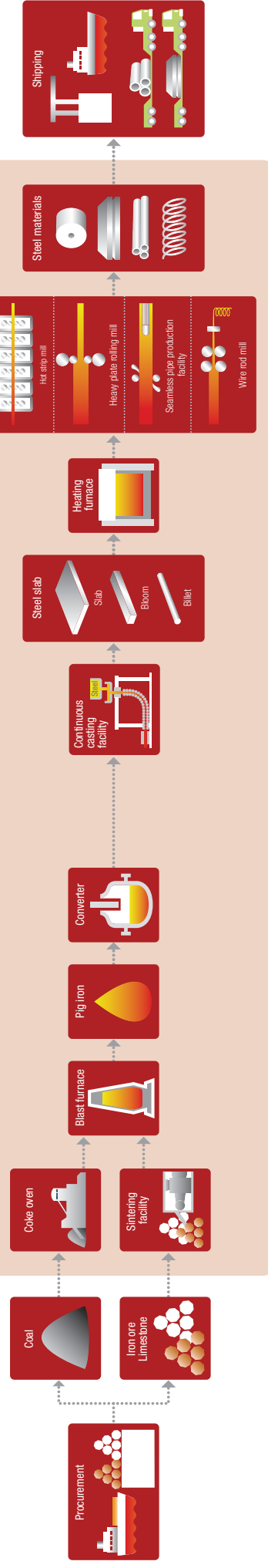
Mt. Fuji viewed from the Kahin District raw materials yard

Expanding Resource Ownership and Technology Development

Assuring stable supplies of coking coal and iron ore has become a critical issue for blast furnace makers faced with increasing worldwide demand for steel, primarily in emerging countries. In response, JFE Steel is expanding its ownership of vital global resources. For coking coal, the company acquired a stake in resource developer Qoal's Byerwen Coal Mine in Australia in 2009. For iron

ore, JFE Steel acquired an interest in Brazil-based Nacional Minérios S.A. (NAMISA), an iron-ore sales company in 2008, and then raised the stake in 2011. Company-owned rights for coking coal and iron ore both account for nearly 20% of total needs at present and will be raised eventually to 30%. JFE Steel also is actively expanding its use of low-cost, low-quality raw materials through the application of new technologies. Under this strategy, ferro-coke produced as an epoch-making blast furnace feed entered trial usage at an actual blast furnace in March 2013.

JFE Steel Production Process

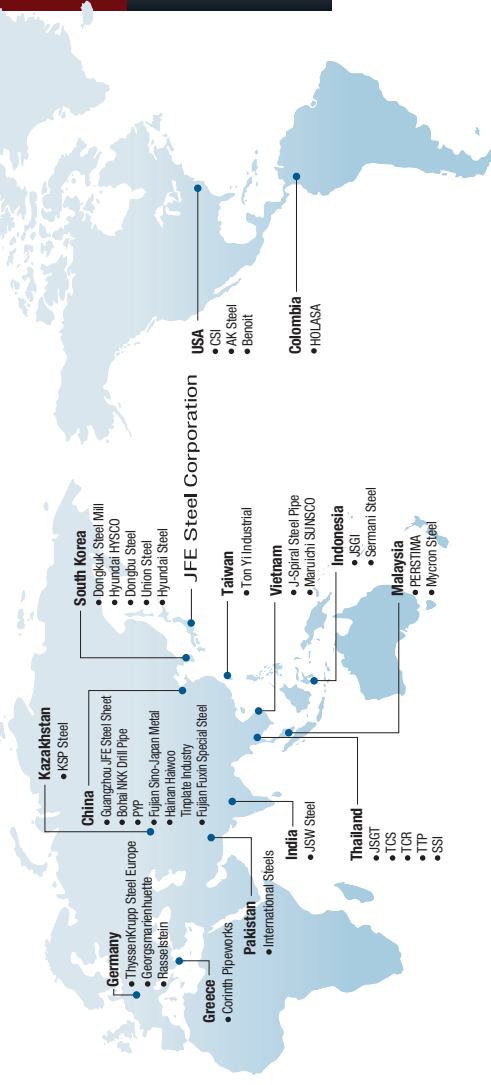


Developing Global Markets Further

With the world's steel market poised to grow, JFE Steel is taking steps to ensure it is ideally positioned to respond. In markets such as China, India and Southeast Asia, production and distribution networks for high-end steel are being established through vertically specialized frameworks created with local partners. Guangzhou JFE Steel Sheet Co., Ltd., a 50–50 joint venture in China, is adding a cold-rolling line and hot-dip galvanizing line for the supply of automotive steel sheet. In Thailand, wholly

owned JFE Steel Galvanizing (Thailand) has begun operating a hot-dip galvanizing line. In India, the company has entered the automotive steel market by taking an equity position in JSW Steel, the nation's largest private steel company. In addition, cooperative arrangements for all product lines in India are being expanded, aiming to solidify JFE Steel's foothold in this promising market. This includes transferring manufacturing technologies for automotive steel sheets and non-oriented electrical steel sheets. Also, a feasibility study is looking at the viability of establishing an integrated steelworks in Vietnam.

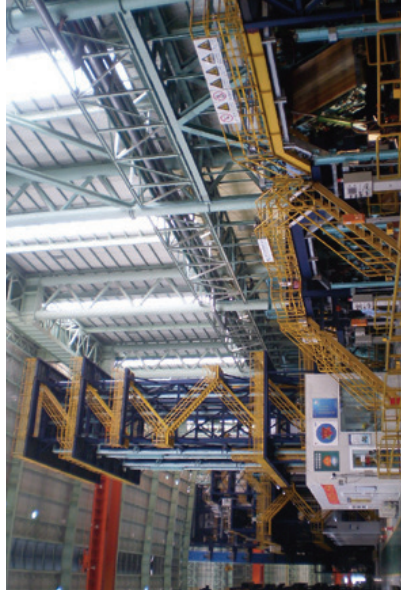
Major Partners in Global Steel Sales



JFE Steel Corporation 2012 Highlights

Guangzhou JFE Steel Sheet's New Continuous Galvanizing Line

To respond to growing demand for high-end steel, Guangzhou JFE Steel Sheet began operating a second continuous galvanizing line in March 2012. The expanded production structure now encompasses cold rolling, continuous annealing and two hot-dip galvanizing lines.



Outstanding Performances by Company Sports Teams

The JFE East Japan baseball team and the JFE West Japan baseball team participated in both an intercity tournament and the Japan National Championship. In the intercity tournament, an enthusiastic crowd of 55,000 company-related people turned up over the six games to root for the teams along with local residents. The JFE East Japan team turned in a strong performance, reaching the semifinal round. Meanwhile, the running team appeared in the New Year *ekiden* (road relay race) for the 37th consecutive year, and of special note, team member Joseph Gitau ran a spectacular race to win the 66th Fukuoka International Open Marathon Championship.



Steel pipe brace

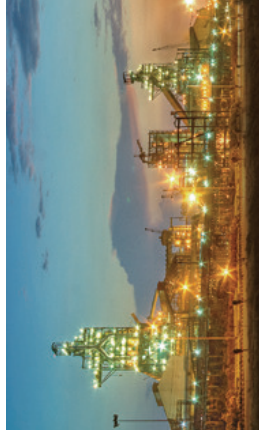
Product Wins Industrial Award Contribution Prize

A steel pipe brace with advanced design features that provide added safety for earthquake-proof buildings and other structures, developed jointly with JFE Civil Engineering & Construction, won the Ichimura Industrial Award Contribution Prize. This marks the second consecutive year for JFE Steel to receive this award, which recognizes outstanding technologies that contribute to industrial advancement in Japan.



Strengthening Steel Partnerships in Thailand

JFE Steel, Sahaviriya Steel Industries and Marubeni-Itochu Steel Inc. signed a partnership agreement in the Thai steel market. Under the agreement, JFE Steel will invest in Sahaviriya Steel Industries, raise its share in their joint venture and provide various technology support.



Provision of Production Technology to JSW Steel

JFE Steel agreed to provide strategy for the production of JSW Steel with advanced technology for the production of automotive steel sheets, helping its partner better respond to increasing demands for sophisticated and diverse local procurement. JFE Steel also agreed to provide JSW Steel with technology for the production of non-oriented electrical steel sheets for home appliances and industrial motors.

Steel Slag Blocks for Major Marine Park in Yokohama

Marine Blocks made of solidified steel slag are being used in UMI (sea) Farm, an aquarium attraction featuring natural seascapes that opened at Yokohama Hakkeijima Sea Paradise in March 2013. The sea life-friendly Marine Blocks perform a valuable role in recovering life-supporting environments in the sea.



Conger eel living in a Marine Block®



Marine Block®

Large Order for Gas Development Line Pipe in Northern Europe

JFE Steel received an order for 325,000 tons of UOE steel pipe for line pipe (welded pipe) from STATOIL (Statol ASA), a Norwegian oil and gas company. The pipe will be used for a 482-kilometer undersea pipeline, with shipments scheduled to begin in 2016.



- April 2012**
 - Guangzhou JFE Steel Sheet in China began operating a second continuous galvanizing line.
 - Research and development of geothermal power generation using exhaust heat began.
- May**
 - Pig iron tapping reached a cumulative 400 million tons at West Japan Works (Fukuoka District).
 - East Japan Works (Kehin District) and West Japan Works (Fukuoka District) held festivals.
- June**
 - East Japan Works (Kehin District) marked its 100th anniversary.
 - Held 19th JT Activity JFE Steel Family Meet.
- July**
 - Plan finalized for construction of electric resistance welded tube manufacturing facility at CSI in United States.
 - JFE East Japan and JFE West Japan baseball teams participated in intercity tournament.
- August**
 - Agreement reached to provide automotive steel sheet production technologies to JSW Steel.
- October**
 - Company-wide disaster drills organized.
 - Advanced Plastic Recycling won Award of Excellence at Nikel Global Environmental Technology Awards.
 - Decision made to acquire premium threading business in United States.

- November**
 - East Japan Works (China District) held festival.
 - Agreement reached on closer ties with Sahaviriya Steel Industries of Thailand and Maubeni-Itochu Steel.
 - West Japan Works (Kurehiko District) and Chita Works held festivals.
 - Held 20th JT Activity JFE Steel Family Meet.
 - JFE East Japan and JFE West Japan baseball teams participated in Japan National Championship.
- December**
 - Joseph Gitau won 66th Fukuoka International Open Marathon Championship.
 - Agreement reached to provide JSW Steel with production technologies for non-oriented electrical steel sheets.
 - Opening ceremony held for stainless steel foil processing joint venture in China.

- January 2013**
 - Agreement reached to provide Fujian Fuxin Special Steel in China with stainless steel sheet manufacturing technologies.
 - Large order received for 325,000 tons of line pipe for natural gas field development project in Norwegian Sea.
- February**
 - Agreement reached to strengthen partnerships with KSP Steel in Kazakhstan and Marubeni-Itochu Steel.
 - Award Contribution Prize for steel pipe brace with advanced features for earthquake-proof buildings.
 - Steel slag blocks used as a rebar for cultivating seaweed beds on Yamaguchi Prefecture's Nakuni coastline.
- March**
 - Steel slag product used in UMI Farm, a new aquarium facility at Yokohama Hakkeijima Sea Paradise.
 - Received Ichimura Industrial Award Contribution Prize for steel pipe brace with advanced features for earthquake-proof buildings.
 - Steel slag blocks used as a rebar for cultivating seaweed beds on Yamaguchi Prefecture's Nakuni coastline.



Advanced Technologies for Energy Use And Urban Environments

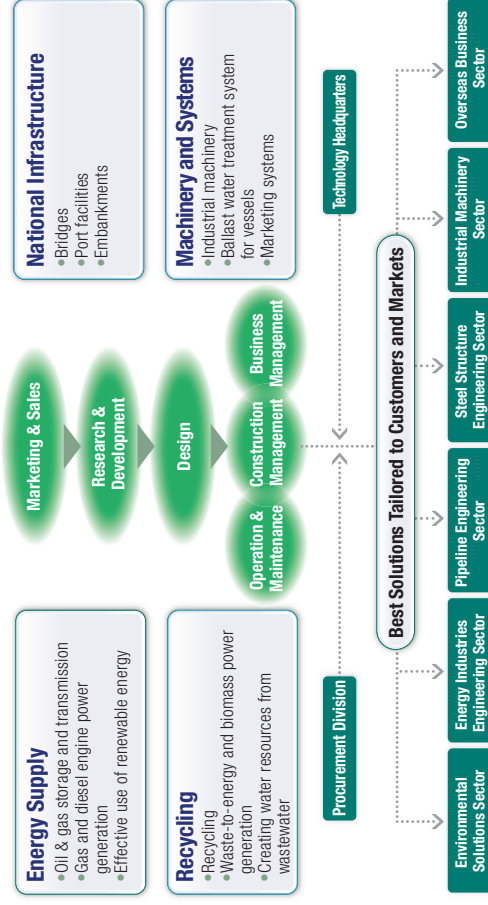
JFE Engineering supports industries and societies with solutions that meet diverse needs in major fields such as transportation, urban infrastructure, energy and the environment. Backed by an outstanding record of accomplishment in developing advanced technologies for natural gas and waste-to-energy applications, the company is now actively engaged in R&D for renewable energies. In Japan, proprietary technologies also are being applied toward disaster-resistant infrastructure. JFE Engineering strives to meet the diverse needs of customers everywhere through its rapid delivery of optimized engineering solutions.

Sumiyuki Kishimoto
President & CEO

JFE Group TODAY 2013

JFE Engineering Corporation

Business Overview



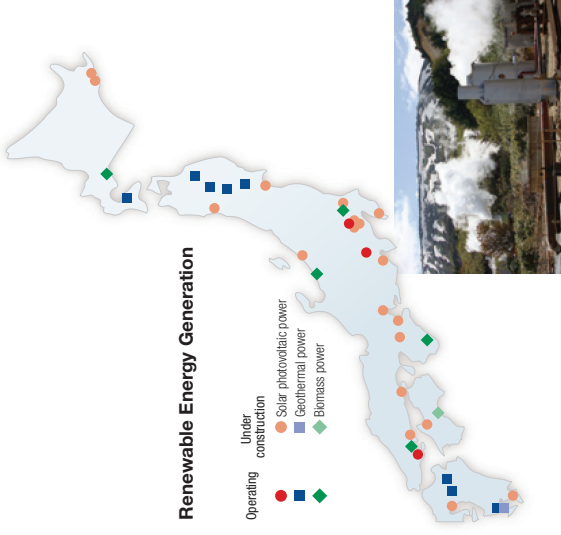
Successfully Developing New Electrical Power

Investments are being made in Japan to increasingly secure power sources in conjunction with the start of a full buyback program for renewable energy. JFE Engineering has become actively involved in this field by offering its advanced technologies and related solutions to power suppliers. To date, the company has built an array of electrical power generation plants that use solar, geothermal or biomass power. In addition to working to attract more orders of this kind, the company is steadily working toward the development of related businesses that take advantage of the company's extensive technologies and know-how in electrical power generation.

Renewable Energy Generation

Operating
Under construction

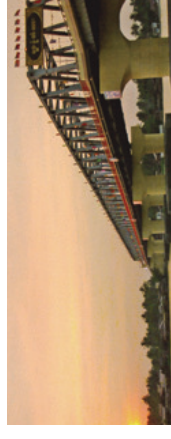
- Solar photovoltaic power
- Geothermal power
- Biomass power



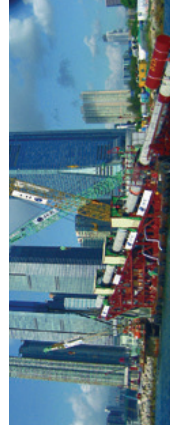
Feasibility study of geothermal power business in Hachimantai, Iwate Prefecture.

Urban Infrastructure Solutions To Support Growth

JFE Engineering is accelerating its overseas business with an emphasis on regions in which existing projects are concentrated. In the rapidly growing Asia-Pacific region countries, business in areas such as bridges and waste-to-energy plants is being pursued in response to growing concerns regarding the environmental impact of constructing roads and railway networks, as well as the urban concentration of populations.



Pyaw Pon Bridge (Myanmar)

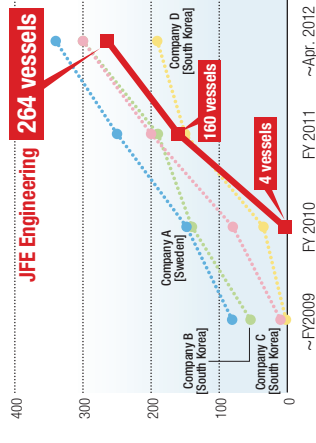


Water supply submarine pipe (Hong Kong)

World's Leading Ballast Water Management System

Efforts to prevent damage to marine ecosystems when ballast water is discharged from ships are giving rise to the installation of on-board water treatment systems. Based on orders received, JFE Engineering's Ballast Ace has become one of the world's most popular systems thanks to its compact size and treatment reliability. The market is expected to expand in the foreseeable future, particularly if an envisioned international convention makes it mandatory for nearly 40,000 ships to be fitted with such systems.

Ballast Water Treatment System Sales — Top Suppliers (Cumulative)



JFE Engineering Corporation

2012 Highlights



Irapu-Ohashi Bridge Joins Two Islands in Okinawa

JFE Engineering installed a bridge girder weighing 1,500 tons with high precision during construction of a large bridge that spans a major shipping lane to connect Miyakojima and Irabujima islands.



Ota Solar Park Completed

The first mega-scale solar photovoltaic power plant to adopt the feed-in tariff (FIT) system was completed and delivered to Ota city, Gunma Prefecture. JFE Engineering is also constructing mega-scale solar photovoltaic power plants in other areas of Japan.



Cement Waste Heat Recovery System Completed in Romania

A heat recovery system was installed in Romania at the Alesd plant operated by Holcim, one of the world's largest cement suppliers, earning JFE Engineering high praise.



Cycle Tree Bicycle Parking System Completed

The Cycle Tree multi-level bicycle parking system constructed at Kalkyu Kawasaki Station near Tokyo accommodates more than 1,000 bicycles and contributes to urban aesthetics.



Container Crane Project Completed at Tomakomai Port

An earthquake-resistant container crane was delivered to Tomakomai Port in northern Japan. JFE Engineering's technological solutions are helping to strengthen ports and harbors across the nation.



JFE Childcare Center Opened

A childcare center was built for JFE employees at JR Tsurumi Station in Yokohama. In addition to supporting the careers of working mothers at JFE, the facility helps to relieve demand for limited spaces at other facilities.



Fukuyama Plastic Material Recycling Plant Launched

JFE Kankyo Corporation, a JFE Engineering group company, commenced operation of a new plant for producing raw materials from waste plastics, which are sold at affordable prices.



Mongolia's Largest Steel Bridge Completed

A railway fly-over named the Sun Bridge was built in the capital city of Ulan Bator, which is undergoing rapid economic development. The bridge was constructed with help from the largest-ever official development assistance (ODA) provided to the country.



Jacket-type Quays with Arc-shaped Retaining Wall Installed

The first jacket-type quays with an arc-shaped retaining wall have been incorporated in the jetty of Sendai-Shiogama Port in northeastern Japan. JFE Engineering's proprietary construction methods have earned high recognition for their outstanding cost efficiency and shortened work time.



Order for Geothermal Binary Power Generation Facility

JFE Engineering will deliver a highly efficient binary facility for a geothermal power generation plant, the first to be constructed in Japan in 14 years, in the southern city of Ibusuki, Kagoshima Prefecture.



Clean Plaza Fujimi Commenced in Tokyo Suburbs

JFE Engineering completed the construction of a waste-to-energy plant in the Mitaka-Chofu area of suburban Tokyo. The company is now managing the plant's operation in harmony with the surrounding community.

> April 2012	May	June	July	August	September	October	November	December	> January 2013	February	March
- Received order from Numano city for the construction and operation of New Saku Waste-to-energy Plant. - Received order for steam supply facilities of geothermal power plant in Indonesia. - Completed Shiden Clean Center waste-to-energy plant in Nigata city and commenced operation. - Completed "Ota" tier "bicycle parking system" at Kalkyu Kawasaki Station. - Completed installation on Taba-Chashi Bridge in Okinawa.	- Received order for new-type catcrift value adjustment system at Yokkaichi Works of Toho Gas. - Held JFE Promenade observance tour. - Completed detoxification of chemical warfare agents for Ministry of the Environment. - Completed Puzzle Tower, a mechanical parking system, in Naha city.	- Installed quick chargers for electric vehicles at Cesmo Oil gas stations. - Received order for renewal of sewage sludge incinerator at Iizuka General Sludge Center in Kawasaki city. - Received order for installation of water pipe on Kuwashima-Kakyo Bridge.	- Started demonstration of sewage sludge-derived electric vehicles at Cesmo in Matsuyama. - Completed Ota Solar Park heat recovery system in Romania. - Completed container crane project at Tomakomai Port.	- Received order for aviation fueling facilities at Noi Bai International Airport. - Commissioned to conduct feasibility study of waste power generation business in Myanmar. - Received multiple orders for major reconstruction of Tokyo Metropolitan Expressway. - Relocated Tokyo Head Office.	- Opened Kaomino-no-Mori JFE Childcare Center. - Commissioned to conduct feasibility study of large bridge in Myanmar. - Completed renewal project of regional wholesale market in Shonan Fujiwara. - Received order for reconstruction of Saitama Waste-to-energy Plant. - ICJA observation team inspected environmental plant facilities.	- Commenced operation of Fukuyama Plastic Material Recycling Plant. - Completed construction of Sun Bridge, Mongolia's largest steel bridge. - Developed new dual-batch automatic welding for gas pipeline.	- Decided to engage in mega-scale solar photovoltaic power generation on unused land throughout Japan. - Completed operation of Nishinomiya East Municipal Refuse Disposal Center (waste-to-energy plant). - Received order for first medication synthesis system for positron emission tomography testing in Japan. - Received order for jacket-type quays to reconstruct Shinomaki Port. - Received first order for fault-area seal pipe newly designed for potable water in Kobe city. - Received order for industrial waste incinerator in Malaysia.	- Completed and commenced operation of Nishinomiya East Municipal Refuse Disposal Center (waste-to-energy plant). - Received order for first medication synthesis system for positron emission tomography testing in Japan. - Received order for jacket-type quays to reconstruct Shinomaki Port. - Received first order for fault-area seal pipe newly designed for potable water in Kobe city. - Held Pipeline Forum 2013 at Yokohama Head Office.	- Received order for construction of an elevated bridge in Yangon, Myanmar. - Received first order for retrofitting tanker with ballast water management system. - Received order for Japan's first power plant fueled with palm kernel shell. - Introduced first Neo White thermal energy storage method for air conditioning systems in Thailand. - Held Pipeline Forum 2013 at Yokohama Head Office.	- Received order for geothermal binary power generation facility in Ibusuki, Kagoshima Prefecture. - Installed jacket-type quays with arc-shaped retaining wall at Sendai-Shiogama Port. - Received order for hybrid mega-scale solar photovoltaic power plant in Akita city. - Developed remote monitoring and control system for solar power generation.	- Received order for waste-to-energy plant in Hapshiosaka. - Commenced operation of Clean Plaza (waste-to-energy plant) Fujimi in Mitaka-Chofu area. - Received order for mega-scale solar photovoltaic power plant in Aki city. - Developed remote monitoring and control system for solar power generation.

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JFE Engineering 24



Developing New Markets and Creating New Value

JFE Shoji Trade engages in domestic trade, export/import and tripartite business involving steel products, raw materials and steel-production machinery. The company also has business in the food and electronics fields. In the domestic market, JFE Shoji Trade has built an optimal sales system that leverages the company's strengths. Overseas, bases are being expanded principally in Asia, along with efforts to cultivate high-potential markets, including in the Middle East and Africa. The company is also actively participating in resource development projects to ensure stable supplies of raw materials for respective Group companies. The company will maximize its specialized know-how to develop new markets and create new value as the core trading company of the JFE Group.



Tsutomu Yajima
President & CEO

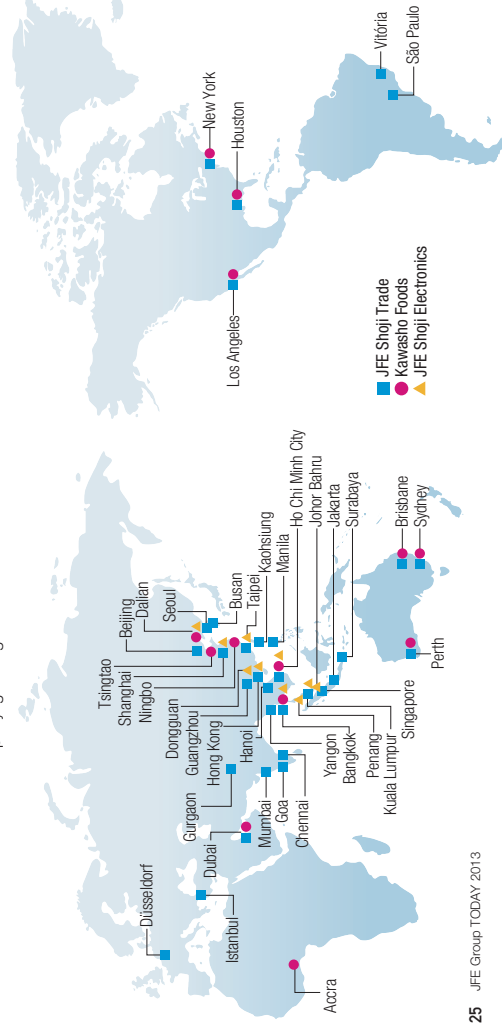
JFE Group TODAY 2013

JFE SHOJI TRADE CORPORATION

Globally Expanding Network

JFE Shoji Trade leads the JFE Group's efforts to cultivate new markets. It operates 51 bases in 18 countries as the core trading company of the Group. In 2013, new bases were established in the rapidly growing economies of

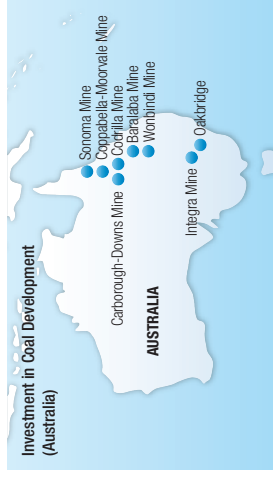
Myanmar and Turkey, both of which offer trading prospects for steel products, raw materials and steel-production machinery.



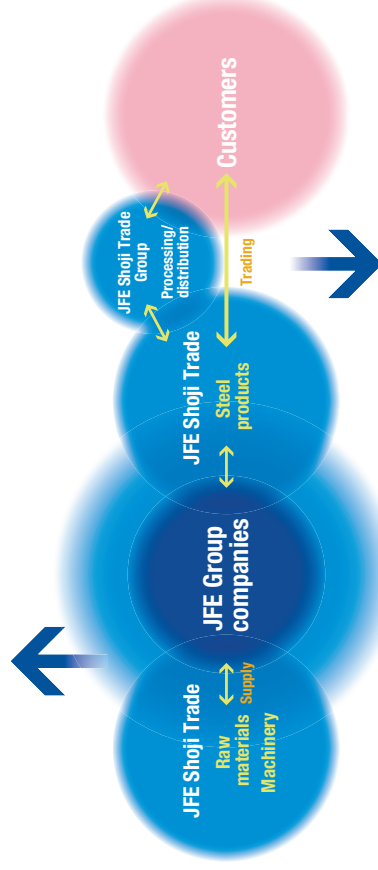
Steel Business Supply Chain

For enhanced competitiveness both in Japan and overseas, the JFE Shoji Trade Group strengthens the JFE Group's steel supply chain by identifying and then responding to customer needs in all phases of operations, from raw materials procurement and technical services to product processing.

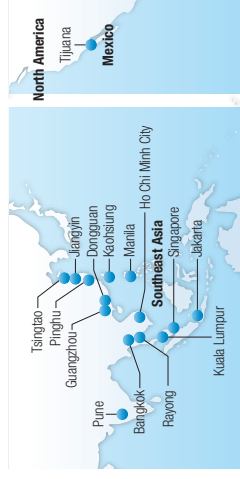
Raw Materials Procurement



JFE Shoji Trade is expanding its import of raw materials and actively participating in resource development projects to ensure stable supplies of competitive resources for JFE Group companies at a time when the expanding global steel industry consumes increasingly more raw materials. A primary focus is investing in coal development projects in Australia to ensure stable supplies for JFE Steel. JFE Shoji Trade is also placing an emphasis on the sale of general coal as fuel for power companies.



Steel Trade and Processing/Distribution Centers



Sitting line at Zhejiang JFE Shoji Steel Products in China
Mitre core used inside the transformers of power generation plants in China

JFE Shoji Trade operates steel processing centers in 15 locations worldwide. The company is responding to the demand for more value-added products by launching operations for secondary fabrication, such as presswork.

Additionally, through its steel-processing centers in countries including Thailand and China, JFE Shoji Trade is responding to fast-growing demand for the processing of automobile steel sheet.

JFE SHOJI TRADE CORPORATION 2012 Highlights



Special Award Received from Indian Automaker

JFE Shoji Trade received a Special Support Award from Maruti Suzuki India in recognition of its cooperation in delivering materials following a disastrous earthquake. This marked the fourth consecutive year in which the automaker has presented JFE Shoji Trade with such an award.

Exhibition Organized at NEPCON West China 2012

JFE Shoji Electronics Corporation exhibited at NEPCON West China 2012 in line with the establishment of the Chengdu Branch of JFE Shoji Electronics Shanghai Corporation. The event served as a good opportunity to expand awareness and understanding of the company's offerings.



Disaster Reconstruction Technologies Introduced at Seminar

At an earthquake recovery seminar organized by JFE Steel, JFE Shoji Trade explained technologies such as the high seismic resistance of reinforced earth, which it confirmed in terrace investigations conducted after earthquakes.



Tokyo Head Office Relocated

The Tokyo Head Office was relocated from the JFE Shoji Building to the newly constructed Otemachi Financial City North Tower located in Otemachi in November 2012. The new office is highly functional in terms of integration, visualization and collaboration.



8% Stake Acquired in Major U.S. Ferrous Scrap Supplier

JFE Shoji Trade reinforced its supply sources for ferrous scrap by acquiring a stake in U.S.-based Advanced Steel Recovery, LLC. The move is part of a tripartite-trade strategy to capture expanding demand for ferrous scrap, particularly in Asia.



Interest Increased in Sonoma Mine Project in Australia

JFE Shoji Trade increased its interest in the Sonoma Mine Project in Australia, raising its equity stake to 9.5%. The investment paves the way for the JFE Group to increase its ratio of raw materials supplied from within the Group.



Donation Presented to Elementary School in Ghana

In West Africa, where the company has sold GEISHA canned goods for 60 years, JFE Shoji Trade and Kawasho Foods donated desks and chairs to an elementary school in Ghana. The company looks forward to making further contributions to development in West Africa.



Relocation of JFE Shoji Trade Companies Completed

Comprehensive relocations, which began by moving the head office in November 2012, were completed in February 2013. Consolidating all group companies in the JFE Shoji Building will help to maximize the collective strengths of the JFE Shoji Trade Group.



J-SLIM Activity Presentations Held

Presentations were held to introduce the J-SLIM Activity business reform project, which is now being implemented throughout the JFE Shoji Trade organization. The project is designed to increase operational efficiency and facilitate greater work productivity.

Coil Center Operations Commenced in India

JFE Shoji Steel India, a steel-processing center based in Ranjangaon, a suburb of Mumbai, commenced operations in March 2013. The JFE Shoji Trade Group now operates steel-processing centers at 15 locations outside Japan.



> April 2012	May	June	July	August	September	October	November	December	> January 2013	February	March
- JFE Shoji Trade and JFE Shoji Trade Holdings merged. - JFE Shoji Pipe & Fitting Trade Corporation stationed first Japanese staffer in Shanghai. - Fuji Xerox Co., Ltd. approved Electrical Appliances Steel Overseas Department as Premier Partner.	- JFE Shoji Trade became wholly owned subsidiary through exchange of shares with JFE Holdings. - JFE Shoji Steel de Mexico, S.A. de C.V. joined electrical transformer exhibition hosted by Institute of Electrical and Electronics Engineers. - Received Special Support Award from Maruti Suzuki India. - JFE Shoji Trade Steel Construction Materials Corporation received The Prize of the Architectural Institute of Japan.	- Acquired 8% stake in Advanced Steel Recovery, LLC, a major U.S.-based ferrous scrap supplier. - JFE Shoji Electronics Corporation exhibited at NEPCON West China 2012.	Kawasho Foods donated NOZAKI brand corned beef and other products to special nursing home for elderly.	Introduced terrace construction method at seminar on earthquake reconstruction methods.	- Nagoya Office and Kyushu Branch received New Office Promotion Awards at 25th Nikkei New Office Awards. - Exercised right to increase interest in Sonoma Mine Project in Australia. - Announced Hoshi Kaseki shall become wholly owned subsidiary of JFE Shoji Pipe & Fitting Trade in October.	- JFE Shoji Trade became wholly owned subsidiary of JFE Holdings in JFE Group restructuring. - Ceremony held to present donation to elementary school in Ghana. - Held J Mama Meeting for employees taking childcare leave.	- Relocated Tokyo Head Office to Otemachi Financial City North Tower. - Ban on sales of Beauvais nouveau lifted. - Held J-SLIM Activity presentations.	- Concluded loan agreement with OM Materials (S) Pte. Ltd. to participate in Ferro Silicom plant construction project. - Announced integration of JFE Shoji Trade Steel Construction Materials and JFE Shoji Construction Materials Sales. - Announced integration of JFE Shoji Usulakenzai and JFE Seibu Usulakenzai.	Established Yangan Branch.	- Completed relocation of JFE Shoji Trade Group companies to JFE Shoji Building. - Announced establishment of Istanbul Liaison Office.	Commenced operation of JFE Shoji Steel India Private Limited.



Rapidly Integrating to Secure Industry's Top Position and Pursue Growth

Japan Marine United was established in January 2013 through the merger of Universal Shipbuilding and IHI Marine United. The company is rapidly leveraging the synergies of integration to establish its position at the top of the industry and help the JFE Group further implement its growth initiatives. The merger consolidates the design and development capabilities of two companies, ultimately for a stronger product lineup. The new firm is also developing technologies to save energy and reduce environmental loads in ships that offer outstanding performance and quality in response to customer needs.



Shinjiro Mishima
President & CEO

JFE Group TODAY 2013

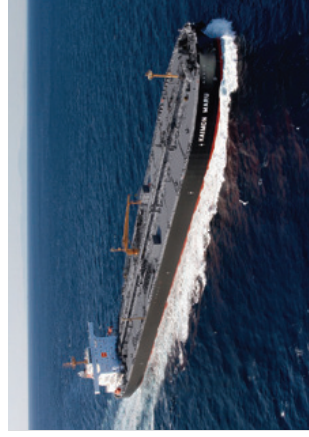
Japan Marine United Corporation

Topics



Establishment of Japan Marine United

On January 7, 2013, an inauguration ceremony was held for the newly integrated company Japan Marine United. During the ceremony, the company chairman and president declared resolutions toward achieving growth.



First Naming Ceremony Following Establishment of the New Company

On January 9, 2013, the first naming ceremony was held as the new company for a 120,000-DWT tanker at the Kure Shipyard. By optimizing the form of the ship, this vessel is able to significantly reduce transportation cost per ton compared with conventional ships.

Business Overview

Japan Marine United will steadily strengthen its competitive edge and profitability in four core fields (see below). It will contribute to society through a combination of technological and manufacturing activities in the shipbuilding and offshore fields, and also pursue advanced technologies in response to customer needs.

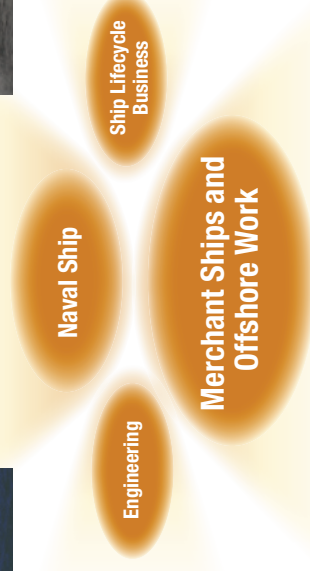
•Merchant Ships and Offshore Work

Japan Marine United boasts advanced, world-class technology and impressive, well-equipped facilities for the production of merchant ships. The merchant shipbuilding division contributes to maritime trade, the backbone of the world economy, by producing a wide range of high-quality ships, including tankers, bulk carriers, container ships, LNG/LPG carriers, car carriers, ferries and more.



•Naval Ship

The company applies its highly advanced technological capabilities in the building and repair of naval ships such as helicopter destroyers, icebreakers, minesweepers for the Japan Maritime Self Defense Force and special vessels including patrol ships. Japan Marine United plays an important role in helping to maintain national defense, maritime transport and security.



•Engineering

Japan Marine United offers first-class designing and construction technologies for ships and offshore structures, such as floating structures and semisubmersible drilling rigs, including IHI-SPB (self-supporting prismatic shape IMO type B) tank technology gas-containment systems. The company also provides technical and production support to shipyards in Japan and overseas.



•Ship Lifecycle Business

Japan Marine United provides solutions and services for ship repairs, onboard inspections, parts supply and other needs throughout the lifecycles of ships. The company also offers customers total support through solutions for environmental emissions, energy-saving operations and advanced ship maintenance.



Contributing to Sustainable Societies

The JFE Group's environmental policy stipulates a firm commitment to protecting the global environment and rigorous pursuit of environmentally responsible corporate growth, based on which the company endeavors to meet the expectations of society and earn the confidence of its many stakeholders.

Customers and Business Partners

The JFE Group delivers products and services of the highest quality to support customers' high competitiveness and meet other diverse needs. To underpin these efforts, the Group acquires and maintains all necessary technical certifications, adopts best practice management systems and operates facilities to collaborate with customers in joint development activities.



Training session

Shareholders and Investors

The JFE Group places priority on the timely and appropriate disclosure of corporate information, making every effort to release information online and publish business results promptly. Plant tours and investor briefings are also conducted to facilitate understanding of the Group's business and related activities.



Plant tour for JFE Group shareholders

Employees

The JFE Group actively hires new recruits and maintains healthy labor-management relations in its commitment to provide a dynamic working environment for a diverse workforce. The Group is an equal opportunity employer for women and persons with physical disabilities and encourages respect for human rights. Occupational safety and the maintenance of a favorable work environment for employees are top priorities.



Cultivating human resources



Community Residents

The JFE Group supports communities where it operates with a variety of long-term initiatives, such as support for university research and educational events, cultural and social welfare activities and disaster-related reconstruction.



Manufacturing workshop for kids



Super-SINTER® line introduced to Keihin District

Process Enhancement

The JFE Group is steadily reducing the environmental impact of its steel business through process enhancement, such as the recovery of ironmaking and steelmaking byproduct gases and the recapture of waste heat and waste pressure energy. Between fiscal 1973 and fiscal 2012, the JFE Group reduced its energy intensity by 36% (forecast) and currently is ranked among the world's most energy-efficient steel producers.

Products and Services

The JFE Group works closely with customers from the development stage to supply high-performance steel products, aiming to spur economic growth while also achieving lower-carbon societies. The JFE Group is making a concerted, ongoing effort to reduce carbon emissions both in its steel manufacturing operations and through the delivery of energy-saving products to end-users.



Ultra-large ore carrier

Global Environment

Environmental Protection

JFE Group Environmental Philosophy

JFE Group Environmental Policy

Communities and Stakeholders

The JFE Group reaches out to stakeholders through a variety of channels, including participation in environmental trade exhibitions, such as Japan's Eco-Products 2012. Individual business units in the Group remain actively involved with environmental initiatives that are rooted deeply in their respective host communities.



Eco-Products 2012



JFE Group CSR Report (to be issued in September 2013)

The JFE Group CSR Report provides detailed information about societal and environmental initiatives.

www.jfe-holdings.co.jp/environment

Members of the Board, Corporate Auditors and Corporate Officers of JFE Holdings



Members of the Board

Hajime Bada	 President & CEO
Eiichi Hayashida	 Member of the Board
Shinichi Okada	 Member of the Board
Sumiyuki Kishimoto	 Member of the Board
Akimitsu Ashida*	 Member of the Board
Masafumi Maeda*	 Member of the Board

* External

Corporate Officers

Hajime Bada	 CEO
President & CEO	
Shinichi Okada	 Supervision of the General Administration Dept. and the Comptrollers' Dept.
Executive Vice President	 In charge of the Corporate Planning Dept. and Finance and Investor Relations Dept.

Yasushi Yamamura In charge of the Comptrollers' Dept.
Vice President

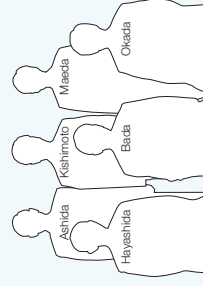
Masashi Terahata In charge of the General Administration Dept.
Vice President

Corporate Auditors

Sakio Sasamoto	 Full-time Auditor
Yasushi Kurokawa	 Full-time Auditor
Hiroyuki Itami*	 Corporate Auditor
Seiji Sugiyama*	 Corporate Auditor

* External

Members of the Board



Operating and Main Group Companies

As of April 1, 2013

Steel Business

Net sales: 2,499.8 billion yen Employees: 42,519

JFE Steel Corporation

Head Office: Chiyoda-ku, Tokyo

Group companies

- **Electric Furnaces and Bar/Shape Steel**
 - JFE Bars & Shapes Corporation
- **Manufacture and Sale of Processed Steel Products, Raw Materials, etc.**
 - JFE Chemical Corporation
 - JFE Metal Products & Engineering Inc.
 - JFE Galvanizing & Coating Co., Ltd.
 - JFE Container Co., Ltd.
 - JFE Mineral Company, Ltd.
 - JFE Welded Pipe Manufacturing Co., Ltd.
 - Mizushima Ferroalloy Co., Ltd.
 - JFE Pipe Fitting Mfg. Co., Ltd.
 - JFE Kozai Corporation
 - JFE Material Co., Ltd.
 - JFE Precision Co., Ltd.
 - River Steel Co., Ltd.
 - JFE Electrical Steel Co., Ltd.
 - Philippine Sinter Corporation
 - Thai Coated Steel Sheet Co., Ltd.
 - Shingawa Refractories Co., Ltd.*
 - Nippon Chuzo K.K.*
 - Nippon Chutesukan K.K.*
 - Dongkuk Steel Mill Co., Ltd.*
 - Guangzhou JFE Steel Sheet Co., Ltd.*
 - Thai Cold Rolled Steel Sheet Public Co., Ltd.*
 - JSW Steel Ltd.*
 - California Steel Industries, Inc.*

Engineering Business

Net sales: 267.5 billion yen Employees: 7,379

JFE Engineering Corporation

Head Office: Chiyoda-ku, Tokyo
Yokohama Head Office: Yokohama

Group companies

- JFE Kankyo Corporation
- JFE Environmental Service Corporation
- JFE Technos Corporation
- Asuka Soken Co., Ltd.
- JP Steel Plantech Co.*

Trading Business

Net sales: 785.6 billion yen Employees: 5,980

JFE SHOJI TRADE CORPORATION

Tokyo Head Office: Chiyoda-ku, Tokyo
Osaka Head Office: Osaka

Group companies

- Kawasho Foods Corporation
- JFE Shoji Electronics Corporation
- JFE Shoji Trade Steel Construction Materials Corporation
- JFE Shoji Pipe & Fitting Corporation
- JFE Shoji Usulikanzaai Corporation
- JFE Shoji Coil Center Corporation
- K&I Tubular Corporation
- VEST Inc.
- Steel Alliance Service Center Co., Ltd.
- JFE Shoji Steel De Mexico, S.A. De C.V.
- Zhejiang JFE Shoji Steel Products Co., Ltd.

Shipbuilding Business

Net sales: 139.8 billion yen Employees: 5,873

Japan Marine United Corporation

Head Office: Minato-ku, Tokyo

Initiated operations following the integration of Universal Shipbuilding and IHI Marine United on January 1, 2013.
The company became an equity-method affiliate with JFE Holdings holding a 45.93% share.

*Equity-method affiliate

Net sales: Fiscal 2012 (ended March 31, 2013)
Employees: as of March 31, 2013

Five-year Financial Summary

JFE Holdings, Inc. and Consolidated Subsidiaries

	Millions of yen			
	FY2012	FY2011	FY2010	FY2009
Operating results (for the year)				
Net sales	¥ 3,189,196	¥ 3,166,511	¥ 3,195,560	¥ 2,844,356
Operating income	39,873	44,779	182,810	88,775
Ordinary income before interest and discount expenses ^{*1}	66,568	68,075	182,268	88,752
Ordinary income	52,214	52,977	165,805	69,289
Net income	39,599	(36,633)	58,608	45,659
Comprehensive income	111,672	(19,268)	29,086	—
Cash flows (for the year)				
Cash flows from operating activities	287,071	110,087	302,603	389,548
Cash flows from investing activities	(163,616)	(205,494)	(302,282)	(236,725)
Free cash flows ^{*2}	123,455	(95,406)	320	152,822
Cash flows from financing activities	(147,550)	96,078	23,073	(321,617)
Financial position (at the year end)				
Total assets	4,107,519	4,007,263	3,976,644	3,918,317
Property, plant and equipment, net	1,606,862	1,644,884	1,712,318	1,800,170
Net assets	1,596,797	1,456,340	1,478,310	1,465,898
Debt outstanding	1,596,363	1,593,633	1,496,413	1,468,472
Capital investment and others				
Capital investment	179,679	197,449	180,492	225,268
Depreciation and amortization	194,062	238,316	246,666	248,374
R&D expenses	33,662	34,243	33,523	36,092
Crude steel output (thousand tons)	30,687	29,235	31,472	28,352
Employees	57,044	54,133	54,400	53,892
Ratio				
Return on sales (ROS) ^{*3}	1.6%	1.7%	5.2%	2.4%
Return on assets (ROA) ^{*4}	1.6%	1.7%	4.6%	2.2%
Return on equity (ROE) ^{*5}	2.7%	(2.6%)	4.1%	3.3%
Equity capital ratio	37.9%	35.3%	36.2%	36.3%
Debt-to-equity ratio ^{*6}	102.4%	112.7%	104.1%	103.2%
Debt-to-equity ratio ^{*7}	76.9%	83.5%	76.5%	75.5%
Per share data				
Net income	¥ 71.20	¥ (68.71)	¥ 110.73	¥ 86.35
Net assets	2,700.83	2,627.63	2,708.51	2,689.88
Cash dividends	20	20	35	20

Notes: ^{*1} Ordinary income before interest and discount expense = Ordinary income + interest and discount expenses
^{*2} Free cash flows = Cash flows from operating activities + cash flows from investing activities
^{*3} Return on sales (ROS) = Ordinary income/net sales × 100
^{*4} Return on assets (ROA) = (Ordinary income-interest and discount expenses)/total assets × 100
^{*5} Return on equity (ROE) = Net income/total shareholders' equity × 100
^{*6} Debt-to-equity ratio = Debt outstanding/total shareholders' equity × 100
^{*7} Debt-to-equity ratio in the rating of debt having a capital component, with 75% of this 300 billion yen in debt deemed to be capital, as assessed by rating agencies.

Financial Information

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Note: Fiscal Year (FY) 2012 in the following pages refers to the period beginning April 1, 2012 and ending March 31, 2013.

Consolidated Balance Sheets

JFE Holdings, Inc. and Subsidiaries
Years ended March 31, 2013 and 2012

	Millions of yen		Thousands of U.S. dollars (Note 1)	
	FY2012	FY2011	FY2012	FY2011
Assets				
Current assets:				
Cash and deposits (Notes 5, 8 and 13)	¥ 64,621	¥ 50,382	\$ 687,091	
Notes and accounts receivable (Note 13)	597,275	580,669	6,350,611	
Allowance for doubtful accounts	(1,628)	(306)	(17,309)	
Merchandise and finished goods	286,524	259,934	3,046,507	
Raw materials and supplies	369,290	405,649	3,926,528	
Deferred tax assets (Note 16)	41,493	59,624	441,180	
Other current assets (Note 8)	164,580	150,303	1,749,920	
Total current assets	1,522,157	1,506,257	16,184,550	
Property, plant and equipment (Note 8):				
Land (Note 9)	509,239	517,944	5,414,556	
Buildings and structures	1,754,924	1,731,921	18,659,479	
Machinery and equipment	5,478,451	5,435,297	58,250,409	
Construction in progress	61,402	49,236	652,865	
Subtotal	7,804,017	7,734,399	82,977,320	
Accumulated depreciation	(6,197,155)	(6,089,514)	(65,892,131)	
Property, plant and equipment, net	1,606,862	1,644,884	17,085,188	
Investments and other assets:				
Investments in unconsolidated subsidiaries and affiliates (Note 13)	365,533	329,906	3,886,581	
Investments in securities (Notes 6, 8 and 13)	383,716	305,704	4,079,914	
Allowance for doubtful accounts	(8,185)	(5,379)	(87,028)	
Deferred tax assets (Note 16)	90,502	105,183	962,275	
Other assets (Note 8)	146,933	120,707	1,562,286	
Total investments and other assets	978,500	856,121	10,404,040	
Total assets	¥ 4,107,519	¥ 4,007,263	\$ 43,673,779	

The accompanying notes are an integral part of these statements.

	Millions of yen		Thousands of U.S. dollars (Note 1)	
	FY2012	FY2011	FY2012	FY2011
Liabilities				
Current liabilities:				
Short-term borrowings (Note 13)	¥ 82,115	¥ 9,722	\$ 873,069	
Current portion of long-term debt (Notes 7 and 13)	283,252	233,662	3,011,717	
Notes and accounts payable (Note 13)	365,308	337,643	3,884,189	
Other current liabilities	295,592	353,312	3,142,817	
Total current liabilities	1,026,259	934,340	10,911,844	
Long-term liabilities:				
Long-term debt (Notes 7 and 13)	1,230,995	1,350,248	13,088,729	
Accrued retirement benefits (Note 10)	118,845	123,714	1,263,636	
Reserve for rebuilding furnaces	33,919	33,298	360,648	
Deferred tax liabilities (Notes 9 and 16)	23,707	18,368	252,068	
Allowance for losses on specific waste disposal business	29,047	32,003	308,846	
Other long-term liabilities	47,948	58,949	509,813	
Total long-term liabilities	1,484,462	1,616,581	15,783,753	
Total liabilities	2,510,722	2,550,922	26,695,608	
Contingencies (Note 11)				
Net assets				
Shareholders' equity:				
Common stock:				
Authorized 2,298,000,000 shares				
Issued 614,438,399 shares as of March 31, 2013				
614,438,399 shares as of March 31, 2012	147,143	147,143	1,564,518	
Capital surplus	647,121	647,121	6,880,606	
Retained earnings	886,338	1,011,124	9,424,114	
Treasury stock, at cost:				
37,328,220 shares as of March 31, 2013				
76,213,077 shares as of March 31, 2012	(178,529)	(378,442)	(1,898,224)	
Total shareholders' equity	1,502,072	1,426,945	15,970,994	
Accumulated other comprehensive income:				
Net unrealized gains and losses on securities	69,184	31,185	735,608	
Net unrealized gains and losses on hedges	(138)	(1,780)	(1,467)	
Revaluation reserve for land, net of tax (Note 9)	14,243	13,806	151,440	
Translation adjustments	(26,697)	(55,900)	(283,753)	
Total accumulated other comprehensive income	56,602	(12,689)	601,828	
Minority interests (Note 9)	38,121	42,084	405,326	
Total net assets	1,596,797	1,456,340	16,978,171	
Total liabilities and net assets	¥ 4,107,519	¥ 4,007,263	\$ 43,673,779	

Consolidated Statements of Operations

JFE Holdings, Inc. and Subsidiaries
Years ended March 31, 2013 and 2012

	Millions of yen		Thousands of U.S. dollars (Note 1)	
	FY2012	FY2011	FY2012	FY2011
Net sales	¥ 3,189,196	¥ 3,166,511	\$ 33,909,580	
Cost of sales	2,884,161	2,879,558	30,666,251	
Gross profit	305,034	286,952	3,243,317	
Selling, general and administrative expenses	265,161	242,173	2,819,362	
Operating income	39,873	44,779	423,955	
Non-operating income (expenses):				
Interest income	879	393	9,346	
Interest expense	(14,374)	(15,098)	(152,833)	
Dividends received	7,988	7,839	84,933	
Foreign exchange gains	10,108	713	107,474	
Equity in earnings of affiliates	9,586	27,253	101,924	
Other, net	(1,846)	(12,902)	(19,627)	
Ordinary income	52,214	52,977	555,172	
Extraordinary income (loss) (Note 21)	23,167	(124,826)	246,326	
Income (loss) before income taxes and minority interests	75,381	(71,850)	801,499	
Income taxes (Note 16):				
Current	26,302	28,488	279,659	
Deferred	6,045	(66,621)	64,274	
Income (loss) before minority interests	32,347	(38,132)	345,934	
Minority interests	43,033	(33,717)	457,554	
Minority interests	(3,434)	(2,915)	(36,512)	
Net income (loss)	¥ 39,599	¥ (36,633)	\$ 421,041	
	Yen		U.S. dollars (Note 1)	
	FY2012	FY2011	FY2012	
Basic net income (loss) per share	¥ 71.20	¥ (68.71)	\$ 0.75	
Cash dividends per share	20	20	0.21	

The accompanying notes are an integral part of these statements.

Consolidated Statements of Comprehensive Income

JFE Holdings, Inc. and Subsidiaries
Years ended March 31, 2013 and 2012

	Millions of yen		Thousands of U.S. dollars (Note 1)	
	FY2012	FY2011	FY2012	FY2011
Income (loss) before minority interests	¥ 43,033	¥ (33,717)	\$ 457,554	
Other comprehensive income (Note 17):				
Net unrealized gains and losses on securities	39,075	24,833	415,470	
Net unrealized gains and losses on hedges	1,586	(1,707)	15,863	
Revaluation reserve for land, net of tax	—	1,443	—	
Translation adjustments	10,020	(2,332)	106,539	
Share of other comprehensive income of affiliates accounted for using equity method	17,957	(7,887)	190,930	
Total other comprehensive income	68,638	14,449	729,803	
Comprehensive income	¥ 111,672	¥ (19,268)	\$ 1,187,368	
Total comprehensive income attributable to:				
Shareholders of the parent	¥ 108,453	¥ (22,071)	\$ 1,153,141	
Minority interests	3,218	2,803	34,215	

The accompanying notes are an integral part of these statements.

Consolidated Statements of Changes in Net Assets

JFE Holdings, Inc. and Subsidiaries
Years ended March 31, 2013 and 2012

	Millions of yen				
	Shareholders' equity				Total shareholders' equity
	Common stock	Capital surplus	Retained earnings	Treasury stock, at cost	
Balance at April 1, 2011	¥ 147,143	¥ 651,364	¥ 1,081,697	¥ (415,890)	¥ 1,464,913
Cash dividends			(13,284)		(13,284)
Net loss			(36,633)		(36,633)
Acquisition of treasury stock				(290)	(290)
Disposal of treasury stock		(4,843)	(22,475)	37,738	10,420
Increase by change of scope of consolidation			1,856		1,856
Decrease by change of scope of consolidation			(37)		(37)
Transfer from land revaluation account			1		1
Net changes in items other than shareholders' equity					—
Total changes in items during the year		(4,843)	(70,573)	37,447	(37,968)
Balance at March 31, 2012	¥ 147,143	¥ 647,121	¥ 1,011,124	¥ (378,442)	¥ 1,426,945

Millions of yen						
	Accumulated other comprehensive income					
	Net unrealized gains and losses on securities	Net unrealized gains and losses on hedges	Revaluation reserve for land, net of tax	Transition adjustments	Total accumulated other comprehensive income	Minority interests

The accompanying notes are an integral part of these statements.

	Millions of yen				
	Shareholders' equity				Total shareholders' equity
	Common stock	Capital surplus	Retained earnings	Treasury stock, at cost	
Balance at April 1, 2012	¥ 147,143	¥ 647,121	¥ 1,011,124	¥ (378,442)	¥ 1,426,945
Cash dividends			(5,395)		(5,395)
Net income			39,599		39,599
Acquisition of treasury stock				(2,428)	(2,428)
Disposal of treasury stock			(158,299)	202,341	44,042
Decrease by change of scope of consolidation			(253)		(253)
Transfer from land revaluation account			(437)		(437)
Net changes in items other than shareholders' equity					—
Total changes in items during the year			(124,785)	199,913	75,127
Balance at March 31, 2013	¥ 147,143	¥ 647,121	¥ 886,338	¥ (178,529)	¥ 1,502,072

Millions of yen						
	Accumulated other comprehensive income					Total net assets
	Net unrealized gains and losses on securities	Net unrealized gains and losses on hedges	Revaluation reserve for land, net of tax	Translation adjustments	Total accumulated other comprehensive income	Minority interests
Balance at April 1, 2012	¥ 31,185	¥ (1,780)	¥ 13,806	¥ (55,900)	¥ (12,689)	¥ 42,084
Cash dividends						¥ (5,395)
Net income						39,599
Acquisition of treasury stock						(2,428)
Disposal of treasury stock						44,042
Decrease by change of scope of consolidation						(253)
Transfer from land revaluation account						(437)
Net changes in items other than shareholders' equity	37,999	1,641	437	29,213	69,292	(3,962)
Total changes in items during the year	37,999	1,641	437	29,213	69,292	(3,962)
Balance at March 31, 2013	¥ 69,184	¥ (138)	¥ 14,243	¥ (26,687)	¥ 56,602	¥ 38,121
						¥ 1,598,797

Consolidated Statements of Cash Flows

JFE Holdings, Inc. and Subsidiaries
Years ended March 31, 2013 and 2012

	Thousands of U.S. dollars (Note 1)			
	Shareholders' equity			Total shareholders' equity
	Common stock	Capital surplus	Retained earnings	Treasury stock, at cost
Balance at April 1, 2012	\$ 1,564,518	\$ 6,880,606	\$ 10,750,919	\$ (4,023,838)
Cash dividends			(57,363)	
Net income			421,041	
Acquisition of treasury stock				(25,816)
Disposal of treasury stock			(1,683,136)	2,151,419
Decrease by change of scope of consolidation			(2,690)	
Transfer from land revaluation account			(4,646)	
Net changes in items other than shareholders' equity				—
Total changes in items during the year		(1,326,794)	2,125,603	798,798
Balance at March 31, 2013	\$ 1,564,518	\$ 6,880,606	\$ 9,424,114	\$ (1,898,234)

	Thousands of U.S. dollars (Note 1)				
	Accumulated other comprehensive income				Total net assets
	Net unrealized gains and losses on securities	Net unrealized gains and losses on hedges	Revaluation reserve for land, net of tax	Transition adjustments	Total accumulated other comprehensive income
Balance at April 1, 2012	\$ 331,578	\$ (18,926)	\$ 146,794	\$ (594,364)	\$ (134,917)
Cash dividends					447,464
Net income					\$ 15,494,742
Acquisition of treasury stock					(57,363)
Disposal of treasury stock					421,041
Decrease by change of scope of consolidation					(25,816)
Transfer from land revaluation account					468,282
Net changes in items other than shareholders' equity					(2,690)
Total changes in items during the year					(4,646)
Balance at March 31, 2013	\$ 735,608	\$ (1,467)	\$ 151,440	\$ (283,753)	\$ 601,828

The accompanying notes are an integral part of these statements.

	Millions of yen		Thousands of U.S. dollars (Note 1)	
	FY2012	FY2011	FY2012	FY2011
Cash flows from operating activities:				
Income (loss) before income taxes and minority interests	¥ 75,381	¥ (71,850)	\$ 801,499	
Adjustments for:				
Depreciation and amortization	194,062	238,316	2,063,391	
Decrease in reserves	(3,681)	(17,446)	(39,138)	
Interest and dividend income	(8,867)	(8,232)	(94,279)	
Interest expense	14,374	15,098	152,833	
Changes in assets and liabilities:				
Changes in notes and accounts receivable	40,145	(52,867)	426,847	
Changes in inventories	90,878	(48,101)	966,273	
Changes in notes and accounts payable	(10,177)	(23,823)	(108,208)	
Other, net	(73,163)	118,694	(777,916)	
Subtotal	318,953	149,788	3,391,313	
Interest and dividend income received	14,782	14,923	157,171	
Interest paid	(16,342)	(15,285)	(173,758)	
Income taxes paid	(30,322)	(39,339)	(322,402)	
Net cash provided by operating activities	287,071	110,087	3,052,323	

Cash flows from investing activities:				
Payments for purchases of property, plant and equipment	(174,165)	(193,470)	(1,851,834)	
Proceeds from sales of property, plant and equipment	7,708	4,676	81,956	
Payments for purchases of investments in securities	(7,999)	(26,797)	(86,050)	
Proceeds from sales of investments in securities	8,987	12,696	96,555	
Other, net	1,852	(2,599)	19,691	
Net cash used in investing activities	(163,616)	(205,494)	(1,739,670)	

Cash flows from financing activities:				
Decrease in short-term borrowings, net	(51,937)	(26,434)	(552,227)	
Increase in long-term debt	450,800	405,540	4,793,195	
Repayments of long-term debt	(239,425)	(281,511)	(2,545,720)	
Payments for redemption of bonds with subscription rights to shares	(300,000)	—	(3,188,792)	
Payments for purchases of treasury stock	(811)	(296)	(8,623)	
Payments for dividends by parent company	(5,443)	(13,456)	(57,873)	
Other, net	(733)	12,235	(7,793)	
Net cash (used in) provided by financing activities	(147,550)	96,078	(1,568,846)	

Effects of exchange rate change on cash and cash equivalents	8,053	(2,807)	85,624	
Net decrease in cash and cash equivalents	(16,042)	(2,135)	(170,588)	
Cash and cash equivalents at beginning of the year	50,492	49,043	536,863	
Increase in cash and cash equivalents at beginning of the year by newly consolidated or deconsolidated subsidiaries	30,012	3,583	319,106	
Cash and cash equivalents at end of the year (Note 5)	¥ 64,463	¥ 50,492	\$ 685,412	

The accompanying notes are an integral part of these statements.

Notes to Consolidated Financial Statements

JFE Holdings, Inc. and Subsidiaries

Years ended March 31, 2013 and 2012

1. Basis of Presentation

The accompanying consolidated financial statements of JFE Holdings, Inc. (the "Company" hereinafter) and consolidated subsidiaries are prepared on the basis of accounting principles generally accepted in Japan, which are different in certain respects as to application and disclosure requirements of International Financial Reporting Standards, and are compiled from the consolidated financial statements prepared by the Company as required by the Financial Instruments and Exchange Act of Japan.

The Company's overseas subsidiaries maintain their accounts and records in conformity with generally accepted accounting principles and practices prevailing in their respective countries of domicile.

The notes to the consolidated financial statements include information that is not required under the Japanese GAAP but is presented herein as additional information.

As permitted by the Financial Instruments and Exchange Act, amounts of less than one million yen have been omitted. Consequently, the totals shown in the accompanying consolidated financial statements (both in yen and U.S. dollars) do not necessarily agree with the sums of the individual amounts.

Certain amounts in the prior years' financial statements have been reclassified to conform to the 2013 presentation.

The translation of the Japanese yen amounts into U.S. dollars is included solely for the convenience of the reader, using the approximate exchange rate at March 31, 2013, which was ¥94.05 to US\$1.00. These convention translations should not be construed as representations that the Japanese yen amounts have been, could have been or could in the future be converted into U.S. dollars at this or any other rate of exchange.

2. Summary of Significant Accounting Policies

(a) Consolidation principles

The consolidated financial statements include the accounts of the Company's 296 domestic and foreign subsidiaries (the "Group" as JFE Holdings, Inc. consolidated group, hereinafter). All significant inter-company transactions and accounts are eliminated in consolidation.

63 affiliates are accounted for by the equity method

estimated useful lives (5 years).

(g) Allowance for doubtful accounts

The projected uncollectible amount is provided as the allowance using historical default rates in the past for ordinary credits and individual collectability assessments for credits deemed to have high likelihood of default and for specific credits.

(h) Accrued retirement benefits

Accrued retirement benefits are provided based on the amount of projected benefit obligation reduced by pension plan assets at fair value at the end of the fiscal period.

Prior service cost is amortized in projected average years of service of the employees.

Actuarial losses are amortized in projected average years of service of the employees from the following fiscal year after the year in which they occurred.

(i) Reserve for rebuilding furnaces

The estimated cost of the next repair is allocated to the reserves in equal amounts over the year to the next repair.

(j) Allowance for losses on specific waste disposal business

Allowance for losses on specific waste disposal business is provided based on the estimated amount sufficient to cover probable loss that will be incurred in the following fiscal years.

(k) Leases

Leased assets under finance leases that do not transfer ownership to the lessees are capitalized and depreciated to a residual value of zero using the straight-line method with useful life defined by the terms of the contract.

(l) Revenue recognition for long-term construction-type contracts

The percentage-completion method (cost-comparison method to estimate the percentage of completion) is applied for construction contracts where the percentage of completion can be reliably estimated. For other contracts, the completed-contract method is applied.

(m) Consolidated tax return

The Company files a consolidated tax return with certain domestic subsidiaries.

(n) Per share information

Basic net income (loss) per share is computed by dividing net income (loss) available to common shareholders by the weighted average number of shares

of common stock outstanding during the period. Net income (loss) used in the computation was ¥39,599 million (¥421,041 thousand) and ¥(36,633) million, and the average number of shares used in the computation was 556,186 thousand and 533,144 thousand for the years ended March 31, 2013 and 2012, respectively.

Cash dividends per share shown in the consolidated statements of income are the amounts applicable to the respective year.

3. Changes in Accounting Policies and Adoption of New Accounting Standards

Depreciation method for property, plant and equipment

Due to the corporation tax reform, effective from the year ended March 31, 2013, the depreciation method for property, plant and equipment acquired on or after April 1, 2012 has been changed to the depreciation method in accordance with the revised Corporation Tax Law. As a result, for the year ended March 31, 2013, operating income increased by ¥2,780 million (¥29,558 thousand) and ordinary income and income before income taxes and minority interests increased by ¥2,787 million (¥29,633 thousand), respectively, compared to the previous method.

4. Accounting Standard Issued But Not Yet Adopted

On May 17, 2012, the Accounting Standards Board of Japan ("ASBJ") issued "Accounting Standard for Retirement Benefits" (ASBJ Statement No. 26) and "Guidance on Accounting Standard for Retirement Benefits" (ASBJ Guidance No. 25), which replaced the Accounting Standard for Retirement Benefits that had been issued by the Business Accounting Council in 1998 with an effective date of April 1, 2000, and the other related practical guidance, being followed by partial amendments from time to time through 2009.

(a) Overview

According to the revised standard, actuarial gains and losses and prior service costs are recognized in net assets of balance sheets after adjustments of tax effects, and the deficit or surplus is recorded as a liability or an asset. In addition, it is allowed to allocate benefits to periods of service according to the benefit formula as well as straight-line allocation. The calculation method of discount rate was also revised.

(b) Expected adoption date

This standard and related guidance will be adopted from the end of the year ending March 31, 2014 except for the revision of calculation method of the retirement benefit obligations and service costs which will be adopted from the beginning of the year ending March 31, 2015.

(c) Effects of the adoption of the standard and the guidance

The Company is currently evaluating the effect that these revisions will have on its consolidated results of operations and financial position.

5. Cash and Cash Equivalents and Nonmonetary Transactions

Cash and cash equivalents at March 31, 2013 and 2012 consisted of the following:

	Millions of yen		Thousands of U.S. dollars
	FY2012	FY2011	FY2012
Cash and deposits	¥ 64,621	¥ 50,382	\$ 687,091
Time deposits with a maturity of more than three months	(158)	(140)	(1,679)
Short-term loans receivable included in other current assets	—	250	—
	¥ 64,463	¥ 50,492	\$ 685,412

Assets acquired and liabilities assumed at the date of the business combination through the share exchange to make JFE Shoji Trade Corporation ("JFE Shoji") a wholly owned subsidiary of the Company were as follows:

	Millions of yen	Thousands of U.S. dollars
	FY2012	
Current assets	¥ 442,515	\$ 4,705,103
Non-current assets	108,006	1,148,389
Total assets	¥ 550,521	\$ 5,853,492
Current liabilities	¥ 409,311	\$ 4,352,087
Non-current liabilities	19,687	209,324
Total liabilities	¥ 428,999	\$ 4,561,392

The treasury stocks which had been owned by the Company were allocated to the shareholders of JFE Shoji in compensation for the share exchange.

6. Securities

The following is a summary of held-to-maturity securities and available-for-sale securities at March 31, 2013 and 2012:

	Millions of yen			
	Held-to-maturity securities			
	FY2012		FY2011	
	Book value (Carrying amount)	Estimated fair value	Book value (Carrying amount)	Estimated fair value
Book value lower than estimated fair value:				
Bonds	¥ 199	¥ 200	¥ 0	¥ 199
Bonds	—	—	—	¥ 201
Total	¥ 199	¥ 200	¥ 0	¥ 199
Book value exceeding estimated fair value:				
Bonds	—	—	—	—
Bonds	—	—	—	¥ 201
Total	—	—	—	¥ 201

	Millions of yen			
	Available-for-sale securities			
	FY2012		FY2011	
	Book value (Estimated fair value)	Cost, net of accumulated impairment losses	Book value (Estimated fair value)	Cost, net of accumulated impairment losses
Cost lower than book value:				
Equity securities	¥ 286,102	¥ 154,752	¥ 191,397	¥ 116,110
Bonds	20	19	20	19
Sub total	286,122	154,772	191,418	116,130
Cost exceeding book value:				
Equity securities	68,604	86,643	87,067	109,403
Bonds	—	—	—	—
Sub total	68,604	86,643	87,067	109,403
Total	¥ 354,727	¥ 241,415	¥ 278,485	¥ 225,533

	Thousands of U.S. dollars	
	Held-to-maturity securities	
	FY2012	
	Book value (Carrying amount)	Estimated fair value
Book value lower than estimated fair value:		
Bonds	\$ 2,115	\$ 2,126
Book value exceeding estimated fair value:		
Bonds	—	—
Total	\$ 2,115	\$ 2,126

	Thousands of U.S. dollars	
	Available-for-sale securities	
	FY2012	
	Book value (Estimated fair value)	Cost, net of accumulated impairment losses
Cost lower than book value:		
Equity securities	\$ 3,042,020	\$ 1,645,422
Bonds	212	202
Sub total	3,042,232	1,645,635
Cost exceeding book value:		
Equity securities	729,441	921,244
Bonds	—	—
Sub total	729,441	921,244
Total	\$ 3,771,685	\$ 2,566,879

The impairment losses on available-for-sale securities for the years ended March 31, 2013 and 2012 were ¥2,439 million (\$25,933 thousand) and ¥89,200 million, respectively.

7. Long-term Debt

Long-term debt at March 31, 2013 and 2012 consisted of the following:

	Millions of yen		Thousands of U.S. dollars	
	FY2012	FY2011	FY2012	FY2011
1.33% yen bonds, due April 2012.....	¥ —	¥ 20,000	\$ —	—
1.33% yen bonds, due November 2012.....	—	29,999	—	—
First issuance of unsecured convertible bonds with acquisition provision (with a subordination special agreement) (Note 1).....	—	300,000	—	—
1.278% yen bonds, due September 2013.....	40,000	—	425,305	—
1.351% yen bonds, due September 2015.....	20,000	40,000	212,652	—
0.927% yen bonds, due July 2014.....	40,000	20,000	425,305	—
0.708% yen bonds, due March 2015.....	40,000	40,000	425,305	—
0.572% yen bonds, due May 2015.....	60,000	60,000	637,958	—
0.859% yen bonds, due May 2017.....	20,000	20,000	212,652	—
1.326% yen bonds, due June 2021.....	30,000	30,000	318,979	—
0.455% yen bonds, due September 2016.....	20,000	20,000	212,652	—
0.686% yen bonds, due September 2018.....	15,000	15,000	159,489	—
0.453% yen bonds, due April 2017.....	30,000	—	318,979	—
3.50% yen bonds (issued by JFE Steel), due May 2012.....	—	20,000	—	—
Loans, principally from banks and insurance companies, due 2014-2073.....	1,199,248	928,911	12,751,174	—
Less current portion.....	(283,252)	(233,662)	(3,011,717)	—
Total long-term debt.....	¥ 1,230,995	¥ 1,350,248	\$ 13,068,729	—

Note 1:
Details of convertible bonds are as follows:
1) Type of shares
2) Common stock
3) Non-assessable
4) Total principal amount issued ¥300,000 million
5) Total principal amount issued of new shares by exercise of rights
6) The rate of granting of stock acquisition rights
7) Stock Acquisition Right exercise period
8) Stock Acquisition Rights may be exercised at any time from March 17, 2008 to the close of banking operations (fiscal time of the party exercising) on July 22, 2013 (or the first banking day prior to redemption in the event of accelerated redemption of the Bond).

All the convertible bonds were redeemed as of March 18, 2013.

8. Pledged Assets

At March 31, 2013 and 2012, pledged assets were as follows:

	Millions of yen		Thousands of U.S. dollars	
	FY2012	FY2011	FY2012	FY2011
Notes receivable	¥ 945	¥ —	\$ 10,047	—
Property, plant and equipment.....	4,385	66,226	46,624	—
Investments in securities.....	319	1,109	3,391	—
Other assets.....	406	129	4,316	—

The Company sets pledges as collateral on the consolidated subsidiaries' short-term loans receivable from the Company related to warranty for equipment performance (book value of ¥8,700 million [\$92,503 thousand] and ¥9,500 million on the financial statements of individual consolidated subsidiaries at March 31, 2013 and 2012, respectively).

9. Revaluation of Land for Business

In the years ended March 31, 2001 and 2002, part of the subsidiaries and affiliates revaluated the land for business purposes based on the Law Concerning Revaluation of Land and its amendment issued on March 31, 2001 and 2002, respectively. Revaluation differences, net of the

Retirement and pension costs of the Company and its subsidiaries included the following components for the years ended March 31, 2013 and 2012.

	Millions of yen		Thousands of U.S. dollars	
	FY2012	FY2011	FY2012	FY2011
Service cost (Note 1).....	¥ 12,289	¥ 14,566	\$ 130,664	—
Interest cost.....	4,347	5,140	46,220	—
Expected return on plan assets.....	(1,573)	(1,743)	(16,725)	—
Amortization.....	—	—	—	—
Net retirement benefit obligation at transition.....	37	7	393	—
Actuarial losses.....	7,468	10,081	79,404	—
Prior service cost.....	10	(738)	106	—
Accrued retirement benefit cost.....	22,579	27,312	240,074	—
Net loss on transfer to defined contribution pension plans, etc.....	—	15,677	—	—
Other (Note 2).....	3,836	2,107	40,786	—
Total.....	¥ 26,416	¥ 45,097	\$ 280,871	—

Notes:
1. Accrued retirement benefit cost incurred by consolidated subsidiaries applying a simplified method to calculate retirement benefit obligation is included under "service cost."
2. Premiums on defined contribution plans
3. Other than the above, the Company and its subsidiaries paid incremental benefits of ¥1,427 million (\$15,172 thousand) and ¥1,538 million for the years ended March 31, 2013 and 2012, respectively.

The rationale for calculations of retirement benefit obligations for the years ended March 31, 2013 and 2012 is as follows:

	FY2012	FY2011
1. Retirement benefit projection amortization method:	Primarily, the straight-line method over the period	Primarily, the straight-line method over the period
2. Discount rate:	Primarily 1.5%	Primarily 1.5%
3. Expected return on plan assets:	Primarily 0.7%	Primarily 0.8%
4. Amortization period for prior service cost:	Primarily 10 years (Treated as cost using the straight-line method for a set number of years within the average remaining service period for employees at the time of accrual)	Primarily 10 years (Treated as cost using the straight-line method for a set number of years within the average remaining service period for employees at the time of accrual)
5. Amortization period for actuarial losses:	Primarily 10 years (Amortized using the straight-line method over a set number of years within the average remaining service period for the employees during the consolidated fiscal year in which discrepancies were accrued. These amounts are treated as cost posted to the next consolidated fiscal year after the year in which they were accrued.)	Primarily 10 years (Amortized using the straight-line method over a set number of years within the average remaining service period for the employees during the consolidated fiscal year in which discrepancies were accrued. These amounts are treated as cost posted to the next consolidated fiscal year after the year in which they were accrued.)

11. Contingencies

At March 31, 2013 and 2012, the Group was contingently liable as follows:

	Millions of yen		Thousands of U.S. dollars	
	FY2012	FY2011	FY2012	FY2011
Guarantees of debt.....	¥ 27,222	¥ 26,255	\$ 289,441	—
Trade notes discounted.....	5,322	60	56,586	—
Trade notes endorsed.....	560	205	5,954	—

At March 31, 2013 and 2012, commitments outstanding for loan commitments were ¥281 million (\$2,987 thousand) and ¥781 million, respectively.

12. Leases

The Group leases certain buildings and structures, machinery and equipment, office space and other assets.

As discussed in Note 2 (k), lease assets under finance leases that do not transfer ownership to lessees are capitalized and depreciated to residual value of zero using the straight-line method with useful life defined by the terms of the contract.

Future minimum lease payments subsequent to March 31, 2013 and 2012 for non-cancelable operating leases are summarized as follows:

(Year ending March 31)

	Millions of yen		Thousands of U.S. dollars	
	FY2012	FY2011	FY2012	FY2011
2013.....	¥ 4,454	¥ 4,357	\$ 47,357	—
2014.....	19,131	192,780	192,780	—
Total.....	¥ 22,585	¥ 240,138	\$ 240,138	—
2012.....	¥ 1,591	¥ 1,591	—	—
2013.....	3,619	3,619	—	—
Total.....	¥ 5,211	¥ 5,211	—	—

13. Financial Instruments

(a) Overview

(1) Group policy for financial instruments

The Group raises funds mainly through the bank loans or by commercial paper/bond issues based on the capital investment plans considering the stability of the fund and financing costs. Temporary surplus of funds are operated only for short-term investments. Derivative transactions are only utilized to hedge the following risks and the Group does not enter into derivative transactions for trading or speculative purposes.

(2) Types of financial instruments and related risk and risk management

Trade receivables such as notes and accounts receivable are exposed to credit risk. The Group manages this risk by monitoring the financial conditions of its customers

fluctuation risk, are hedged by the interest rate swap agreements to correspond with and to decrease interest payments.

Derivative transactions are exposed to market fluctuation risk of future foreign exchange and interest rates. However, the Group utilizes the derivative transactions to correspond with the actual demands of imports and exports, debts and bonds, and thus the risk is limited to the extent of opportunity loss. The Group enters into derivative

transactions only with financial institutions with high credit ratings, and thus there is almost no credit risk, which is the risk of default by the counterparties' bankruptcy, etc. The Group implemented the internal rules of derivative transactions and transactions are operated based on these rules. Derivative transactions are executed based on the above internal rules, which require getting the approval

from the financial operating officer. The balances, fair values and valuation differences are reported to the management meetings periodically. Consolidated subsidiaries operate the derivative transactions based on the internal rules.

are applied. Also, for the contract amount regarding derivative transactions described in Note 14, "Derivatives and Hedging Activities," the contract amount itself does not indicate market risk related to derivative transactions.

(b) Fair value of financial instruments
Carrying value on the consolidated balance sheets, fair value and difference as of March 31, 2013 and 2012 are as follows.

d difference as of March 31, 2013 and 2012 are as follows.
determine are not included below.

	Millions of yen			
	FY 2012		FY 2011	
	Carrying value	Fair value	Difference	Difference
Cash and deposits	¥ 64,621	¥ 64,621	¥ —	¥ 50,382
Notes and accounts receivable	597,275	597,275	—	590,669
Investments in securities:				
Held-to-maturities	199	200	0	199
Available-for-sale securities	354,727	354,727	—	278,485
Total assets	¥ 1,016,824	¥ 1,016,824	¥ 0	¥ 909,737
Notes and accounts payable	¥ 365,308	¥ 365,308	¥ —	¥ 337,643
Short-term borrowings	82,115	82,115	—	9,722
Current portion of long-term debt	283,252	283,252	—	233,998
Long-term debt:				
Bonds	275,000	276,351	1,351	285,000
Bonds with stock acquisition rights	—	—	—	300,000
Long-term borrowings	955,995	955,719	(275)	765,248
Total liabilities	¥ 1,961,672	¥ 1,962,757	¥ 1,085	¥ 1,937,279
Derivative transactions ¹⁾ :				
Hedge accounting not applied	¥ 588	¥ 588	¥ —	¥ (13)
Hedge accounting applied	(470)	(470)	—	(965)
Total derivative transactions	¥ 177	¥ 177	¥ —	¥ (979)

Financial instruments above are not included in securities on the table in (b) "Fair value of financial instruments" because there are no market prices available and it is extremely difficult to determine the fair value.

Thousands of U.S. dollars

	FY2012	
	Carrying value	Fair value
Cash and deposits	\$ 687,091	\$ —
Notes and accounts receivable	6,350,611	—
Investments in securities:		
Held-to-maturities	2,115	0
Available-for-sale securities	3,771,685	—
Total assets	\$ 10,811,525	\$ 0
Notes and accounts payable	\$ 3,884,189	\$ —
Short-term borrowings	873,099	—
Current portion of long-term debt	3,011,717	—
Long-term debt:		
Bonds	2,923,976	2,938,447
Bonds with stock acquisition rights	—	—
Long-term borrowings	10,164,752	10,161,818
Total liabilities	\$ 20,857,756	\$ 20,869,292
Derivative transactions ¹ :		
Hedge accounting not applied	\$ 6,251	\$ —
Hedge accounting applied	(4,997)	—
Total derivative transactions	\$ 1,244	\$ —

*1 Derivative transactions are presented on a net basis and net liability position is shown in parentheses.

Note 1. Valuation method for financial instruments and information of investments in securities and derivative transactions

Assets:

These are paid in short-term and the fair value approximates carrying value. Some accounts receivable are subject to the allocation treatment of the foreign exchange forward contracts.

SECURITIES
Fair value of stocks is based on the quoted price on stock exchanges and that of bonds is based on the quoted price on bond markets or price presented by the counter party, financial institutions. Please see Note 6, "Securities" regarding the information of the fair value for the investment in securities by classification.

Liabilities

Derivative Transactions

debt (except for bonds due within one year).
 Notes and accounts payable, short-term borrowings and current portion of long-term debt are paid in short-term and the fair value approximates the equivalent of carrying these. Some accounts payable are subject to the allocation treatment of the foreign exchange forward contracts.

Bonds and bonds due within one year (included in current portion of long-term debt). Fair value of bonds is based on the quoted market price. Fair value of the bonds subject to the special treatment of the interest rate swaps are calculated by discounting the sum of principal and interest including the interest swap, using the reasonable interest rate of principal and interest.

Note 2. Financial instruments whose fair value cannot be reliably determined

	Millions of yen	Thousands of U.S. dollars
	FY2012	FY2012
	Carrying value	
Unlisted stock.....	¥ 28,968	\$ 308,006
Unlisted bond.....	1	10
Subscription certificates.....	19	202

Note 3. The redemption schedule for financial instruments and securities with maturities

	Millions of yen				
	FY2012		FY2011		
	Due in one year or less	Due after one year through five years	Due after one year through five years	Due after five years through ten years	Due after ten years
Cash and deposits	¥ 64,621	—	¥ 50,382	¥ —	¥ —
Notes and accounts receivable	536,304	272	—	431,692	1,121
Securities:					
Held-to-maturities	200	—	—	—	200
Available-for-sale securities	—	—	—	—	—
Total	¥ 601,127	¥ 292	¥ —	¥ 482,095	¥ 1,343

Thousands of U.S. dollars

	FY2012		
	Due in one year or less	Due after one year through five years	Due after five years through ten years
Cash and deposits	\$ 687,091	\$ —	\$ —
Notes and accounts receivable	5,702,328	2,892	—
Securities:			
Held-to-maturities	2,126	—	—
Available-for-sale securities	—	—	—
Total	\$ 6,391,568	\$ 3,104	\$ —

Note 4. Scheduled maturities of short-term borrowings, current portion of long-term debt and long-term debt

	Millions of yen			
	FY2012			
	Due in one year or less	Due after one year through two years	Due after two years through three years	Due after three years through five years
Short-term borrowings	¥ 82,115	—	—	—
Current portion of long-term debt	283,252	—	—	—
Long-term debt:				
Bonds	—	80,000	20,000	50,000
Bonds with stock acquisition rights	—	—	—	—
Long-term borrowings	—	180,301	166,779	23,313
Total	¥ 365,368	¥ 260,301	¥ 186,779	¥ 73,313

Millions of yen

	FY2011			
	Due in one year or less	Due after one year through two years	Due after two years through three years	Due after three years through five years
Short-term borrowings	¥ 9,722	—	—	—
Current portion of long-term debt	233,662	—	—	—
Long-term debt:				
Bonds	—	40,000	80,000	20,000
Bonds with stock acquisition rights	—	300,000	—	—
Long-term borrowings	—	243,285	176,028	161,251
Total	¥ 243,384	¥ 583,285	¥ 256,028	¥ 181,251

Thousands of U.S. dollars

	FY2012				
	Due in one year or less	Due after one year through two years	Due after two years through three years	Due after three years through four years	Due after four years through five years
Short-term borrowings	\$ 873,099	—	—	—	—
Current portion of long-term debt	3,011,717	—	—	—	—
Long-term debt:					
Bonds	—	850,611	850,611	212,652	531,632
Bonds with stock acquisition rights	—	—	—	—	—
Long-term borrowings	—	1,917,076	1,665,039	1,773,301	247,878
Total	\$ 3,884,827	\$ 2,767,687	\$ 2,515,651	\$ 1,985,954	\$ 779,510

14. Derivatives and Hedging Activities

Derivative transactions for which hedge accounting is not applied for the years ended March 31, 2013 and 2012 were as follows:

	Millions of yen				Thousands of U.S. dollars			
	FY2012		FY2011		FY2012		FY2011	
	Contracted amount	Recognized gain (loss)	Contracted amount	Recognized gain (loss)	Contracted amount	Recognized gain (loss)	Contracted amount	Recognized gain (loss)
Foreign exchange forward contracts:								
USD (Selling)	¥ 17,814	¥ (67)	¥ —	¥ —	¥ 189,409	\$ (712)	—	—
EUR (Selling)	307	(22)	—	—	3,264	(233)	—	—
THB (Selling)	99	(3)	—	—	1,052	(31)	—	—
USD (Buying)	5,075	87	—	—	53,960	925	—	—
EUR (Buying)	52	9	—	—	552	95	—	—
THB (Buying)	0	(0)	—	—	0	(0)	—	—
SGD (Buying)	8	0	—	—	85	0	—	—
Total	¥ 4	¥ —	¥ —	¥ —	¥ 42	¥ —	¥ —	¥ —
Interest rate swap agreements:								
To receive floating and pay fixed rates	¥ 20,000	¥ 7	¥ 890	¥ (13)	\$ 212,652	\$ 74	—	—
To receive fixed rates and pay floating	20,000	574	—	—	212,652	6,103	—	—
Total	¥ 582	¥ (13)	¥ —	¥ —	¥ 6,188	¥ —	¥ —	¥ —
Commodity forward contracts:								
Nonferrous metal (Selling)	¥ 115	¥ 8	¥ —	¥ —	\$ 1,222	\$ 85	—	—
Nonferrous metal (Buying)	58	(5)	—	—	616	(53)	—	—
Total	¥ 2	¥ —	¥ —	¥ —	¥ 21	¥ —	¥ —	¥ —

Derivative transactions for which hedge accounting is applied for the years ended March 31, 2013 and 2012 were as follows:

(a) Currency related

Benchmark method Foreign exchange forward contracts:	Millions of yen				Thousands of U.S. dollars	
	FY2012		FY2011		FY2012	
	Contract amount	Fair value	Contract amount	Fair value	Contract amount	Fair value
Hedged item						
Accounts receivable (forecasted transactions)	¥ 1,304	¥ (25)	¥ 143	¥ 2	¥ 13,864	\$ (265)
Accounts receivable (forecasted transactions)	0	0	476	(3)	0	0
CAD (Selling)	384	5	—	—	4,082	53
USD (Buying)	93,848	(429)	86,757	(837)	997,852	(4,561)
EUR (Buying)	378	36	113	1	4,019	382
GBP (Buying)	—	—	20	1	—	—
KRW (Buying)	—	—	99	7	—	—
THB (Buying)	4	(0)	—	—	42	(0)
Foreign currency option contracts:						
USD (Selling)	—	—	3,384	(69)	—	—
USD (Buying)	—	—	1,692	(17)	—	—
Allocation method						
Foreign exchange forward contracts:						
USD (Selling)	290	Note 1	5,030	Note 1	3,083	Note 1
EUR (Selling)	2	Note 1	—	—	21	Note 1
USD (Buying)	29,169	Note 1	18,799	Note 1	310,143	Note 1
EUR (Buying)	18	Note 1	4,196	Note 1	191	Note 1
GBP (Buying)	—	—	304	Note 1	—	—
NOK (Buying)	—	—	536	Note 1	—	—
KRW (Buying)	—	—	134	Note 1	—	—
THB (Buying)	11	Note 1	—	—	116	Note 1
Cross currency swap contracts:						
To receive USD floating and pay JPY fixed rates	26,206	Note 1	—	—	278,639	Note 1

Fair value of derivative transactions is measured at the quoted price obtained from financial institutions.

Note 1: Fair value of the foreign exchange forward contracts to which allocation treatment has been applied is included in the fair value of corresponding accounts receivable, accounts payable and long-term debt as hedged item.

(b) Interest rate related

Benchmark method Interest rate swap agreements: To receive floating and pay fixed rates	Millions of yen				Thousands of U.S. dollars	
	FY2012		FY2011		FY2012	
	Contract amount	Fair value	Contract amount	Fair value	Contract amount	Fair value
Hedged item						
Long-term debt	¥ 123,842	¥ (57)	¥ 881	¥ (50)	¥ 1,316,767	\$ (606)
Special treatment						
Interest rate swap agreements: To receive floating and pay fixed rates	121,830	Note 1	114,700	Note 1	1,295,374	Note 1
To receive floating and pay floating	—	—	1,900	Note 1	—	—
To receive fixed rates and pay floating	270,200	Note 1	294,180	Note 1	2,872,939	Note 1

Fair value of derivative transactions is measured at the quoted price obtained from financial institutions.

Note 1: Fair value of the interest rate swap agreements to which special treatment method has been applied is included in the fair value of corresponding bonds and long-term debt as hedged item.

15. Research and Development Expenses

Research and development expenses charged to income were ¥33,662 million (\$357,916 thousand) and ¥34,243 million for the years ended March 31, 2013 and 2012, respectively.

16. Income Taxes

The tax effects of temporary differences that give rise to significant portions of the deferred tax assets at March 31, 2013 and 2012 are presented below:

Deferred tax assets:	Millions of yen				Thousands of U.S. dollars	
	FY2012		FY2011		FY2012	
	Contract amount	Fair value	Contract amount	Fair value	Contract amount	Fair value
Loss carry-forwards	¥ 145,975	¥ 115,428	¥ 115,428	¥ 115,428	¥ 1,552,089	\$ 372,025
Accrued retirement benefits	34,989	40,376	40,376	40,376	172,620	134,758
Loss on impairment of property, plant and equipment	16,235	14,691	14,691	14,691	794,992	3,026,517
Accrued bonuses	12,674	12,280	12,280	12,280	(989,506)	2,038,001
Others	74,769	88,186	88,186	88,186	—	—
Total deferred tax assets	284,644	270,962	270,962	270,962	—	—
Valuation allowance	(92,969)	(67,158)	(67,158)	(67,158)	—	—
Deferred tax assets net of valuation allowances	191,674	203,804	203,804	203,804	—	—
Deferred tax liabilities:						
Net unrealized gains and losses on securities	(40,012)	(17,664)	(17,664)	(17,664)	(425,433)	(85,699)
Reserve for advanced depreciation of noncurrent assets	(8,060)	(8,294)	(8,294)	(8,294)	(61,105)	(20,152)
Reserve for special repairs	(5,747)	(7,714)	(7,714)	(7,714)	(773,779)	(157,273)
Others	(18,953)	(12,857)	(12,857)	(12,857)	—	—
Total deferred tax liabilities	(72,774)	(46,530)	(46,530)	(46,530)	—	—
Net deferred tax assets	¥ 118,900	¥ 157,273	¥ 157,273	¥ 157,273	¥ 1,264,221	\$ 313,111

Reconciliation of the statutory tax rate to the effective tax rate for the years ended March 31, 2013 and 2012 were as follows:

Statutory tax rate	Millions of yen				Thousands of U.S. dollars	
	FY2012		FY2011		FY2012	
	Contract amount	Fair value	Contract amount	Fair value	Contract amount	Fair value
Statutory tax rate	38.0%	40.0%	38.0%	40.0%	38.0%	40.0%
Valuation allowance and others	4.9	13.1	4.9	13.1	4.9	13.1
Effective tax rate	42.9%	53.1%	42.9%	53.1%	42.9%	53.1%

17. Comprehensive Income

Reclassification adjustments and income tax effects attributable to other comprehensive income for the years ended March 31, 2013 and 2012 were as follows:

	Millions of yen		Thousands of U.S. dollars	
	FY2012	FY2011	FY2012	FY2011
Net unrealized gains and losses on securities:				
Gains (losses) arising during the year	¥ 61,783	¥ (43,061)	\$ 666,916	\$ (459,161)
Reclassification adjustments	(122)	79,199	(1,297)	852,319
Amounts before income tax effects	61,661	36,138	665,619	370,828
Income tax effects	(22,586)	(11,204)	(240,148)	(120,484)
Net unrealized gains and losses on securities	39,075	24,933	415,470	250,344
Net unrealized gains and losses on hedges:				
Gains (losses) arising during the year	634	(920)	6,741	(10,044)
Reclassification adjustments	1,876	(1,721)	19,946	(18,644)
Amounts before income tax effects	2,510	(2,642)	26,687	(28,688)
Income tax effects	(924)	934	(9,824)	10,044
Net unrealized gains and losses on hedges	1,586	(1,707)	16,863	(18,644)
Revaluation reserve for land, net of tax:				
Income tax effects	—	1,443	—	15,544
Revaluation reserve for land, net of tax	—	1,443	—	15,544
Transition adjustments:				
Adjustments arising during the year	10,020	(2,332)	106,539	(25,044)
Transition adjustments	10,020	(2,332)	106,539	(25,044)
Share of other comprehensive income of affiliates accounted for using equity method:				
Gains (losses) arising during the year	17,522	(7,877)	186,305	(86,444)
Reclassification adjustments	434	(10)	4,614	(109)
Share of other comprehensive income of affiliates accounted for using equity method	17,957	(7,887)	190,930	(86,553)
Total other comprehensive income	¥ 68,638	¥ 14,449	\$ 729,803	\$ 138,828

18. Business Combination

Acquisition

(a) Overview of the business combination

- (1) Name of acquired company and description of the business:

Company name:	JFE Shoji Trade Corporation
Description of the business:	Primarily domestic trading and import/export of steel products, raw materials for steel production, nonferrous metals, chemical products, machinery and marine vessels, etc.

- (2) Main reason for the business combination
To utilize JFE Shoji's marketing capabilities throughout the Group and to strengthen and streamline the Group's

overall supply chains for steel production

- (3) Date of the business combination
October 1, 2012

- (4) Legal form of the business combination
Share exchange making JFE Shoji a wholly owned subsidiary of the Company

- (5) Percentage share of voting rights acquired by the Company
Share of voting rights owned indirectly before share exchange 39.4%
Share of voting rights acquired on the date of business combination 60.6%
Share of voting rights after acquisition 100.0%

(b) Period of acquired company's financial results included in the consolidated financial statements

October 1, 2012 through March 31, 2013

(c) Acquisition cost of the acquired company

	Millions of yen	Thousands of U.S. dollars
Fair value of the Company's treasury stock delivered on the date of business combination	¥ 65,283	\$ 694,130
Expenses directly incurred for acquisition	¥ 34	\$ 361
Acquisition cost	¥ 65,318	\$ 694,502

(d) Share exchange ratio by type of share, calculation method and number of shares delivered

- (1) Share exchange ratio by type of share
For each common share of JFE Shoji, 0.268 share of common share of the Company was delivered.

- (2) Calculation method of the share exchange ratio

To ensure fairness and appropriateness, the Company and JFE Shoji each selected a different independent third-party institution for calculation of the share exchange ratio.

The Company selected Nomura Securities Co., Ltd. ("Nomura Securities") and JFE Shoji selected Mizuho Securities Co., Ltd. ("Mizuho Securities").

For the common shares of the Company and JFE Shoji, Nomura Securities applied the average market share price method in consideration of the fact that both companies' common shares have a market price, as well as analyses of comparable peer companies and the discounted cash flow (DCF) method. Mizuho Securities applied the market price standard method in

consideration of the fact that both companies' common shares have a market price, as well as analyses of comparable listed companies and the DCF method.

The Company and JFE Shoji agreed to the share exchange ratio provided previously, following extensive negotiations and discussions in consideration of the calculation results provided to each party by the third-party institutions, their respective financial conditions, financial performance trends and stock movements. Both sides determined that the share exchange ratio would advance the shareholders' interests of each company.

- (3) Number of shares delivered
63,382,418 shares

(e) Difference between acquisition cost of the acquired company and total acquisition cost of individual transactions in stages

¥21,279 million (\$226,251 thousand)

(f) Amount of negative goodwill and reason for recognizing negative goodwill

- (1) Amount of negative goodwill
¥57,042 million (\$606,507 thousand)

- (2) Reason for recognizing negative goodwill
Net asset value at the time of business combination exceeded the acquisition cost of the acquired company.

(g) Assets acquired and liabilities assumed at the date of the business combination

	Millions of yen	Thousands of U.S. dollars
Current assets	¥ 442,515	\$ 4,705,103
Non-current assets	106,006	1,148,389
Total assets	¥ 550,521	\$ 5,853,492
Current liabilities	¥ 409,311	\$ 4,352,657
Non-current liabilities	19,687	209,324
Total liabilities	¥ 428,999	\$ 4,561,982

(h) Estimated effect on consolidated financial statement of operations assuming the business combination completed at the beginning of the year ended March 31, 2013 (unaudited)

	Millions of yen	Thousands of U.S. dollars
Net sales	¥ 344,390	\$ 3,661,775
Operating income	9,323	99,128
Ordinary income	7,124	75,746

The above amounts are estimated as differences between net sales and income information assuming the business

combination had been executed at the beginning of the year ended March 31, 2013 and net sales and income information in the consolidated financial statement of operations for the year ended March 31, 2013.

19. Segment Information

(a) Overview of reportable segments

The Group places one operating company to each industry and executes business based on an operating system specifically designed for its industry under the Company as a holding company. The reportable segments are identified by products and services belonging to the operating companies. For the year ended March 31, 2012, the Group consisted of four operating companies that were JFE Steel Corporation, JFE Engineering Corporation, Universal Shipbuilding Corporation and Kawasaki Microelectronics, Inc. and four reportable segments based on these four operating companies were "Steel", "Engineering", "Shipbuilding" and "LSI", respectively.

The Company sold all shares of its wholly owned subsidiary, Kawasaki Microelectronics, Inc., to MegaChips Corporation on July 1, 2012, and thereby abolished the Group's LSI segment from the second quarter ended September 30, 2012. Also, JFE Shoji became a wholly owned subsidiary of the Company through a share exchange on October 1, 2012. Consequently, the "Trading" segment was newly established from the third quarter ended December 31, 2012. In addition, the Group abolished the "Shipbuilding" segment from the fourth quarter ended March 31, 2013 because Universal Shipbuilding Corporation, formerly a consolidated subsidiary of the Company, was merged with IHI Marine United Inc. and became an equity-method affiliate of the Company named Japan Marine United Corporation on January 1, 2013.

Products and services for each reportable segment are as follows:

"Steel" produces and sells a wide range of steel products, steel processed products and raw materials and operates peripheral business, such as transporting, and maintenance and construction of equipment.

"Engineering" provides engineering services for energy, urban environment, recycle, steel construction and industrial machines and systems.

"Shipbuilding" constructs merchant ships and vessels and maintains them.

"LSI" produces and sells a wide range of LSI products.

"Trading" purchases, processes and sells steel products, raw materials for steel production, nonferrous metal products, food, etc.

(b) Method of calculating net sales, income (loss), assets, liabilities and other items by reportable segment

Accounting policies of the reportable segments are consistent with those described in Note 2. "Summary of Significant Accounting Policies." Income by reportable segment is based on ordinary income. Intersegment transactions are based on prevailing market price. Due to the corporation tax reform, the depreciation method of property, plant and equipment acquired on or after April 1, 2012 has been changed to the depreciation method in accordance with the revised Corporation Tax Law. As a result, segment income increased by ¥2,446 million (\$26,007 thousand), ¥173 million (\$1,839 thousand), ¥147 million (\$1,562 thousand), ¥1 million (\$10 thousand) and ¥18 million (\$191 thousand) for Steel, Engineering, Shipbuilding, LSI and Trading for the year ended March 31, 2013, respectively, compared to the previous method.

(c) Net sales, income (loss), assets, liabilities and other items by reportable segment

	Millions of yen		Thousands of U.S. dollars	
	FY2012	FY2011	FY2012	FY2011
Sales:				
Steel.....				
Sales to customers.....	¥ 2,071,832	¥ 2,662,706	¥ 22,029,048	
Intersegment sales or transfers.....	427,982	51,771	4,550,579	
Total.....	¥ 2,499,814	¥ 2,714,477	¥ 26,579,627	
Engineering.....				
Sales to customers.....	¥ 256,896	¥ 267,869	¥ 2,731,483	
Intersegment sales or transfers.....	10,644	10,908	113,173	
Total.....	¥ 267,541	¥ 278,777	¥ 2,844,657	
Shipbuilding.....				
Sales to customers.....	¥ 139,869	¥ 214,522	¥ 1,487,177	
Intersegment sales or transfers.....	24	109	255	
Total.....	¥ 139,894	¥ 214,632	¥ 1,487,442	
LSI.....				
Sales to customers.....	¥ 4,890	¥ 21,413	¥ 51,983	
Intersegment sales or transfers.....	—	—	—	
Total.....	¥ 4,890	¥ 21,413	¥ 51,983	
Trading.....				
Sales to customers.....	¥ 670,678	¥ —	¥ 7,131,079	
Intersegment sales or transfers.....	114,985	—	1,222,594	
Total.....	¥ 785,663	¥ —	¥ 8,353,673	
Total.....				
Sales to customers.....	¥ 3,144,167	¥ 3,168,511	¥ 33,430,802	
Intersegment sales or transfers.....	553,636	62,769	5,886,613	
Total.....	¥ 3,697,804	¥ 3,231,300	¥ 39,317,426	
Adjustments.....				
Sales to customers.....	¥ 45,028	¥ —	¥ 478,766	
Intersegment sales or transfers.....	(553,636)	(62,769)	(5,886,613)	
Total.....	¥ (508,608)	¥ (62,769)	¥ (5,407,846)	
Consolidated.....				
Sales to customers.....	¥ 3,189,196	¥ 3,166,511	¥ 33,909,580	
Intersegment sales or transfers.....	—	—	—	
Total.....	¥ 3,189,196	¥ 3,166,511	¥ 33,909,580	
Segment income (loss):				
Steel.....	¥ 15,300	¥ 25,773	¥ 162,679	
Engineering.....	16,446	14,361	174,864	
Shipbuilding.....	8,010	12,216	85,167	
LSI.....	410	1,535	4,359	
Trading.....	7,478	—	79,510	
Total.....	47,646	53,887	506,662	
Adjustments.....	4,567	(909)	48,559	
Consolidated.....	¥ 52,214	¥ 52,977	¥ 555,172	

	Millions of yen		Thousands of U.S. dollars	
	FY2012	FY2011	FY2012	FY2011
Segment assets:				
Steel.....	¥ 3,523,803	¥ 3,620,528	¥ 37,467,336	
Engineering.....	267,083	287,469	2,839,904	
Shipbuilding.....	—	189,289	—	
LSI.....	—	15,522	—	
Trading.....	523,022	—	5,561,105	
Total.....	¥ 4,313,918	¥ 4,112,809	¥ 45,868,346	
Adjustments.....	(206,399)	(105,546)	(2,194,566)	
Consolidated.....	¥ 4,107,519	¥ 4,007,263	¥ 43,673,779	
Depreciation:				
Steel.....	¥ 180,123	¥ 226,003	¥ 1,915,183	
Engineering.....	5,769	5,916	61,339	
Shipbuilding.....	4,190	5,246	44,550	
LSI.....	183	1,137	2,052	
Trading.....	2,198	—	23,370	
Total.....	¥ 192,474	¥ 238,303	¥ 2,046,307	
Adjustments.....	1,588	12	16,884	
Consolidated.....	¥ 194,062	¥ 238,316	¥ 2,063,381	
Amortization of goodwill:				
Steel.....	¥ 1,058	¥ 187	¥ 11,249	
Engineering.....	—	—	—	
Shipbuilding.....	2,596	3,462	27,892	
LSI.....	—	—	—	
Trading.....	142	—	1,599	
Total.....	¥ 3,797	¥ 3,649	¥ 40,372	
Adjustments.....	19	—	202	
Consolidated.....	¥ 3,817	¥ 3,649	¥ 40,584	
Interest income:				
Steel.....	¥ 716	¥ 689	¥ 7,612	
Engineering.....	109	117	1,158	
Shipbuilding.....	1	3	10	
LSI.....	0	2	0	
Trading.....	379	—	4,029	
Total.....	¥ 1,208	¥ 812	¥ 12,844	
Adjustments.....	(320)	(419)	(3,487)	
Consolidated.....	¥ 879	¥ 393	¥ 9,346	

	Millions of yen		Thousands of U.S. dollars	
	FY2012	FY2011	FY2012	FY2011
Equity in earnings (losses) of affiliates:				
Steel.....	¥ 6,640	¥ 27,607	¥ 70,600	
Engineering.....	822	(419)	8,740	
Shipbuilding.....	—	—	—	
LSI.....	—	—	—	
Trading.....	(179)	—	(1,903)	
Total.....	¥ 7,283	¥ 27,187	¥ 77,437	
Adjustments.....	2,303	65	24,486	
Consolidated.....	¥ 9,586	¥ 27,253	¥ 101,924	
Investment in affiliates accounted for using equity method:				
Steel.....	¥ 289,660	¥ 307,740	¥ 3,079,851	
Engineering.....	17,662	21,040	187,783	
Shipbuilding.....	—	—	—	
LSI.....	—	—	—	
Trading.....	18,876	—	200,701	
Total.....	¥ 326,199	¥ 328,780	¥ 3,468,357	
Adjustments.....	38,095	(1,006)	405,050	
Consolidated.....	¥ 364,294	¥ 327,773	¥ 3,873,407	
Increase in property, plant and equipment and intangible assets:				
Steel.....	¥ 161,773	¥ 161,185	¥ 1,720,074	
Engineering.....	7,334	8,515	77,979	
Shipbuilding.....	5,557	7,104	59,085	
LSI.....	152	638	1,616	
Trading.....	3,602	—	38,298	
Total.....	¥ 178,420	¥ 197,443	¥ 1,897,076	
Adjustments.....	1,259	5	13,386	
Consolidated.....	¥ 179,679	¥ 197,449	¥ 1,910,462	

(d) Information about products and services
Information about products and services has not been disclosed since the classification by products and services is the same as the reportable segment.

(e) Information by geographical area
(1) Sales

	Millions of yen			Thousands of U.S. dollars		
	FY2012	Others	Total	FY2011	Others	Total
Sales.....	¥ 1,970,946	¥ 120,230	¥ 3,188,096	¥ 1,956,343	¥ 1,195,557	¥ 3,166,511
Consolidated						
Japan						
Others						
Total						
Sales.....	¥ 21,041,414	¥ 12,868,155	¥ 33,909,580			

(2) Property, plant and equipment

Information about property, plant and equipment has not been disclosed since property, plant, and equipment in Japan constituted more than 90% of property, plant and equipment on the consolidated balance sheets.

(f) Information about major customers

Name of customer	Millions of yen		Thousands of U.S. dollars	
	FY2012	FY2011	FY2012	FY2011
JFE Shoji Trade Corporation	Sales	Sales	Sales	Sales
	¥ 380,223	¥ 842,568	¥ 4,042,775	
Marubeni-Itochu Steel Inc.	Steel	354,205	3,411,983	

(g) Information about impairment loss by reportable segment

	Millions of yen			
	FY2012			
	Steel	Engineering	Shipbuilding	Total
Impairment loss	¥ 5,306	¥ 858	¥ —	¥ 680
				¥ 6,825
	Millions of yen			
	FY2011			
	Steel	Engineering	Shipbuilding	Total
Impairment loss	¥ 4,124	¥ 2,101	¥ —	¥ 6,225
				¥ 6,225
Thousands of U.S. dollars				
	Steel	Engineering	Shipbuilding	Total
Impairment loss	¥ 56,416	¥ 9,122	¥ —	¥ 7,017
				¥ 72,567

(h) Information on unamortized balance of goodwill by reportable segment

	Millions of yen			
	FY2012			
	Steel	Engineering	Shipbuilding	Total
Unamortized balance	¥ 521	¥ —	¥ —	¥ 16
				¥ 537
	Millions of yen			
	FY2011			
	Steel	Engineering	Shipbuilding	Total
Unamortized balance	¥ 692	¥ —	¥ 3,462	¥ 4,154
				¥ 4,154
Thousands of U.S. dollars				
	Steel	Engineering	Shipbuilding	Total
Unamortized balance	¥ 5,539	¥ —	¥ —	¥ 170
				¥ 5,709

(i) Information about gain on negative goodwill by reportable segment

Gain on negative goodwill of ¥57,042 million (\$606,507 thousand) was recognized in extraordinary income during the year ended March 31, 2013 since the Company executed the share exchange with JFE Shoji in exchange for common shares of the Company.

Gain on negative goodwill was not allocated to reporting segments.

No gain on negative goodwill was recognized for the year ended March 31, 2012.

20. Impairment Loss

The Company classified long-lived assets as idle assets, value of the idle properties was reduced to the recoverable amount. The Company recognized loss on impairments of long-lived assets totaling ¥6,825 million (\$72,567 thousand), including ¥3,787 million (\$40,265 thousand) for independent of other assets or group of assets.

machinery and equipment, ¥767 million (\$8,155 thousand) for buildings and structures and ¥2,270 million (\$24,136 thousand) for land. The recoverable amount of the above assets is principally based on the estimated value of disposition.

For the year ended March 31, 2012, primarily the book value of the idle properties was reduced to the recoverable

21. Extraordinary Income (Loss)

For the years ended March 31, 2013 and 2012, extraordinary income (loss) consisted of the following:

	Millions of yen		Thousands of U.S. dollars	
	FY2012	FY2011	FY2012	FY2011
Gain on sales of investments in securities	¥ —	¥ 9,361	¥ —	—
Gain on turning a trading business company into a wholly owned subsidiary (Note 1)	35,762	—	380,244	—
Loss on impairment of property, plant and equipment	(6,825)	(6,225)	(72,567)	—
Write-down of investments in securities	—	(89,200)	—	—
Loss on change in equity (Note 2)	(5,769)	—	(61,339)	—
Loss related to emission credits	—	(7,385)	—	—
Loss on natural disaster (Note 3)	—	(11,860)	—	—
Loss on revision of retirement benefit plans (Note 4)	—	(15,677)	—	—
Loss on cancellation of purchase contracts	—	(3,840)	—	—

Note 1:
Gain on turning a trading business company into a wholly owned subsidiary consists of gain on negative goodwill of ¥57,042 million (\$606,507 thousand) and loss on step acquisition of ¥21,279 million (\$226,251 thousand) in association with the business combination making JFE Shoji a wholly owned subsidiary.

Note 2:
Loss on change in equity is related to the merger of Universal Shipbuilding Corporation and IHI Marine United Inc.

Note 3:
Loss on natural disaster is mainly repair costs for property, plant and equipment which were damaged by the Great East Japan Earthquake. Loss on natural disaster for the year ended March 31, 2012 consists of the following:

	Millions of yen	
	FY2011	
Repair costs	¥ (8,367)	
Fixed costs during shutdown	(2,723)	
Other	(768)	

Note 4:
JFE Steel Corporation and JFE Engineering Corporation, consolidated subsidiaries of the Company, had tax-qualified pension plans and lump-sum retirement plans. Effective October 1, 2012, the Company recognized a net loss of ¥57,042 million (\$606,507 thousand) due to the effects of the transition of the pension plans from the "Accounting for Transfers between Retirement Benefit Plans" (ASBU Guidance No. 1, issued on January 31, 2002).

22. Net Income (Loss) per Share

Diluted net income per share is not shown due to no dilutive stocks for the year ended March 31, 2013.

(Year ended March 31, 2013)

	Thousands of shares		EPS	
	Millions of yen	Weighted average shares	Millions of yen	Weighted average shares
Net income	¥ 39,599	556,186	¥ 71.20	\$ 0.75

Diluted net income per share is not shown due to recording a net loss for the year ended March 31, 2012.

(Year ended March 31, 2012)

	Thousands of shares		EPS	
	Millions of yen	Weighted average shares	Millions of yen	Weighted average shares
Net loss	¥ (36,633)	533,144	¥ (68.71)	

Independent Auditor's Report

The Board of Directors
JFE Holdings, Inc.

We have audited the accompanying consolidated financial statements of JFE Holdings, Inc. and its consolidated subsidiaries, which comprise the consolidated balance sheet as at March 31, 2013, and the consolidated statements of operations, comprehensive income, changes in net assets, and cash flows for the year then ended and a summary of significant accounting policies and other explanatory information, all expressed in Japanese yen.

Management's Responsibility for the Consolidated Financial Statements

Management is responsible for the preparation and fair presentation of these consolidated financial statements in accordance with accounting principles generally accepted in Japan, and for designing and operating such internal control as management determines is necessary to enable the preparation and fair presentation of the consolidated financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on these consolidated financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in Japan. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the consolidated financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the consolidated financial statements, whether due to fraud or error. The purpose of an audit of the consolidated financial statements is not to express an opinion on the effectiveness of the entity's internal control, but in making these risk assessments the auditor considers internal controls relevant to the entity's preparation and fair presentation of the consolidated financial statements in order to design audit procedures that are appropriate in the circumstances. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the consolidated financial position of JFE Holdings, Inc. and its consolidated subsidiaries as at March 31, 2013, and their consolidated financial performance and cash flows for the year then ended in conformity with accounting principles generally accepted in Japan.

Convenience Translation

We have reviewed the translation of these consolidated financial statements into U.S. dollars, presented for the convenience of readers, and, in our opinion, the accompanying consolidated financial statements have been properly translated on the basis described in Note 1.

June 20, 2013

Ernst & Young ShinNihon LLC

A member firm of Ernst & Young Global Limited



JFE Holdings, Inc.

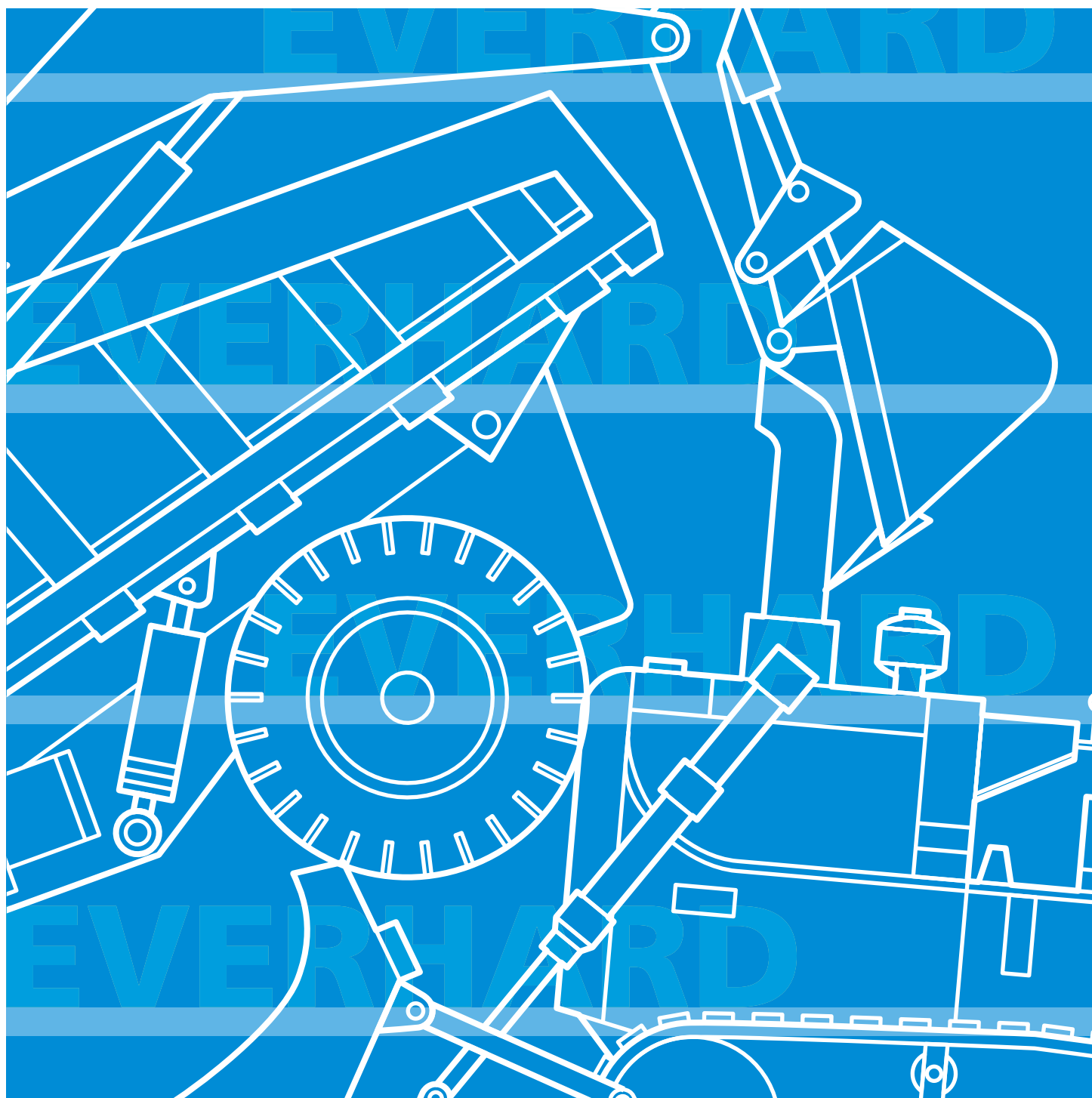
2-2-3 Uchisaiwaicho, Chiyoda-ku, Tokyo, Japan 100-0011

www.jfe-holdings.co.jp/en



EVERHARD™

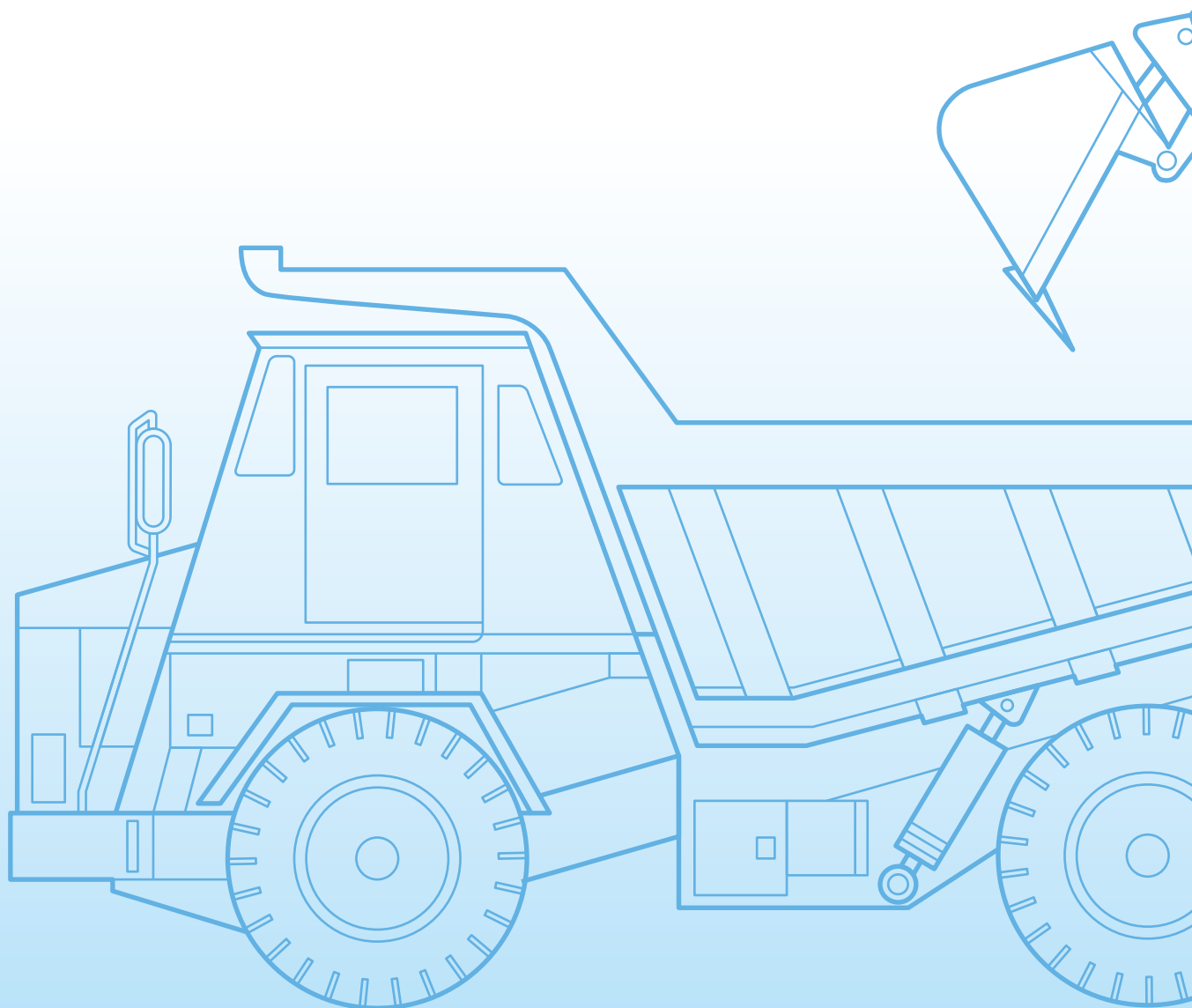
Abrasion-Resistant Steel Plate



JFE Steel Corporation

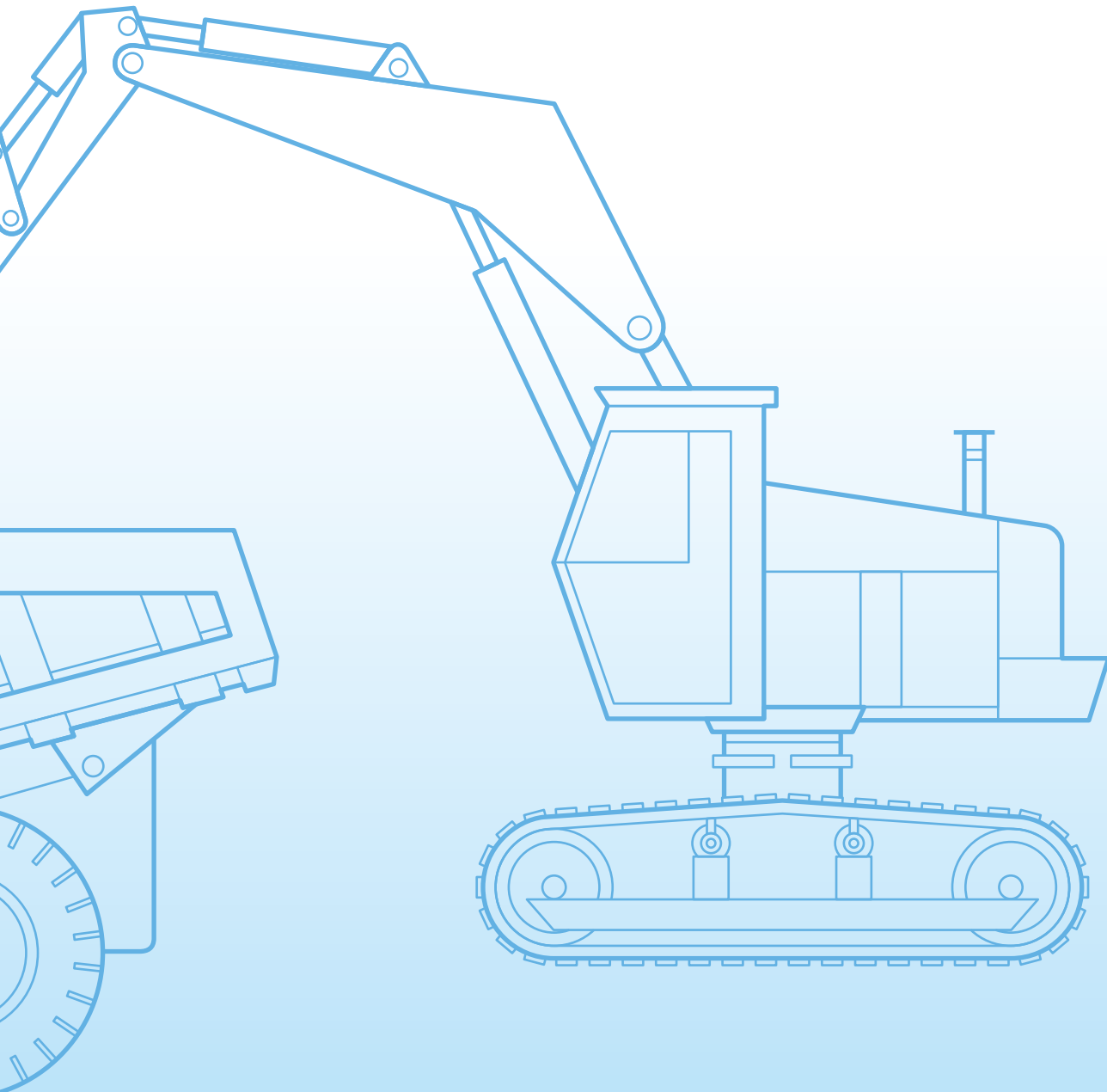
Contents

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**JFE
Steel Co.**

pioneered the production and sale of abrasion-resistant steel plate in Japan in the mid-1950s, and JFE abrasion-resistant steel plate (EVERHARD) enjoyed widespread use as a vital material for construction, mining, civil engineering and farming equipment. Furthermore, JFE Steel Co. has succeeded in developing super abrasion-resistant steel plate EVERHARD-SP with higher abrasion-resistance than that of the Brinell 500 grade, and EVERHARD360LE, EVERHARD400LE, EVERHARD500LE with excellent toughness through the leading edge of production technology. Those products enjoy customer's reputation. In this catalog, we would like to introduce the EVERHARD series of abrasion-resistant steel plate.





Special Features of EVERHARD

A variety of available grades

A total of 9 grades are available ; the standard series and the alloy series with 3 and 2 grades of hardness respectively, a new super abrasion resistant grade, as well as 360 grade, 400 grade and 500 grade with high toughness, providing a complete product line that can meet a wide range of applications.

Standard Series

This series consists of grades produced with the main emphasis on their hardness levels, the chemical composition being basically simple with boron added while the addition of other alloying elements is restrained.

Alloy Series

This series contains alloying elements in greater quantities than the standard series. The prescribed hardness is guaranteed for plate thickness of up to 100mm and, at the same time, careful consideration has been given to low-temperature toughness.

Super Abrasion resistant plate EVERHARD-SP

Customers often call for the development of a longer-lasting abrasion-resistant plate in order to reduce running cost. However up to now, it has been difficult to develop an abrasion resistant plate that performs better than the conventional 500 grade plate, without reducing the plate's weldability and formability.

Our new higher abrasion resistant plate succeeds in doing this.

Abrasion-resistant steel plate with excellent toughness EVERHARD360LE, EVERHARD400LE, EVERHARD500LE

High toughness at -40°C of abrasion-resistant steel plate was generally difficult to be guaranteed.

JFE has succeeded in developing abrasion-resistant steel plate including 500 grade with excellent toughness guaranteed at -40°C. EVERHARD360LE, EVERHARD400LE and EVERHARD500LE are the most suitable plates when high toughness is required because of the application in low temperature environment and/or suffering with high impact.

EH360LE has also high resistance to weld cracking, then presents high quality and safety of welded joint.

Superb quality

JFE's abrasion-resistant steel plates are produced at modern Works. Based on many years of experience, production incorporates the latest in heat treatment technology and proceeds under strict quality control. The result is high-quality steel plate that offers not only outstanding abrasion-resistance but good weldability and workability as well.

Specifications of EVERHARD

EVERHARD is manufactured for non-structural steel plates which are specified by chemical analysis of molten steel, Brinell hardness at the plate surface and material toughness. It is not specified and guaranteed by its tensile strength and elongation which are required to be specified as structural steel plates. In case of any request for the tensile strength and/or elongation as reference, please refer to JFE Steel Technical Bulletins.

1. Chemical composition

Type	Grade	Available thickness mm	Heat treatment	Chemical composition %*										
				C	Si	Mn	P	S	Cr	Mo	V	Ti	B	Ceq**
Standard	EVERHARD360	6 ~ 50	Controlled Heat Treatment	0.20max.	0.55 max.	1.60 max.	0.030 max.	0.030 max.	0.40max.	—	—	0.005 ~0.020	0.004 max.	—
	0.25max.			0.80max.										
	0.35max.			0.80max.										
Alloyed	EVERHARD360A	6 ~ 100	Controlled Heat Treatment	0.20max.	0.55 max.	1.60 max.	0.030 max.	0.030 max.	0.40	0.10	0.10	0.020	0.004	—
	0.35max.			~1.20					~0.50	max.	max.	max.		
EVERHARD-SP		6 ~ 65	Controlled Heat Treatment	0.35max.	0.55max.	1.60max.	0.030 max.	0.030 max.	0.50 ~1.50	Other alloying elements are added.				
EVERHARD360LE		6 ~ 19	Controlled Heat Treatment	0.17	0.55 max.	1.60 max.	0.020 max.	0.010 max.	0.40 max.	0.35 max.	—	0.020 max.	0.004 max.	0.40max.
		19.1 ~ 32		max.										0.43max.
EVERHARD400LE		6 ~ 19	Controlled Heat Treatment	0.23	0.55 max.	1.60 max.	0.020 max.	0.010 max.	0.80 max.	0.35 max.	—	0.020 max.	0.004 max.	0.50max.
		19.1 ~ 32		max.										0.53max.
EVERHARD500LE		6 ~ 19	Controlled Heat Treatment	0.29	0.55 max.	1.60 max.	0.020 max.	0.010 max.	0.40 max.	0.35 max.	—	0.020 max.	0.004 max.	0.55max.
		19.1 ~ 32		max.										0.58max.

*Elements that are not given in the above table may be added. Chemical composition data are quoted from our molten steel analysis.

**Ceq = $C + Mn / 6 + (Cu + Ni) / 15 + (Cr + Mo + V) / 5$

2. Mechanical properties

Type	Grade	Hardness test*		Charpy impact test		
		Thickness mm	Brinell hardness (3000) (Average of 5 values)	Thickness mm	Test temperature °C	Impact value J (Average of 3 specimens)
Standard	EVERHARD360	6 ~ 50	361min.	—	—	—
	EVERHARD400	6 ~ 50	401min.	—	—	—
	EVERHARD500	6 ~ 50	477min.	—	—	—
Alloyed	EVERHARD360A	6 ~ 100	361min.	13.1 ~ 50.0	0	21min.
	EVERHARD500A	6 ~ 100	477min.	13.1 ~ 25.0	0	21min.
EVERHARD-SP		6 ~ 65	401min.	—	—	—
EVERHARD360LE		6 ~ 32	361 ~ 440	12.0 ~ 32.0	-40	27min.
EVERHARD400LE		6 ~ 32	410 ~ 490	12.0 ~ 32.0	-40	27min.
EVERHARD500LE		6 ~ 32	477 ~ 556	12.0 ~ 32.0	-40	21min.

*Test for plate surface.

3. Appearance, shape, dimensions, mass and their tolerances comply with JIS G3193.

Typical Mechanical Properties of EVERHARD

Grade	Thick- ness mm	Mechanical properties										
		Tensile test					Bend test			Charpy impact test		Hardness test
		Test specimen	Sampling direction	Yield strength N/mm ²	Tensile strength N/mm ²	Elongation %	Test specimen	Sampling direction	Bend radius =thickness x3	Sampling direction	Impact value 0°C Average J	Brinell hardness (3000) Average of 5 values
EVERHARD360	19	JIS-5	C	1083	1246	20.8	JIS-1	L	Good	—	—	385
EVERHARD400	19	JIS-5	C	1163	1316	19.8	JIS-1	L	Good	—	—	442
EVERHARD500	19	JIS-5	C	1297	1449	17.7	JIS-1	L	Good	—	—	508
EVERHARD360A	19	JIS-5	C	1147	1203	23.9	JIS-1	L	Good	L	156	388
EVERHARD500A	20	JIS-5	C	1321	1516	22.9	JIS-1	L	Good	L	65	542
EVERHARD-SP	35	JIS-5	C	1104	1352	10.7	JIS-1	L	Good	—	—	455
EVERHARD360LE	19	JIS-5	C	1058	1308	23.0	JIS-1	L	Good	L	−40°C 61	411
EVERHARD400LE	20	JIS-5	C	1121	1442	19.6	JIS-1	L	Good	L	−40°C 45	450
EVERHARD500LE	20	JIS-5	C	1203	1681	17.0	JIS-1	L	Good	L	−40°C 42	502

Maximum Available Sizes

Product length : m

Thickness mm	Width mm	1501 ┆ 1800	1801 ┆ 2000	2001 ┆ 2200	2201 ┆ 2400	2401 ┆ 2600	2601 ┆ 2800	2801 ┆ 3000	3001 ┆ 3200	3201 ┆ 3400	3401 ┆ 3600	3601 ┆ 3800	3801 ┆ 4000	4001 ┆ 4200	4201 ┆ 4400	4401 ┆ 4600	4601 ┆ 4800	4801 ┆ 5000	5001 ┆ 5200	5201 ┆ 5300
		18	16	14	12	12	10	—	—	—	—	—	—	—	—	—	—	—	—	—
6.0 ~ 6.9	6.9	18	16	14	12	12	10	—	—	—	—	—	—	—	—	—	—	—	—	—
7.0 ~ 7.9	7.9	18	16	14	12	12	10	—	—	—	—	—	—	—	—	—	—	—	—	—
8.0 ~ 8.9	8.9	18	16	14	12	12	10	—	—	—	—	—	—	—	—	—	—	—	—	—
9.0 ~ 9.9	9.9	18	16	14	12	12	10	—	—	—	—	—	—	—	—	—	—	—	—	—
10.0 ~ 11.9	11.9	22	20	18	16	14	14	12	—	—	—	—	—	—	—	—	—	—	—	—
12.0 ~ 12.9	12.9	22	20	18	16	14	14	12	—	—	—	—	—	—	—	—	—	—	—	—
13.0 ~ 13.9	13.9	22	20	18	16	14	14	12	—	—	—	—	—	—	—	—	—	—	—	—
14.0 ~ 22.0	22.0	22	20	18	16	14	14	12	—	—	—	—	—	—	—	—	—	—	—	—
22.1 ~ 24.0	24.0	24	22	22	20	18	16	14	12	—	—	—	—	—	—	—	—	—	—	—
24.1 ~ 26.0	26.0	25	24	22	22	20	18	16	14	12	—	—	—	—	—	—	—	—	—	—
26.1 ~ 28.0	28.0	25	25	24	24	22	22	20	18	16	14	12	—	—	—	—	—	—	—	—
28.1 ~ 30.0	30.0	25	25	25	25	25	24	22	20	20	18	18	16	16	—	—	—	—	—	—
30.1 ~ 35.0	35.0	25	25	25	25	25	25	24	22	22	22	20	20	20	18	18	18	—	—	—
35.1 ~ 40.0	40.0	25	25	25	25	25	25	25	24	22	22	22	20	20	20	19	18	—	—	—
40.1 ~ 45.0	45.0	25	25	25	25	25	25	25	25	24	23	22	20	19	19	18	17	16	16	—
45.1 ~ 50.8	50.8	25	25	25	25	25	25	25	23	22	20	20	18	17	17	16	15	15	14	—
50.9 ~ 60.0	60.0	25	23	23	21	24	22	20	19	18	17	16	15	14	14	13	13	12	11	—
60.1 ~ 70.0	70.0	22	19	20	18	20	19	17	16	15	14	14	13	12	12	11	11	10	10	—
70.1 ~ 80.0	80.0	19	17	17	16	18	16	15	14	13	13	12	11	11	10	10	9.7	9.3	8.9	—
80.1 ~ 90.0	90.0	17	15	15	14	16	14	13	13	12	11	11	10	9.8	9.4	8.9	8.6	8.2	7.9	—
90.1 ~ 100.0	100.0	15	13	14	12	14	13	12	11	10	10	10	9.3	8.8	8.4	8.0	7.7	7.4	7.1	—



Typical Applications

Industry	Applications
Construction and Automotive Industries	• Bulldozer shovels and buckets - Slush plates for bulldozers - Exterior linings of bulldozer buckets • Trailer beds • Vessels for dump and cargo trucks • Dredger buckets
Cement and Mining	• Lining material for ready-mixed concrete turbine mixer • Paddle for above • Conveyor chute for concrete mixing plant • Pug mill for soil cement • Conveyor pipe for solids (pneumatic pipelines for coal mines)
Chemical Industry	• Agitators for asphalt plants and finishers • Sand conveyor pipe for sand cracking in naphtha cracking plants • Sulfide mineral bucket elevators
Steel and Gas	• BF top swivel chute - BF stationary chute, liner, upper hopper liner, gate liner • BF gas washing venturi scrubber, and septum valve • Screens for ores, and switching damper - Bypass chute for ore conveyors - Chute for ore conveyors - Tripper chute for ore conveyors • Tripper chute for coke conveyors - Coke conveyor chute, and stacker chute • Lining for rotary mixers • Drop chute receiver for blending conveyor in sintering plants - Liner for vibro-feeders in sintering plants • Raw material and sole roll feeders
Others	• Earth drills • Shear liners

Recommendations for excellent fabrication performance

Gas cutting

- Gas cutting can be applied in the same way as for ordinary steel plates. However, due to the hardness of EVERHARD, it is necessary to prevent the “notches” that occur during gas cutting of a plate as they may cause the plate to crack.
- Therefore, higher gas pressure and oxygen pressure and lower cutting speed are preferable in order to prevent the notches.
- In particular, when cutting an ultra-hard steel plate, such as grade 500, it is recommended to preheat or postheat it at a temperature under 200°C to prevent its cracking from cut surface.
- If notches occur during the cutting of a high hardness steel plate, cracks might result. Therefore, in such cases, use a grinder or other tools to form smooth finish.
- A thin hardened layer will be formed on the gas cut surface due to heat effects, although its thickness is around 2 ~ 3mm as shown in the Fig. 1. A softening layer appears next to a hardening layer due to heating by gas cutting.

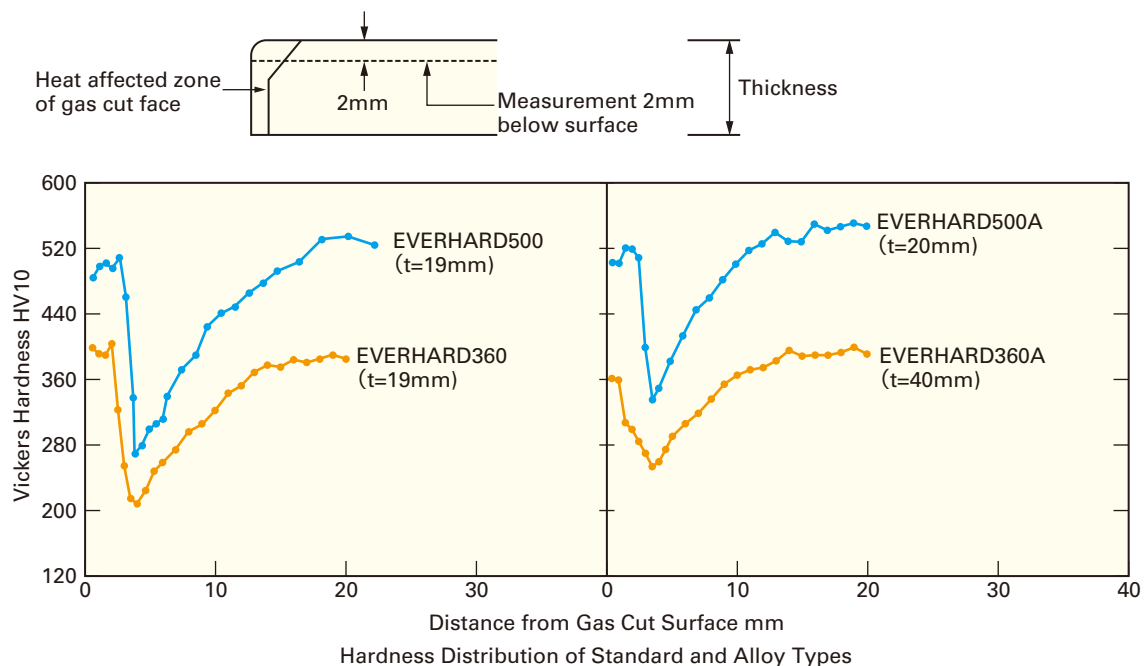


Fig. 1 Hardness around gas cut surface

- In case the surface temperature increases above 250°C by such operations as gas cutting into small pieces, please note that there is a possibility of hardness reduction.
- Surface temperature will be elevated too high if simultaneous cutting of both the sides is carried out when slitting especially into small pieces. In such cases, please cut one side first and wait for the cooling of the surface temperature sufficiently, then cut another side. Please use caution with hardness reduction near gas cut surface as shown in Fig. 1, especially when slit pieces for applications or hardness test are taken.

Recommendations for excellent fabrication performance



Machining

- For machining tools, super-hardened tools are recommended.
- The machining conditions will vary according to the hardness level of a steel plate, the tool and cutting method used, etc. As the hardness level increases, it becomes necessary to reduce the cutting depth and feed speed.
- For EVERHARD-SP, the same machining tools as that for EH500 are applicable.

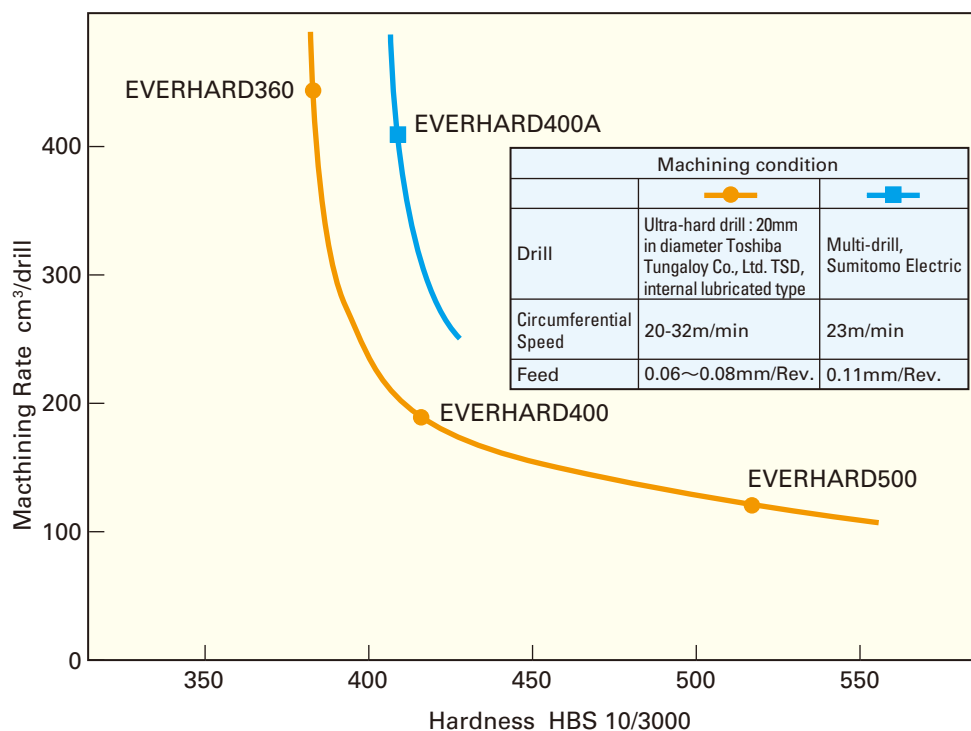


Fig. 2 Machining rate according with hardness

Shot blasting

- When shot blasting is required, it is recommended to be applied after cold working. Although the increment of hardness by blasting is minimal.

Bending

- EVERHARD is formable by cold working such as pressing or roll bending. However, more care is necessary than with high strength steel due to its high hardness.
- Bending radius more than that are shown in Table 1 is recommended. However the removal of the notches on the cut surface, and the adequate rounding of the edge corner are necessary. To secure the bending, the removal of a hardened layer produced by flame cutting is recommended.
- Bending or roll forming is preferable to be performed transverse to the final direction of rolling as shown in Fig. 3.
- In order to prevent inside cracking, overbend by forming with small radius die, such as pipe forming, is not recommended.
- Since fragments of materials might fly about when crack occurs on the plate during processing of bending especially high hardness material such as 500 grade, please keep enough distance from a bending machine for safety.

Table 1 Recommended bending radius

Grade	Minimum Bending Radius
EVERHARD360	4.5t
EVERHARD360A, EVERHARD360LE	4.5t
EVERHARD400, EVERHARD400LE	5t
EVERHARD500, EVERHARD500A, EVERHARD500LE	6t
EVERHARD-SP	6t

t : plate thickness

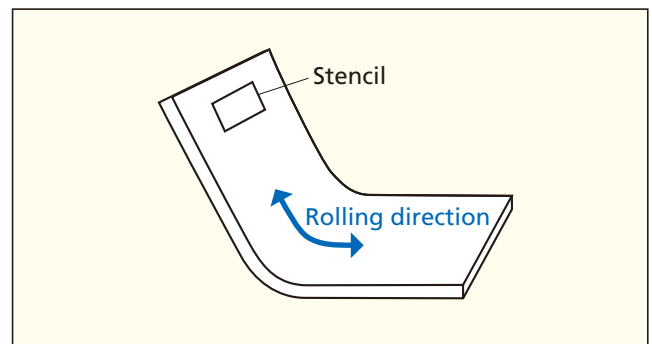
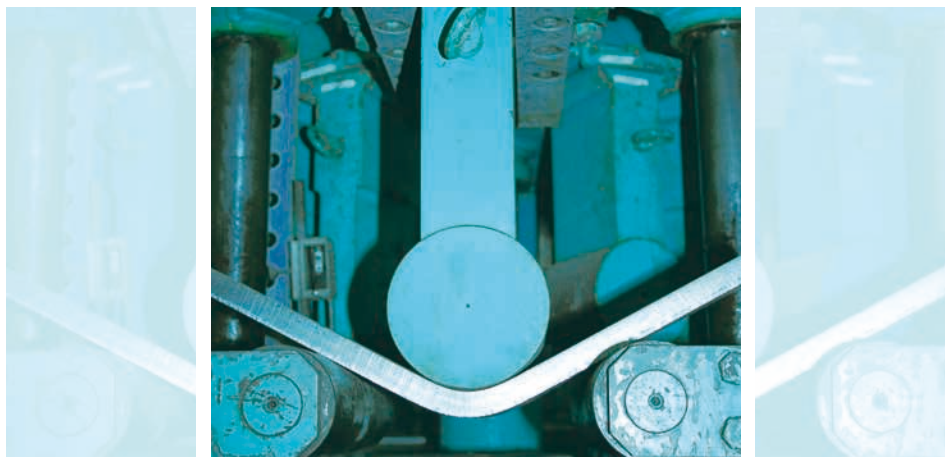


Fig. 3 Recommended bending direction



Hot working

- All EVERHARD grades are given by a special controlled heat treatment. Therefore, please avoid using hot working.

Welding

- Careful cautions are required in welding of EVERHARD from a viewpoint of prevention of weld cracking, as it has high hardness and high strength compare to common structural steel plates. The cracking, in many cases, is so called hydrogen induced cracking, which is also called cold cracking or delayed cracking, due to the hydrogen contained in weld metal diffusing into base metal. Therefore, please pay full attention to the following points.

1. Selection of welding materials

- Typical welding materials for EVERHARD are shown in Table 2.

Low hydrogen or ultra-low hydrogen type materials are recommended.

Solid wire for CO₂ gas shield arc welding is also recommended.

Probability of cold cracking (hydrogen induced cracking) is reduced when low strength welding materials are used. If wear resistance of weld metal is a key factor, please use high strength welding materials for final welding layers, such as 590N/mm² or 780 N/mm² grade welding material.

Table 2 Examples of welding materials

Materials applicable to all grades of EVERHARD in terms of weldability

Strength grade of materials	Shield metal arc welding		Gas shielded arc welding	
	Bland*	AWS grade	Bland*	AWS grade
490N/mm ²	KS-76 KSA-76 LB-52 LB-52UL	E7016 E7016-G E7016 E7016	KC-50(CO ₂) KM-50(Ar + CO ₂) MG-50(CO ₂) MGS-50(Ar + CO ₂)	ER70S-G ER70S-G ER70S-G ER70S-G
590N/mm ²	KSA-86 LB-62 LB-62UL	E9016-G E9016-G E9016-G	KC-60(CO ₂) MG-60(CO ₂) MGS-63B(Ar + CO ₂)	ER80S-G ER80S-G ER90S-G
780N/mm ²	LB-116 LB-80UL	E11016-G E11016-G	MGS-80(Ar + CO ₂)	ER110S-G

*KOBELCO

2. Preheating

- Preheating condition varies with chemical composition, plate thickness and the restraint conditions for weld areas. For your reference, recommended preheating temperature based on test results under high restraint condition is given in Table 3.
- In case preheating can not be applied, it can be welded by using austenitic stainless materials. In this case, high Cr and Ni content austenitic stainless material such as type 309 is recommended instead of 304 or 316 type.

3. Postheating

- In general, postheating is not necessarily required unless hard facing welding material is used. Postheating at the same temperature as preheating makes crack prevention more secure.

Table 3 Recommended preheating temperature

Based on y-groove weld cracking test results under high restraint

Grade	Thickness mm	Shielded metal arc welding ^{*1} (°C)	Gas shielded arc welding ^{*2} (°C)
EVERHARD360LE	19	75	25
	32	100	25
EVERHARD360	19	75	50
	40	125	100
EVERHARD400LE	20	75	25
	30	100	50
EVERHARD400	20	100	50
	40	175	100
EVERHARD500LE	19	125	75
	32	175	125
EVERHARD500	19	125	75
	40	175	125
EVERHARD360A	20	100	75
	40	150	125
EVERHARD500A	20	125	100
	40	175	150
EVERHARD-SP	35	175	175
	51	200	200

*1 Welding materials : LB-62(AWS E9016-G)

*2 Welding materials : MG-50(AWS ER70S-G)



4. Other general items

- Before using welding electrodes, please re-dry them for shield metal arc welding at 350 ~ 400°C for approximately 1 hour.
- When flux cored wire is used, please note that induced hydrogen might be higher by moisture absorption of flux. The stocking procedures of FCW shall be in accordance with the suppliers' instruction.
- When humidity at working area is high, induced hydrogen might be high. The stocking procedures of FCW shall be in accordance with the suppliers' instruction.
- Please remove rust, oil, slag and other undesirable materials from the weld area and maintain it in good condition. Such contaminations might provide weld defects and/or cracking.
- If arc-striking is done on the surface of the base metal, it may cause cracks. Therefore, use either the back-step welding or waste piece arcing method.
- Please keep the arc length as short as possible.
- Please avoid weaving as much as possible. If weaving must be performed, please restrict it to no more than 1.5 times the diameter of the welding electrode.
- Tack welding can be performed in the same manner as conventional welding, however please keep the bead length 50mm or longer.
- Heat input is recommended to be set above 2kJ/mm.

PWHT

- PWHT is sometimes applied to structures such as pressure vessels to reduce residual stress by welding. However PWHT should not be applied to EVERHARD used for wear resistant purpose.

Storage

- For storing plates, deflection and distortion of plates should be minimized, and the plates have to be waterproofed by sheet to prevent rusting and pitting by corrosion from which crack would be originated. When a waterproof sheet is used, it should be removed away occasionally to reduce inside humidity.

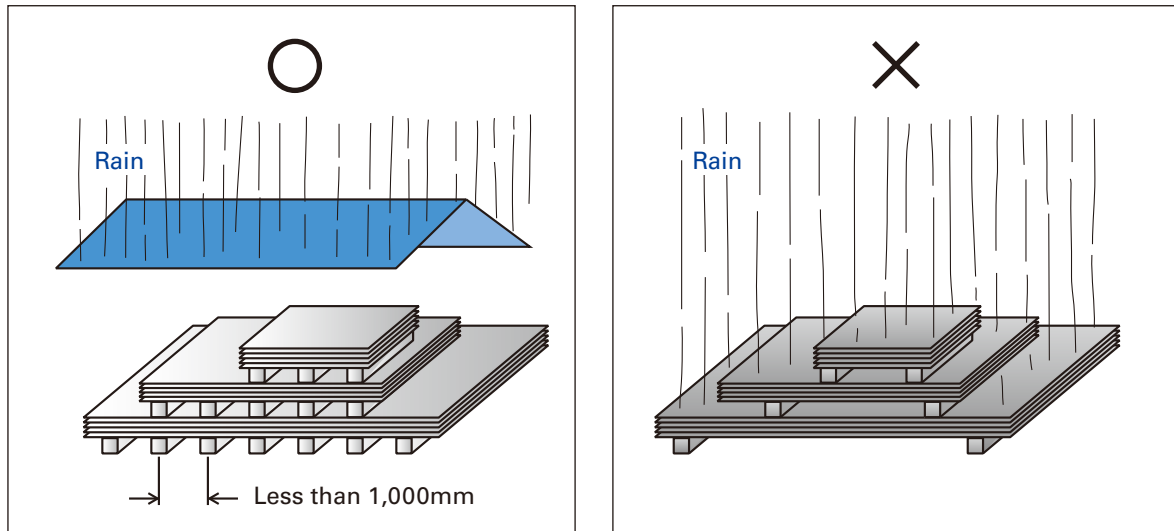
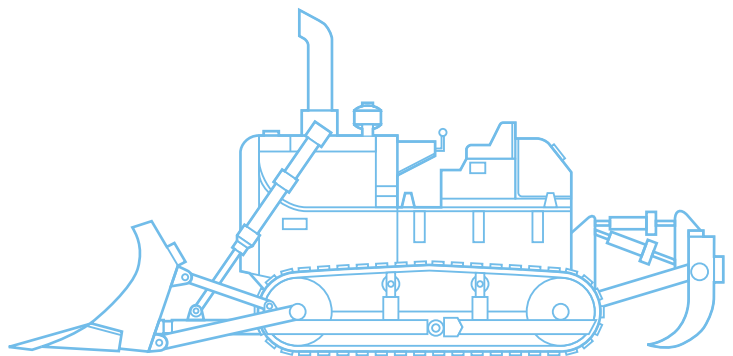


Fig. 4 Recommended storage method



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NEW YORK OFFICE	JFE Steel America, Inc., New York Office 600 Third Avenue, 12th Floor, New York, NY 10016, U.S.A. Phone : (1)212-310-9320 Fax : (1)212-308-9292
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MUMBAI OFFICE	JFE Steel India Private Limited Mumbai Office 308, A Wing, 215 Atrium, Andheri - Kurla Road, Andheri (East), Mumbai - 400093, Maharashtra, INDIA Phone : (91)22-3076-2760 Fax : (91)22-3076-2764
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BEIJING OFFICE	JFE Steel Corporation Beijing 1720 Beijing Fortune Building No.5, Dongsanhuan North Road, Chaoyang District, Beijing, 100004, P.R.China Phone : (86)10-6590-9051 Fax : (86)10-6590-9056
SHANGHAI OFFICE	JFE Consulting (Shanghai) Co., Ltd. Room 801, Building A, Far East International Plaza, 319 Xianxia Road, Shanghai 200051, P.R.China Phone : (86)21-6235-1345 Fax : (86)21-6235-1346
GUANGZHOU OFFICE	JFE Consulting (Guangzhou) Co., Ltd./ JFE Steel Corporation, Guangzhou Office Room 3901, Citic Plaza, 233 Tian He North Road, Guangzhou 510613, P.R.China Phone : (86)20-3891-2467 Fax : (86)20-3891-2469

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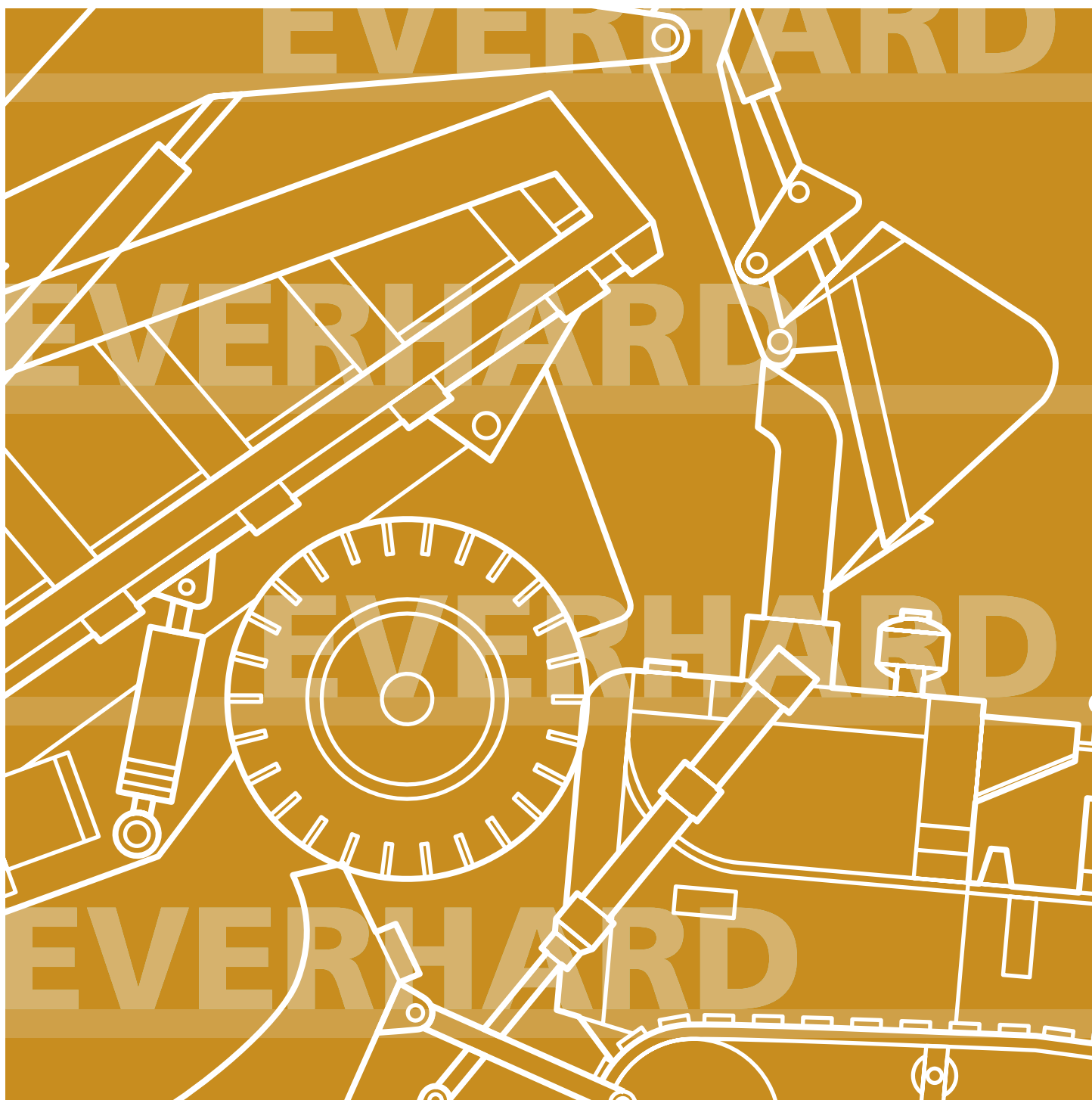
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JFE

JFE EVERHARD EH-SP

JFE's Super Abrasion-Resistant
Steel Plate



JFE Steel Corporation

What's new

JFE-EH-SP

Excellent abrasion resistance without sacrificing formability and weldability.

Until now, wear resistance was created with increasing hardness which consequently reduces formability and weldability.

After extensive research for years, JFE succeeded in developing excellent abrasion resistant steel, JFE-EH-SP.

By utilizing extremely hard precipitates “Titanium Carbide”, excellent wear resistance of JFE-EH-SP has been achieved without increasing hardness.

Highly improved abrasion resistance

Almost same weldability and formability as conventional JFE-EH500

Specification

Chemical composition

Grade	Available thickness mm	Heat treatment	Chemical composition %									
			C	Si	Mn	P	S	Cr	Mo	V	Ti	B
JFE-EH-SP	6~65	Controlled Heat Treatment	0.35 max.	0.55 max.	1.60 max.	0.030 max.	0.030 max.	0.50 ~1.50	Other alloying elements are added.			

Mechanical properties

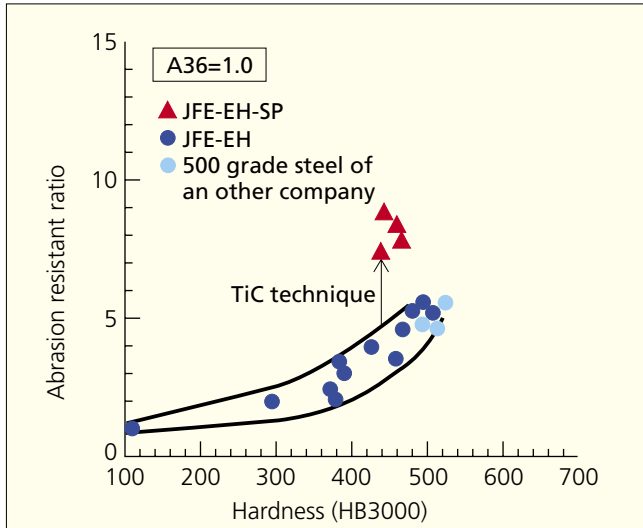
Grade	Hardness test*	
	Thickness mm	Brinell hardness (3000) Average of 5 values
JFE-EH-SP	6~65	401min.

Appearance, shape, dimensions, mass and their tolerances comply with JIS G3193.

* Test for plate surface.

Super Abrasion-Resistance

JFE-EH-SP vs Conventional material



Relationship between hardness and abrasion resistance
(Abrasive : flattery sand)

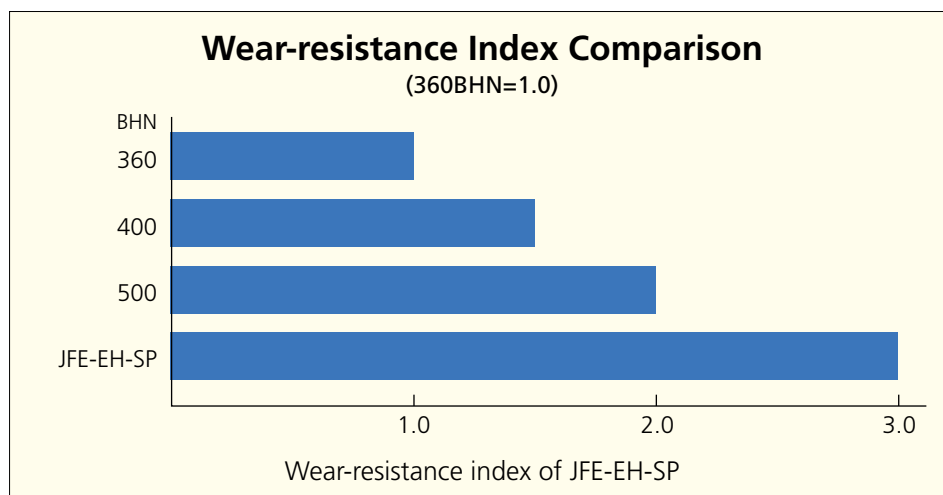


Titanium carbide

Steel	Wear Mechanism
JFE-EH-SP	Moving direction Sand Sand is broken
JFE-EH500	Sand

Field Test Comparison

Field tests in various mining plants and power plants prove that the wear-resistance of JFE-EH-SP exceeds conventional 360 to 500 Brinell steels.



The results of the field test with JFE-EH-SP at American mines

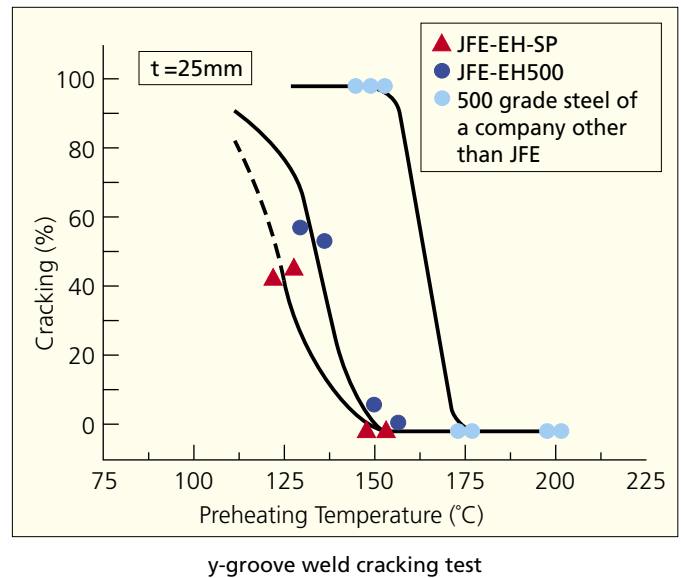
APPLICATION	ABRASIVE	COMPARED WITH	RESULTS*1
LOADER BUCKET SKID PLATES	GOLD	500 BHN STEEL	1.60
CHUTE LINERS	GRANITE	500 BHN STEEL	1.50
LOADER BUCKET HEEL PLATES	CONCRETE	500 BHN STEEL	1.50
TRUCK BODY LINER PLATES	COPPER	500 BHN STEEL	1.55
CRUSHER DISCHARGE HOPPER	COPPER	500 BHN STEEL	1.52
CRUSHER FEEDER	COPPER	500 BHN STEEL	1.53
CRUSHER CHUTE	COPPER	500 BHN STEEL	1.52
TRCK BODY LINER PLATE	GOLD	360 BHN STEEL	3.00
DRAGLINE BUCKET SHROUDS	ROCK QUARRY	400 BHN STEEL	1.90
CRUSHER PARTS	CONTRACTOR	500 BHN STEEL	2.70
RIPPER TOOTH	CONTRACTOR	OVERLAY	1.12
TRUCK LINER PLATES	COPPER	500 BHN STEEL	1.30
SHOVEL BUCKET	COAL	HARDOX500	1.50
COAL CHUTE	POWER PLANT	500 BHN STEEL	1.60
VIBRATORY FEEDER	GOLD	500 BHN STEEL	1.40
SHOVEL BUCKET	COAL	HARDOX400	2.30
CHUTE	COPPER	HARDOX500	1.40
SPLITTER GATE	COPPER	HARDOX400	2.00
CRUSHER PARTS	GOLD	500 BHN STEEL	1.50
CHUTE	ROCK QUARRY	450 BHN STEEL	1.40

*1 Material compared with = 1.0

Weldability

JFE is always developing and improving the abrasion-resistant steel plates in consideration of weldability. JFE-EH-SP shows almost same weldability as that of conventional JFE-EH500 while abrasion-resistance of EH-SP is superior.

Please note that there exists a difference of weldability among companies' products and JFE's EH500 is superior in weldability.



JFE Steel Corporation

TOKYO HEAD OFFICE	Hibiya Kokusai Building, 2-3 Uchisaiwaicho 2-chome, Chiyodaku, Tokyo 100-0011, Japan Phone : (81)3-3597-3111 Fax : (81)3-3597-4860
NEW YORK OFFICE	350 Park Avenue, 27th Fl., New York, NY 10022, U.S.A. Phone : (1)212-310-9320 Fax : (1)212-308-9292
DETROIT OFFICE	2000 Town Center, Suite 1900, Southfield, MI 48075, U.S.A. Phone : (1)248-351-6290 Fax : (1)248-351-6291
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VANCOUVER OFFICE	P.O. Box 49168, Three Bentall Centre, 2383-595, BURRARD STREET, VANCOUVER, B.C. V7X 1J1 Phone : (1)604-687-0091 Fax : (1)604-688-7020
BRASIL OFFICE	Praia de Botafogo 228, Setor B, Salas 508 & 509, CEP 22359-900, Botafogo Phone : (55)21-2553-1132 Fax : (55)21-2553-3430
LONDON OFFICE	8th Floor, International Press Centre, 76 Shoe Lane, London EC4A 3JB, U.K. Phone : (44)20-7583-1133 Fax : (44)20-7583-1144
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MALAYSIA OFFICE	Unit C-13A-5, Block-C, Megan Avenue II, 12, Jalan Yap Kwan Seng, 50450, Kuala Lumpur, Malaysia Phone : (60)3-2164-6618 Fax : (60)3-2164-6695
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SEOUL OFFICE	Room No.1301, Donghwa Bldg., 58-7 Seosomun-dong, Chung-ku, Seoul 100-110, Korea Phone : (82)2-779-8246 Fax : (82)2-779-8958
BEIJING OFFICE	1720, Beijing Fortune Building, Chaoyang District, Beijing 100004, People's Republic of China Phone : (86)10-6590-9051 Fax : (86)10-6590-9056
SHANGHAI OFFICE	Room No.2112, Lippo Plaza, 222 Huai Hai Road(M), Shanghai 200021, People's Republic of China Phone : (86)21-5396-5610 Fax : (86)21-5396-5611
HONG KONG OFFICE	2904, 1Exchange Square, 8 Connaught Place, Central, Hong Kong SAR Phone : (85)2-2537-2176 Fax : (85)2-2537-5339

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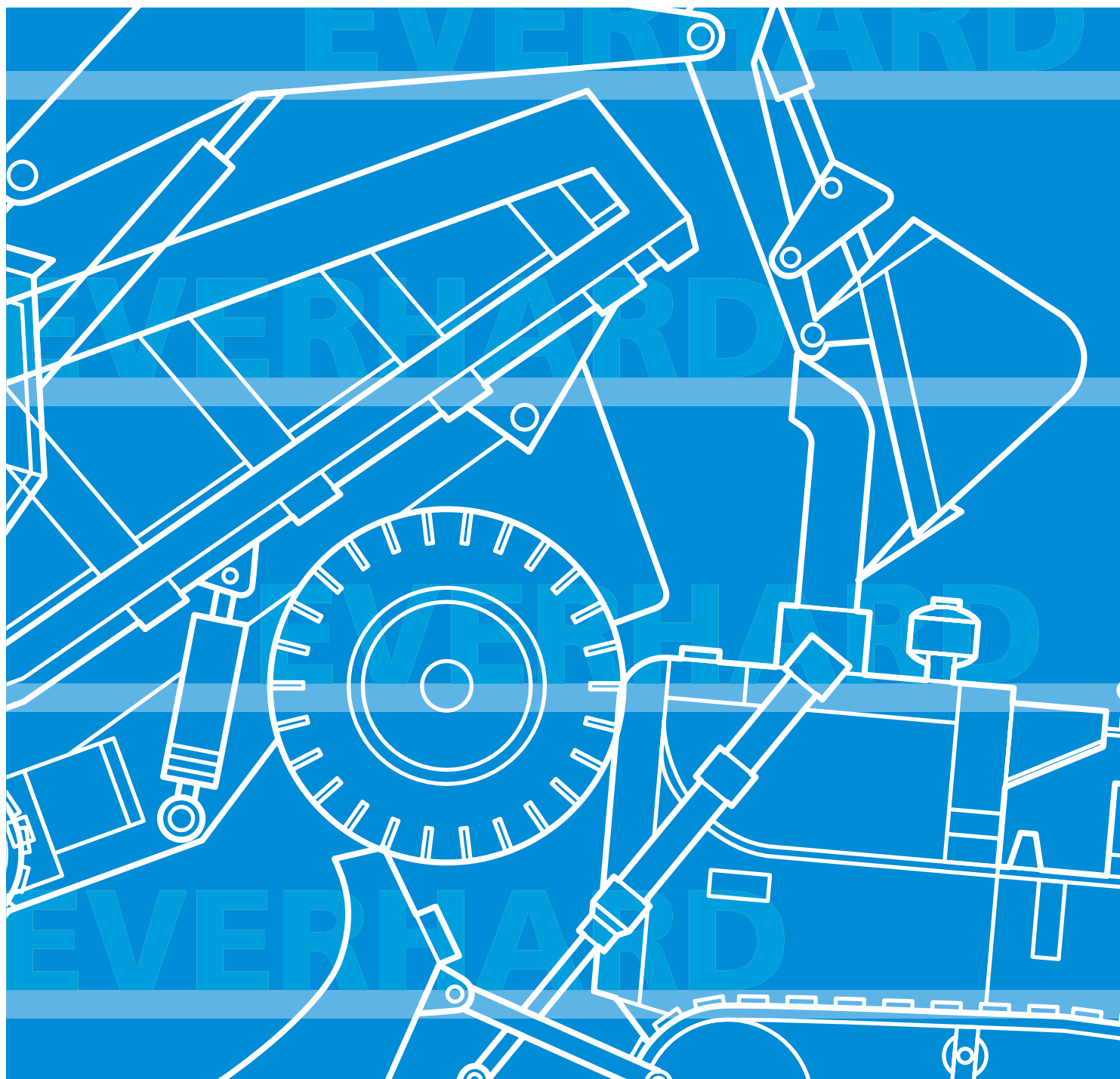
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EVERHARD™ LE and C Series

Abrasion-Resistant Steel Plate

— EVERHARD™, Reliable Forever —



JFE Steel Corporation

Establishment of new grades ; EVERHARD C series

JFE Steel corporation can produce 8 grades of abrasion-resistant steel plate basically; the standard series and alloy series with 3 and 2 grades of hardness respectively, a super abrasion resistant grade, as well as 400 grade, 450 grade and 500 grade with high toughness, providing a complete product line that can meet a wide range of applications. It adds above, at this time, we have established C(means center) series, which set the narrower Brinell hardness range and also adopt it's center value as grade name.

◆Standard series: 3 grades

This series consists of grades produced with the main emphasis on their hardness levels, the chemical composition being basically simple with boron added while the addition of other alloying elements is restrained in viewpoint of manufacturing cost reduction.

◆Alloy series: 2 grades

This series contains alloying elements in greater quantities than the standard series. The prescribed hardness is guaranteed for plate thickness up to 100mm and at the same time, consideration has been given to low-temperature(0°C) toughness which is in case of EVERHARD 360A(hardness:400 grade), 500A(hardness:500 grade), plate thickness is 13.1~50mm and 13.1~25mm respectively.

◆LE series: 3 grades

LE(means Leading Edge) series had developed by micro-alloying technology and controlled heat treatment, consideration has been given to low-temperature(-40°C) excellent toughness. The high toughness is required because of the application in low temperature environment and/or suffering with high impact. Brinell hardness levels are 400, 450 and 500 grade. And this series have also high resistance to weld-cracking, then presents high quality and safety of weld joint.

◆C series: 4 grades

JFE Steel corporation have established C(means center) series, which set the narrower Brinell hardness range at surface and also adopt it's center value as grade name by accuracy improvement of alloying element content at the time of steel making process, etc. This series arranged 4 grade of hardness levels 400, 450 about standard series and LE series.



■ Comparison with conventional grades

Table1 Comparison with conventional grades and new grades

Conventional			New grade			Concept of new grade
Grade	Thick. (mm)	Brinell hardness	Grade	Thick. (mm)	Brinell hardness	
EVERHARD 360	6~50.8	≥361	EVERHARD C400	6~101.6	400±30	Narrow range of Brinell hardness guaranteed
EVERHARD 360A	6~101.6					
EVERHARD 360LE	6~32	361~440	EVERHARD C400LE	6~60		Narrow range of Brinell hardness guaranteed Thickness enlarged
EVERHARD 400	6~50.8	≥401	EVERHARD C450	6~101.6		
EVERHARD 400LE	6~32	410~490	EVERHARD C450LE	6~50.8		
EVERHARD 500	6~50.8	≥477	—			
EVERHARD 500A	6~101.6					
EVERHARD 500LE	6~32	477~556				

■ Specification of new grade

Table2 Mechanical properties of new grades

New grade	Thick. (mm)	Brinell hardness	Charpy impact value			Chemical composition	
			Thick. (mm)	Temp (℃)	Energy (J)	Thick. (mm)	Ceq (IIW)
EVERHARD C400	6.0~101.6	400±30	—			—	
EVERHARD C400LE	6.0~60		6.0~11.9	—		6.0~19	≤0.40
			12.0~32	-40	≥27	19.1~32	≤0.43
			32.1~60			32.1~60	≤0.58
EVERHARD C450	6.0~101.6	450±25	—			—	
EVERHARD C450LE	6.0~50.8		6.0~11.9	—		6.0~19	≤0.50
			12.0~32	-40	≥27	19.1~32	≤0.53
			32.1~50.8			32.1~50.8	≤0.65

■ Test results of EVERHARD C400LE

Table3 Brinell hardness at surface

Thick. (mm)	Brinell hardness () : Ave.	Spec.
50.8	413,405,429,425,425 (419)	Ave. 400±30
60	423,411,421,413,411 (416)	

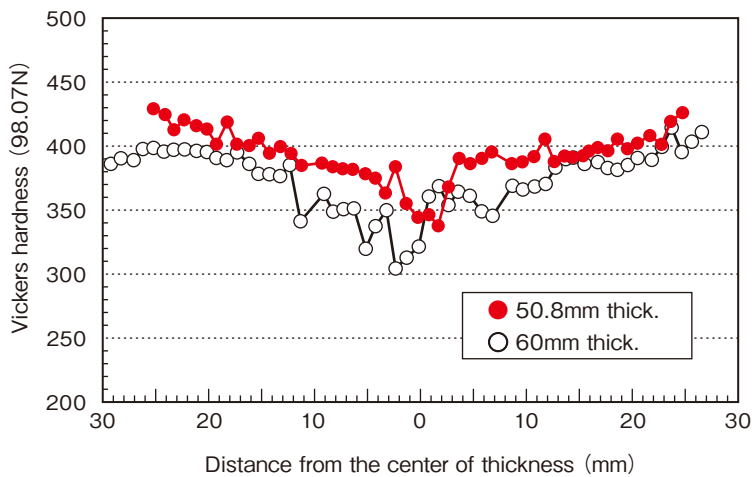


Fig.1 Section hardness distribution

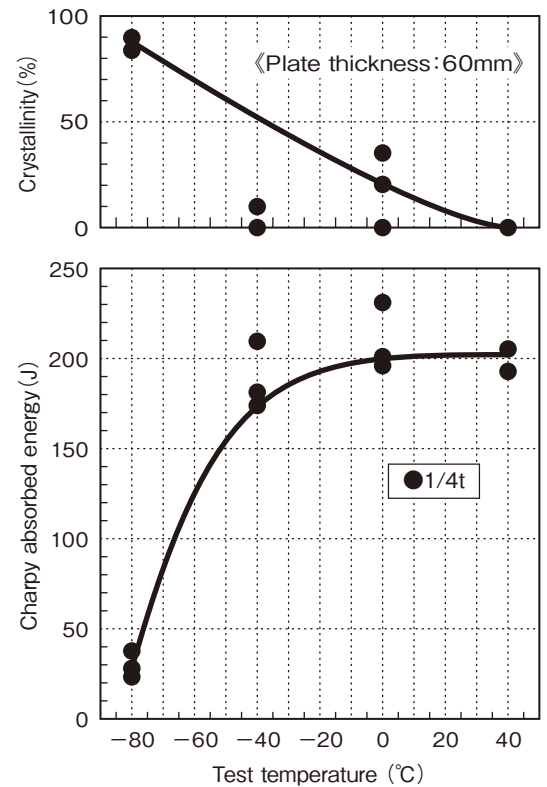


Fig.2 Charpy transition curve

Table4 Mechanical properties

Thick. (mm)	Tensile test *					Charpy impact test **		
	Test specimen	Direction	0.2%YS (MPa)	TS (MPa)	El. (%)	Direction	Test temp (°C)	Absorbed energy (J)
19	No.5	C	1058	1308	23	L	-40	61
30			927	1198	18			47
60	No.4		971	1096	21			189

* JIS Z2241

** JIS Z2242 2mmV 10×10 (1/4t)

■ Test results of EVERHARD C450LE

Table5 Brinell hardness at surface

Thick. (mm)	Brinell hardness () : Ave.	Spec.
10	455,482,469,466,466 (468)	Ave. 450±25
15	435,463,458,463,447 (453)	
20	450,452,445,450,452 (450)	
25	442,440,447,445,450 (445)	
32	440,452,447,450,445 (447)	
40	464,453,452,455,458 (456)	
50	468,468,470,467,472 (469)	

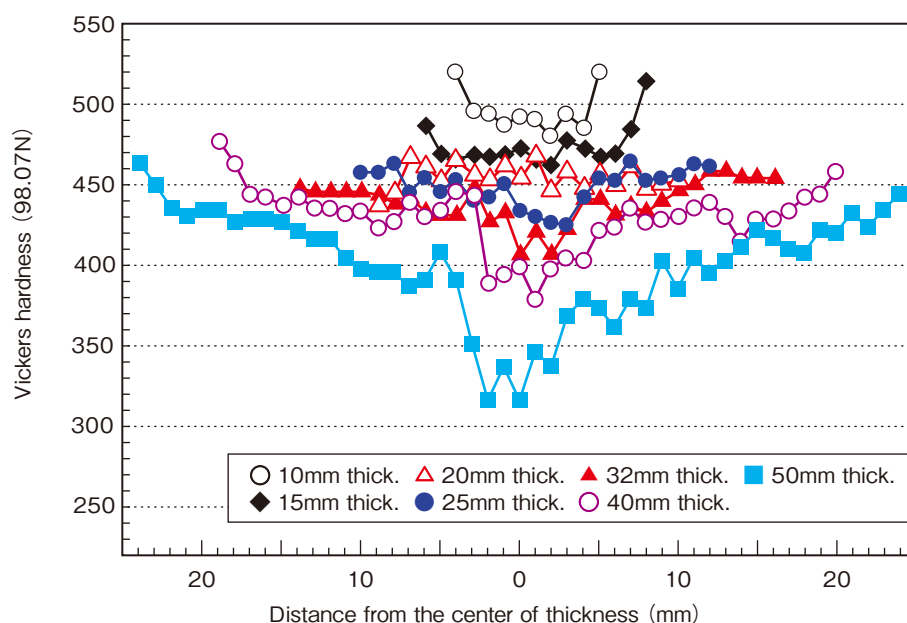


Fig.3 Section hardness distribution

Table6 Mechanical properties

Thick. (mm)	Tensile test					Prueba de impacto Charpy			
	Test specimen	Direction	0.2%YS (MPa)	TS (MPa)	El. (%)	Test specimen	Direction	Test temp (°C)	Absorbed energy (J)
10	JIS Z2241 No.5 (Todo espesor)	C	1174	1504	16	JIS Z2242 2mmV 10×10 (1/4t)	L	-40	38,57,43 (46)*
15			1173	1487	18				42,43,41 (42)
20			1121	1442	20				50,42,42 (45)
25			1124	1425	21				46,39,51 (45)
32			1106	1402	24				32,33,34 (33)
40	JIS Z2241 No.4 (1/4t)	C	1035	1371	16				35,41,50 (42)
50			1008	1290	15				43,32,43 (39)

※Sub size specimen (7.5×10)

Test results of EVERHARD C400

Table7 Brinell hardness at surface

Thick. (mm)	Brinell hardness () : Ave.	Spec.
25.4	396,399,372,379,387 (387)	Ave. 400±30
50	406,408,401,401,402 (404)	
70	403,415,420,400,409 (409)	

Table8 Mechanical properties

Thick. (mm)	Tensile test *				Charpy impact test **		
	Direction	0.2%YS (MPa)	TS (MPa)	El. (%)	Direction	Test temp. (°C)	Absorbed energy Ave. (J)
19	C	1083	1246	21	L	0	52

* JIS Z2241 No.5 (All thickness)

** JIS Z2242 2mmV 10×10 (1/4t)

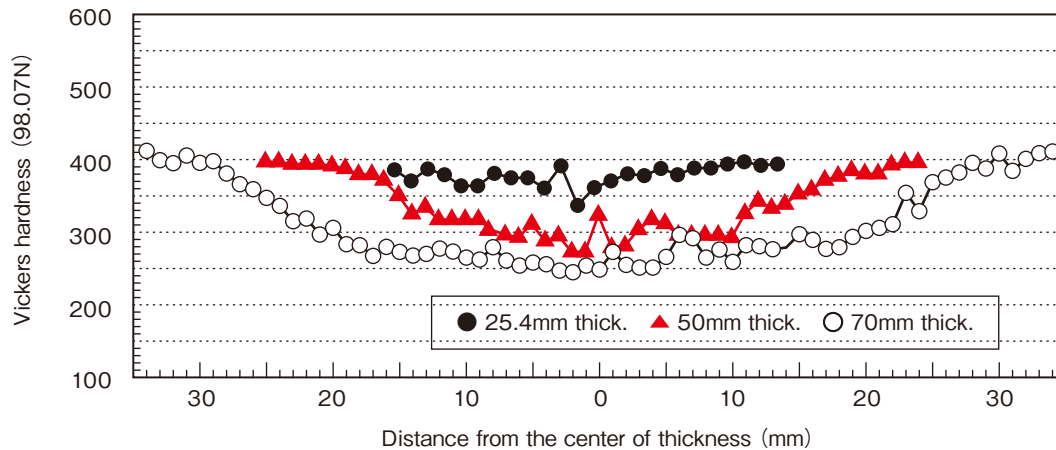


Fig.4 Section hardness distribution

Test results of EVERHARD C450

Table9 Brinell hardness at surface

Thick. (mm)	Brinell hardness () : Ave.	Spec.
20	437,445,437,437,452 (442)	Ave. 450±25
30	442,440,435,440,435 (438)	
50	437,463,463,458,445 (453)	

Table10 Mechanical properties

Thick. (mm)	Tensile test *				Charpy impact test **		
	Direction	0.2%YS (MPa)	TS (MPa)	El. (%)	Direction	Test temp. (°C)	Absorbed energy Ave. (J)
19	C	1163	1316	20	L	0	48

* JIS Z2241 No.5 (All thickness)

** JIS Z2242 2mmV 10×10 (1/4t)

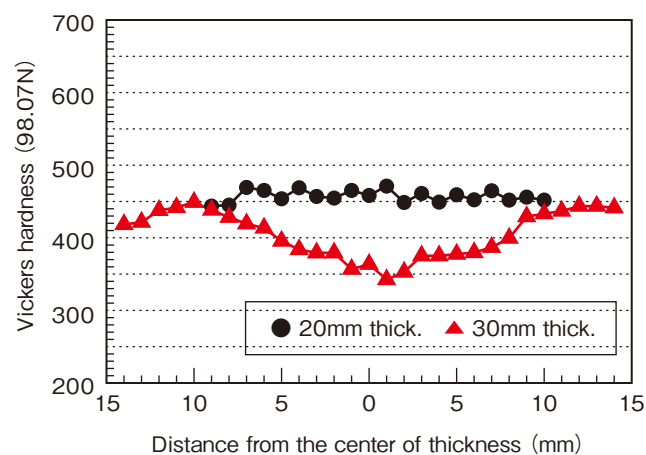


Fig.5 Section hardness distribution

Maximum Available Size

It is the same as written contents on conventional JFE' s catalog (Cat.No.C1E-004-07).

Recommendations for excellent fabrication performance

It is the same as written contents on conventional JFE' s catalog (Cat.No.C1E-004-07). For example, the recommended preheating temperature based on y-groove weld cracking test(JIS Z 3158) shows as following.

		Thickness (mm)										
Grade	Welding Method	Thickness (mm)										
		10	20	30	40	50	60	70	80	90	101.6	
EVERHARD C400	SMAW	50°C	75°C	100°C	>125°C							
	GMAW	R.T.		50°C	>75°C							
EVERHARD C450	SMAW	50°C	75°C	100°C	>125°C							
	GMAW	R.T.		50°C	>75°C							
EVERHARD C400LE	SMAW	75°C	100°C	125°C								
	GMAW	R.T.		75°C								
EVERHARD C450LE	SMAW	75°C	100°C	125°C								
	GMAW	R.T.	50°C	75°C								

・Decided by y-groove weld cracking test according to JIS Z 3158
 ・SMAW: Shielded Metal Arc Welding
 ・GMAW: Gas shielded Metal Arc Welding

Fig.6 Recommended preheating temperature based on y-groove weld cracking test



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TOKYO HEAD OFFICE	Hibiya Kokusai Building, 2-3 Uchisaiwaicho 2-chome, Chiyodaku, Tokyo 100-0011, Japan Phone : (81)3-3597-3111 Fax : (81)3-3597-4860
NEW YORK OFFICE	JFE Steel America, Inc., New York Office 600 Third Avenue, 12th Floor, New York, NY 10016, U.S.A. Phone : (1)212-310-9320 Fax : (1)212-308-9292
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RIO DE JANEIRO OFFICE	JFE Steel do Brasil LTDA / JFE Steel Corporation, Rio de Janeiro Office Praia de Botafogo, 228 Setor B, Salas 508 & 509, Botafogo, CEP 22250-040, Rio de Janeiro-RJ, Brazil Phone : (55)21-2553-1132 Fax : (55)21-2553-3430
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NEW DELHI OFFICE	JFE Steel India Private Limited 1101, 11th Floor, Unitech's Signature Tower, Tower-A, South City-I, NH-8, Gurgaon, Haryana, 122002, India Phone : (91)124-426-4981 Fax : (91)124-426-4982
MUMBAI OFFICE	JFE Steel India Private Limited Mumbai Office 308, A Wing, 215 Atrium, Andheri - Kurla Road, Andheri (East), Mumbai - 400093, Maharashtra, INDIA Phone : (91)22-3076-2760 Fax : (91)22-3076-2764
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VIETNAM OFFICE	JFE Steel Corporation, Vietnam Office Unit 1401, 14th Floor, Kumho Asiana Plaza, 39 Le Duan Street, Dist 1, HCMC, Vietnam Phone : (84)8-3825-8576 Fax : (84)8-3825-8562
JAKARTA OFFICE	JFE Steel Corporation, Jakarta Office 16th Floor Summitmas II, JL Jendral Sudirman Kav. 61-62, Jakarta 12190, Indonesia Phone : (62)21-522-6405 Fax : (62)21-522-6408
MANILA OFFICE	JFE Steel Corporation, Manila Office 23rd Floor 6788 Ayala Avenue, Oledan Square, Makati City, Metro Manila, Philippines Phone : (63)2-886-7432 Fax : (63)2-886-7315
SEOUL OFFICE	JFE Steel Korea Corporation 6th Floor, Geumgang-Tower, 889-13, Daechi-dong, Gangnam-gu, Seoul, 135-570, Korea Phone : (82)2-3468-4130 Fax : (82)2-3468-4137
BEIJING OFFICE	JFE Steel Corporation Beijing 1720 Beijing Fortune Building No.5, Dongsanhuan North Road, Chaoyang District, Beijing, 100004, P.R.China Phone : (86)10-6590-9051 Fax : (86)10-6590-9056
SHANGHAI OFFICE	JFE Consulting (Shanghai) Co., Ltd. Room 801, Building A, Far East International Plaza, 319 Xianxia Road, Shanghai 200051, P.R.China Phone : (86)21-6235-1345 Fax : (86)21-6235-1346
GUANGZHOU OFFICE	JFE Consulting (Guangzhou) Co., Ltd./ JFE Steel Corporation, Guangzhou Office Room 3901, Citic Plaza, 233 Tian He North Road, Guangzhou 510613, P.R.China Phone : (86)20-3891-2467 Fax : (86)20-3891-2469

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JFE-HITEN

HIGH STRENGTH STEEL PLATES



JFE Steel Corporation

INTRODUCTION

In accordance with the technical evolution, structures or pressure vessels are becoming bigger, and more highly pressurized recently. To maintain the safety of those structures, consequently, customers have required high strength steel plates with good weldability and high toughness.

To meet the rapidly growing customer requirements, JFE Steel has developed wide range of high tensile strength steel plates such as 590~980N/mm² class, with their own special characteristics. These are called JFE-HITEN, and JFE Steel wins a popularity in the world.

These products are used in ships, storage tanks, spherical gas holders, pressure vessels, bridges, penstocks, machineries, off-shore structures, etc, and receive valuable reliance from customers.

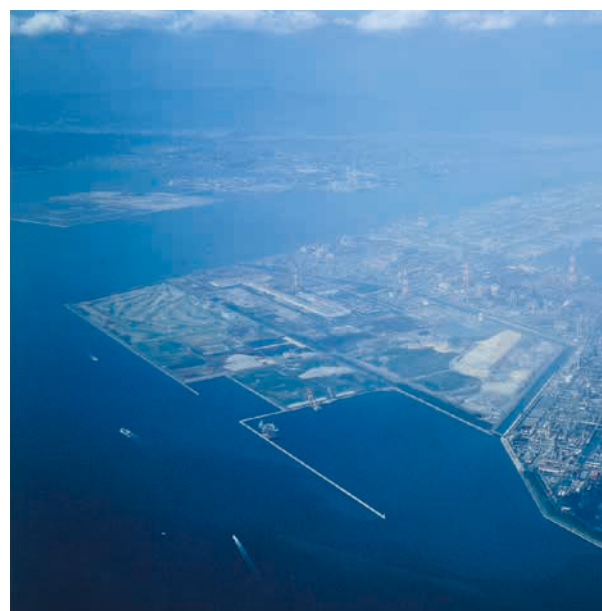
So, JFE Steel introduces here the features and characteristics of JFE-HITEN series.

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▲ East Japan works (Keihin)



▲ West Japan works (Kurashiki)



▲ West Japan works (Fukuyama)



JFE's High Tensile Strength Steel Plates (JFE-HITEN)

High Strength

JFE-HITEN is low-alloyed high-strength steel plate manufactured by TMCP, or quenched and tempered. Because JFE-HITEN offers high strength, it results in a significant reduction in the weight of welded structures.

Good Weldability

JFE-HITEN, of which chemical composition is controlled by specific procedure, offers low carbon equivalent and excellent weldability. JFE Steel also supplies welding materials suitable for JFE-HITEN effectively, and thereby enjoys acceptances by customers.

Excellent Notch Toughness

JFE-HITEN offers high notch toughness because it is produced by closely controlling the chemical composition and heat treatment conditions. Application of JFE-HITEN ensures construction of structures providing high reliability against brittle fracture.

Excellent Uniformity and Clean Surface

Rolled on the most modern plate mill under rigid quality control, JFE-HITEN has excellent uniformity in properties, flatness and surface finish. In addition, slab surfaces are carefully scarfed, powerful water jets are used during rolling, and non-oxidizing atmosphere furnaces are used for heat treatment. Consequently, JFE-HITEN has smooth, and clean surfaces.

Good Workability

Because JFE-HITEN features good ductility, it offers not only good formability, but also good machinability, making it easy to drill and cut.

Wide Range of Sizes

JFE-HITEN are available in widths of up to 5,350mm, and in lengths of up to 27,000mm, and then contributes to saving expenses.



JFE'S HIGH TENSILE STRENGTH STEEL PLATE PRODUCTS SPECIFIED BY TYPICAL STANDARDS

Type of Steel		JIS	ASTM	EN	WES **	Ship's class Standard ***	JFE Standard
Steel Plates for Structural Use	590N/mm ² Class	G3106 SM570 *	A678 Gr.C Gr.D A841		HW 450 HW 450CF	A47 D47 E47 F47	JFE-HITEN570U2 JFE-HITEN570E JFE-HITEN590S JFE-HITEN590SL JFE-HITEN590AZ JFE-HITEN590 JFE-HITEN590U2 JFE-HITEN590E
							JFE-HITEN610 JFE-HITEN610U2 JFE-HITEN610E
	690N/mm ² Class				HW 550 HW 620	A56 D56 E56 A63, 63N D63, 63N E63	JFE-HITEN690S JFE-HITEN690 JFE-HITEN690M JFE-HITEN710 JFE-HITEN710M
	780N/mm ² Class	G3128 SHY685 SHY685N SHY685NS	A514 A709 Gr.100		HW 685	A70, 70N D70, 70N E70, 70N F70, 70N	JFE-HITEN780EX JFE-HITEN780S JFE-HITEN780LE JFE-HITEN780M
	980N/mm ² Class				HW 885		JFE-HITEN980S JFE-HITEN980
Steel Plates for Pressure Vessels	590N/mm ² Class	G3115 SPV450 G3124 SEV345	A537 Cl. 2 A738 Gr.B A841	EN10028 P460N	HW 450	KPV46	JFE-HITEN570U2 JFE-HITEN570E JFE-HITEN590 JFE-HITEN590U2 JFE-HITEN590E
		G3115 SPV490			HW 490	KPV50	JFE-HITEN610 JFE-HITEN610U2 JFE-HITEN610E
	690N/mm ² Class		A543 Cl. 1		HW 620		JFE-HITEN690M
	780N/mm ² Class		A517 A543 Cl. 2		HW 685		JFE-HITEN780M
	980N/mm ² Class				HW 885		JFE-HITEN980

* JFE supplies high tensile strength steel plates based on JIS SM570 with high weldability, which are SM570TMC, SM570TMC-LB, SM570-EX, SM570-EG respectively.

TMC : Produced by TMCP, with high weldability (JIS std.)

LB : Extremely Low carbon Bainite for excellent weldability with fully on-lined process

EX : With high weldability

EG : For high heat input welding

** When ordered by WES Designation, corresponding JFE-HITEN approved by WES is applied. Please refer to details on page18, "Approved or Authorized Products".

*** Ship's class society approval is shown on page18, "Approved or Authorized Products".

In case of application of the official specification, JFE steel grades are available depending on usages or characteristics. Please consult with JFE.

GRADES OF JFE-HITEN

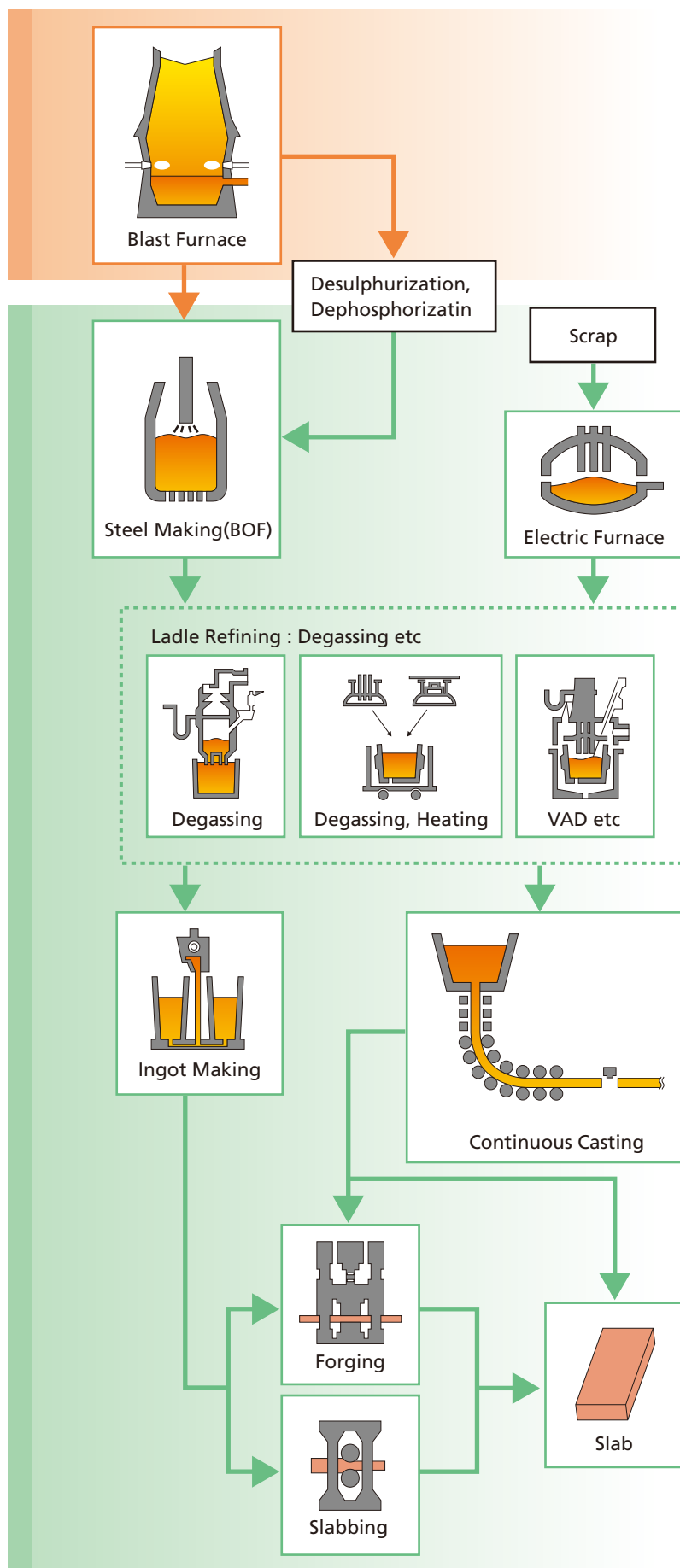
JFE-HITEN composes of various grades ranging widely in tensile strengths, corresponding to broad variety of usages. The grades and features of JFE-HITEN are shown as follows.

Besides the JFE-HITEN series, JFE Steel also produces high strength steel plates to both domestic and overseas specifications - ASTM, ASME, JIS, EN, etc. And thereby, addition or modifications of these standards for each grade can be made according to the customer's requirements. Please consult with JFE Steel.

Strength (N/mm ²)	Designation	Thickness (mm)	Yield Strength Min. (N/mm ²)	Tensile Strength (N/mm ²)	Features and Typical Applications
590	JFE-HITEN590	6 ~ 150	450	590 ~ 710	For Bridges, Penstocks, Tanks, Offshore structures
	JFE-HITEN610	6 ~ 150	490	610 ~ 730	
	JFE-HITEN570U2	6 ~ 100	450	570 ~ 700	U2 : High Tensile Strength Steel Plates with High Weldability
	JFE-HITEN590U2	6 ~ 75	450	590 ~ 710	
	JFE-HITEN610U2	6 ~ 75	490	610 ~ 730	E : High Tensile Strength Steel Plates with High Weldability for High Heat Input Welding
	JFE-HITEN570E	6 ~ 100	450	570 ~ 700	
	JFE-HITEN590E	6 ~ 75	450	590 ~ 710	
	JFE-HITEN610E	6 ~ 75	490	610 ~ 730	
	JFE-HITEN590S	6 ~ 40	450	590 ~ 710	S : Without Heat treatment for Civil Engineering and Industrial Machinery
	JFE-HITEN590SL	6 ~ 50	450	590 ~ 710	
690	JFE-HITEN690	6 ~ 100	590	690 ~ 820	Ni-free type for Tanks, Offshore Structures etc.
	JFE-HITEN710	6 ~ 100	620	710 ~ 840	
	JFE-HITEN690M	6 ~ 100	590	690 ~ 820	Ni type and Low carbon-equivalent for Bridges, Penstocks, Tanks, etc.
	JFE-HITEN710M	6 ~ 100	620	710 ~ 840	
	JFE-HITEN690S	6 ~ 25	550	690 ~ 830	With reducing alloying elements and without Heat Treatment, for Civil Engineering and Industrial Machinery
780	JFE-HITEN780M	6 ~ 150	685	780 ~ 930	Ni type and Low Carbon-equivalent for Bridges, Penstocks, Offshore structures etc.
	JFE-HITEN780EX	6 ~ 60	685	780 ~ 930	High Performance with Relaxing Pre-heating for Bridges
	JFE-HITEN780S	6 ~ 160 161 ~ 200	685 610	780 ~ 930 700 ~ 850	Reducing alloying elements for Civil Engineering and Industrial Machinery
	JFE-HITEN780LE	6 ~ 40	685	780 ~ 930	High Weldability and excellent toughness at low temperature (-40°C), for Civil Engineering and Industrial Machinery
980	JFE-HITEN980	6 ~ 120	885	950 ~ 1130	High Strength, High Weldability and Good Toughness for Penstocks
	JFE-HITEN980S	6 ~ 50	885	950 ~ 1130	For Civil Engineering and Industrial Machinery
	JFE-HYD960LE	6 ~ 32	960	980 ~ 1150	Higher yield strength than conventional 980 grade steel, high weldability and excellent toughness at low temperature (-40°C), for Civil Engineering and Industrial Machinery.

Note: Chemical compositions described in this catalogue are values by ladle analysis.

MANUFACTURING PROCESS



Blast furnace



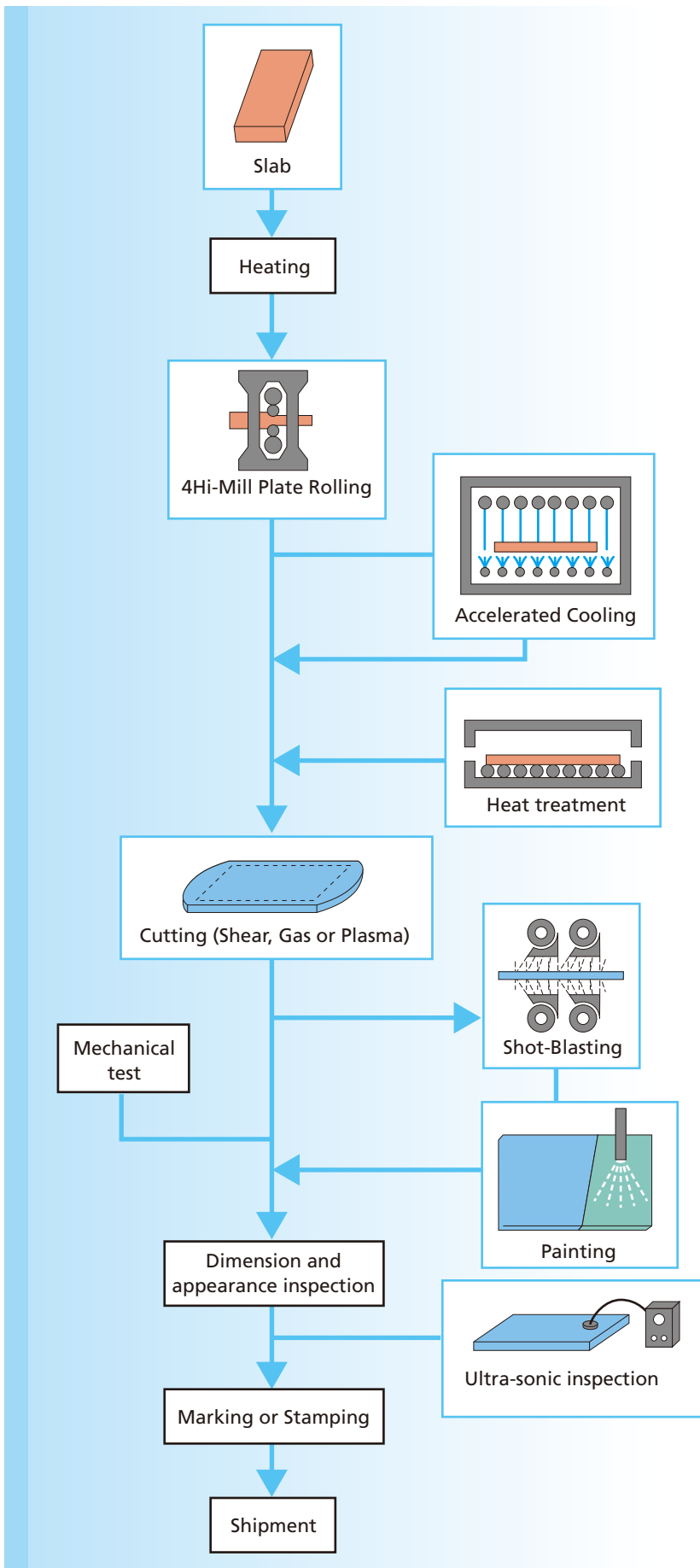
Oxygen converter



Continuous casting machine



6000t Forging press



Rolling Mill



Super-OLAC



Heat treatment system

AVAILABLE SIZES

Without Heat Treatment

		Product Length : m																						
Width mm Thickness mm		1000 ~ 1400	1401 ~ 1600	1601 ~ 1800	1801 ~ 2000	2001 ~ 2200	2201 ~ 2400	2401 ~ 2600	2601 ~ 2800	2801 ~ 3000	3001 ~ 3200	3201 ~ 3400	3401 ~ 3600	3601 ~ 3800	3801 ~ 4000	4001 ~ 4200	4201 ~ 4400	4401 ~ 4600	4601 ~ 4800	4801 ~ 5000	5001 ~ 5200	5201 ~ 5300	5301 ~ 5350	
6.0 ~ 6.9																		22	22	19	16	13.5	13.5	
7.0 ~ 9.0	25																		22	20	16	13.5	13.5	
9.1 ~ 11.9																				20	20	20	16	
12.0 ~ 13.9																						22	16	
14.0 ~ 25.0																					25		16	
25.1 ~ 28.0	27																	25					16	
28.1 ~ 32.0														25			24	23	20	16				
32.1 ~ 38.0												25		24	23	22	21	20	19	18	16			
38.1 ~ 45.0												24	23	23	20	19	19	18	17	16	16	16		
45.1 ~ 50.0	25									23	22	21	20	20	18	17	16	16	15	14	14	14		
50.1 ~ 55.0								24	24	21	21	20	19	18	18	16	16	15	14	14	13	13	13	
55.1 ~ 60.0							24	22	21	19	19	17	16	16	15	14	13	13	12	12	12	11		
60.1 ~ 65.0						24	23	21	20	18	18	17	16	15	15	14	13	12	12	11	11	10	9.5	
65.1 ~ 70.0					24	24	22	21	19	18	17	16	15	14	14	13	12	12	11	11	10	10	9.5	
70.1 ~ 75.0	24	23	24	23	21	20	18	17	15	15	15	14	13	13	12	11	11	10	10	9.2	9	8.5		
75.1 ~ 80.0	23	23	22	21	21	19	18	17	15	14	14	13	12	12	11	11	10	10	9.6	9.2	9	8.5		
80.1 ~ 90.0	20	20	20	19	19	17	16	15	14	13	12	11	11	10	10	9.7	9.2	8.8	8.5	8.2	8	7.5		
90.1 ~ 100.0	18	18	18	17	17	15	14	13	12	11	11	10	10	9.6	9.1	8.7	8.3	8	7.6	7.3	Not Available			
100.1 ~ 110.0	16	16	16	16	15	14	13	12	11	10	10	9.7	9.1	9	8.3	8	7.6	7.2	7	6.7 5.8				
110.1 ~ 120.0	15	15	15	14	14	13	12	11	10	10	9.4	8.8	8.4	8	7.6	7.2	6.9 6.0	6.6 5.8	6	6				
120.1 ~ 130.0	14	14	14	13	13	12	11	10	9.8	9.2	8.6	8.2	7.7	7.3	7.0	6.7 5.8	6	6	5.1	5.3				
130.1 ~ 140.0	13	13	13	12	12	11	10	9.7	9	8.5	8	7.5	7.1	7	6	6	5.1	5.1	5.1	5.3				
140.1 ~ 150.0	12	12	12	11	11	10	9.7	9.1	8.4	7.9	7.4	7	6.7 5.8	6	6	5	5	5						

- 1 In case of the diagonal-lined column , 'A' shows the maximum product length. And the product length between 'B' and 6.1m can not be provided.
- 2 The minimum product size is as follows ; 1 m wide and 3m long.
- 3 Please consult with JFE prior to ordering the product width between 5,201 and 5,350 mm.

Heat Treated

		Product Length : m																														
Thickness mm \ Width mm		1000 ~ 1600	1601 ~ 1800	1801 ~ 2000	2001 ~ 2200	2201 ~ 2400	2401 ~ 2600	2601 ~ 2800	2801 ~ 3000	3001 ~ 3200	3201 ~ 3400	3401 ~ 3600	3601 ~ 3800	3801 ~ 4000	4001 ~ 4200	4201 ~ 4400	4401 ~ 4600	4601 ~ 4800	4801 ~ 5000	5001 ~ 5200	5201 ~ 5300	5301 ~ 5350										
6.0 ~ 6.9												22	20	15	13	Not Available																
7.0 ~ 7.9													24	22	20									15								
8.0 ~ 8.9															22									18	16	13	11					
9.0 ~ 9.9																									22	20	16	12				
10.0 ~ 11.9												25												22	20	18	Negotiable Range					
12.0 ~ 13.9																															22	
14.0 ~ 26.0																																
26.1 ~ 28.0																																
28.1 ~ 30.0																				24	24	22										
30.1 ~ 35.0																24	24	23	22	21	21	20										
35.1 ~ 40.0														24	23	22	21	20	19	18	18	17										
40.1 ~ 45.0													23	22	20	19	19	18	17	16	16	15										
45.1 ~ 50.0												23	22	20	19	18	17	17	16	15	15	14	14									
50.1 ~ 60.0						24	24	22	20	19	18	17	16	15	14	14	13	13	12	11	11											
60.1 ~ 70.0			23	20	24	22	20	19	17	16	15	14	14	13	12	12	11	11	10	10	10											
70.1 ~ 80.0	22	20	18	21	19	18	16	15	14	13	13	12	11	11	10	10	9.7	9.3	8.9	8.7												
80.1 ~ 90.0	20	18	16	19	17	16	14	13	13	12	11	10	10	9.8	9.4	8.9	8.5	8.3	7.9	Not Available												
90.1 ~ 100.0	18	16	14	17	15	14	13	12	11	10	10	9.8	9.3	8.8	8.4	8.0	7.7	7.3	7.0													
100.1 ~ 110.0	16	14	13	15	14	13	12	11	10	9.9	9.4	8.8	8.4	8.0	7.6	7.3	6.9 6.0	6.6 5.7	6.4 5.5													
110.1 ~ 120.0	15	13	12	14	13	11	11	10	9.7	9.1	8.5	8.1	7.7	7.3	6.9 6.0	6.6 5.7	6.3 5.8	5.2														
120.1 ~ 130.0	13	12	11	13	11	11	10	9.5	8.9	8.3	7.9	7.3	7.0	6.7	6.4 5.5	5.2	5.0															
130.1 ~ 140.0	11	10	9.7	11	10	9.7	9.4	8.7	8.2	7.7	7.2	6.8	6.5 5.6	5.3	4.8																	
140.1 ~ 150.0	10	10	9.6	10	9.7	9.4	8.7	8.1	7.6	7.1	6.7	6.4 5.5	5.2	4.9																		

- 1 In case of the diagonal-lined column

A
B

, 'A' shows the maximum product length. And the product length between 'B' and 6.1m can not be provided.
- 2 The minimum product size is as follows ; 1 m wide and 3m long.
- 3 Please consult with JFE prior to ordering the product width between 5,201 and 5,350 mm.

JFE-HITEN STANDARDS

JFE-HITEN590 Series and JFE-HITEN690 Series

These series are suitable for a wide range of applications, such as bridges, cylindrical or spherical storage tanks, machine structures etc. By adding alloying elements to the Si-Mn based compositions depending on plate thickness, the carbon equivalent is kept low to improve weldability. Among these, 'M' series are

Designation (Thickness mm)	Heat Treatment	Chemical Composition(%)											
		C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	B	Thickness (mm)
JFE-HITEN590 (6~150)	QT	≤0.16	0.15/0.55	≤1.50	≤0.025	≤0.015	≤0.30	≤1.00	≤0.30	≤0.30	≤0.08	–	t ≤ 50 50 < t ≤ 75 75 < t
JFE-HITEN610 (6~150)	QT	≤0.16	0.15/0.55	≤1.50	≤0.025	≤0.015	≤0.30	≤1.00	≤0.30	≤0.30	≤0.08	–	t ≤ 50 50 < t ≤ 75 75 < t
JFE-HITEN690 (6~100)	QT	≤0.16	≤0.35	≤1.20	≤0.025	≤0.015	≤0.40	≤1.00	≤0.70	≤0.50	≤0.08	≤0.005	t ≤ 50 50 < t
JFE-HITEN710 (6~100)	QT	≤0.16	≤0.35	≤1.20	≤0.025	≤0.015	≤0.40	≤1.00	≤0.70	≤0.50	≤0.08	≤0.005	t ≤ 50 50 < t
JFE-HITEN690M (6~100)	QT	≤0.14	≤0.35	≤1.20	≤0.015	≤0.015	≤0.40	0.30/1.30	≤0.70	≤0.50	≤0.05	≤0.005	t ≤ 50 50 < t
JFE-HITEN710M (6~100)	QT	≤0.14	≤0.35	≤1.20	≤0.015	≤0.015	≤0.40	0.30/1.30	≤0.70	≤0.50	≤0.05	≤0.005	t ≤ 50 50 < t

JFE-HITEN780 Series and JFE-HITEN980

780M has better low-temperature toughness and higher weldability than 780F through its reduced carbon equivalent, and been widely applied to bridges, penstocks, offshore structures and others, including low temperature applications.

As the development of higher strength steel has made it possible to reduce the weight of structures, JFE has

Designation (Thickness mm)	Heat Treatment	Chemical Composition(%)													
		Thickness (mm)	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	B	
JFE-HITEN780M (6~150)	QT	t ≤ 100 100 < t	≤ 0.14 ≤ 0.18	≤ 0.35 ≤ 0.35	≤ 1.20 ≤ 1.20	≤ 0.015 ≤ 0.015	≤ 0.015 ≤ 0.015	≤ 0.50 ≤ 0.50	0.30/1.50 0.30/1.50	≤ 0.70 ≤ 0.80	≤ 0.60 ≤ 0.60	≤ 0.05 ≤ 0.05	– –	≤ 0.005 ≤ 0.005	
JFE-HITEN980 (6~120)	QT	–	≤ 0.14	≤ 0.35	≤ 1.20	≤ 0.010	≤ 0.005	≤ 0.70	≤ 4.00	≤ 0.80	≤ 0.80	≤ 0.15	≤ 0.02	≤ 0.005	

designed to lower carbon equivalent, resulting in high weldability and low temperature toughness, and therefore, can be applied for construction of penstocks or offshore structures in low temperature regions.

		Tensile Test*1)						Bending Test (180°)*2)		Charpy Impact Test (2mmV)*3)		
Ceq	PCM	Yield Strength		Tensile Strength (N/mm ²)	Elongation			Bending Radius (Test Specimen No.1)		Test Temperature		Absorbed Energy (J)
		Thickness (mm)	(N/mm ²)		Thickness (mm)	(%)	Test Specimen	Thickness (mm)	(Test Specimen No.1)	Thickness (mm)	(°C)	
≤ 0.44 ≤ 0.46 ≤ 0.48	≤ 0.26 ≤ 0.28 ≤ 0.28	–	≥ 450	590/710	t ≤ 16 16 < t ≤ 50 20 < t	≥ 20 ≥ 28 ≥ 20	No.5 No.5 No.4	–	1.5t	12 < t	-10	≥ 47
≤ 0.45 ≤ 0.47 ≤ 0.49	≤ 0.26 ≤ 0.28 ≤ 0.28	t ≤ 75 75 < t	≥ 490 ≥ 470	610/730	t ≤ 16 16 < t ≤ 50 20 < t	≥ 19 ≥ 27 ≥ 19	No.5 No.5 No.4	–	1.5t	12 < t ≤ 32 32 < t	-10 -15	≥ 47 ≥ 47
≤ 0.54 ≤ 0.58	– –	t ≤ 75 75 < t	≥ 590 ≥ 570	690/820	t ≤ 16 16 < t ≤ 50 20 < t	≥ 17 ≥ 25 ≥ 17	No.5 No.5 No.4	t ≤ 32 32 < t	1.5t 2.0t	12 < t ≤ 32 32 < t ≤ 50 50 < t	-15 -20 -30	≥ 47 ≥ 47 ≥ 47
≤ 0.55 ≤ 0.59	– –	t ≤ 75 75 < t	≥ 620 ≥ 600	710/840	t ≤ 16 16 < t ≤ 50 20 < t	≥ 17 ≥ 25 ≥ 17	No.5 No.5 No.4	t ≤ 32 32 < t	1.5t 2.0t	12 < t ≤ 32 32 < t ≤ 50 50 < t	-15 -20 -30	≥ 47 ≥ 47 ≥ 47
≤ 0.53 ≤ 0.57	– –	t ≤ 75 75 < t	≥ 590 ≥ 570	690/820	t ≤ 16 16 < t ≤ 50 20 < t	≥ 17 ≥ 25 ≥ 17	No.5 No.5 No.4	t ≤ 32 32 < t	1.5t 2.0t	12 < t ≤ 32 32 < t ≤ 50 50 < t	-15 -20 -30	≥ 47 ≥ 47 ≥ 47
≤ 0.53 ≤ 0.57	– –	t ≤ 75 75 < t	≥ 620 ≥ 600	710/840	t ≤ 16 16 < t ≤ 50 20 < t	≥ 17 ≥ 25 ≥ 17	No.5 No.5 No.4	t ≤ 32 32 < t	1.5t 2.0t	12 < t ≤ 32 32 < t ≤ 50 50 < t	-15 -20 -30	≥ 47 ≥ 47 ≥ 47

Note: *1) Test method: JIS Z 2241, Test specimen: JIS Z 2201

*2) Test method: JIS Z 2248, Test specimen: JIS Z 2204

*3) Test method/Test specimen: JIS Z 2242

furthered this trend by introducing its highest-class steel plate 980.

Providing good weldability by optimizing alloying elements, 980 is suitable for penstocks and other applications in a low temperature environment where good toughness is required.

			Tensile Test*1)						Bending Test (180°)*2)		Charpy Impact Test (2mmV)*3)		
Thickness (mm)	Ceq	PCM	Yield Strength		Tensile Strength (N/mm ²)	Elongation			Bending Radius (Test Specimen No.1)		Test Temperature		Absorbed Energy (J)
			Thickness (mm)	(N/mm ²)		Thickness (mm)	(%)	Test Specimen	Thickness (mm)	(Test Specimen No.1)	Thickness (mm)	(°C)	
t ≤ 50 50 < t ≤ 100 100 < t	≤ 0.53 ≤ 0.57 ≤ 0.62	≤ 0.30 ≤ 0.32 –	t ≤ 75 75 < t	≥ 685 ≥ 665	780/930	t ≤ 16 16 < t ≤ 50 20 < t	≥ 16 ≥ 24 ≥ 16	No.5 No.5 No.4	t ≤ 32 32 < t	1.5t 2.0t	12 < t ≤ 32 32 < t ≤ 50 50 < t	-20 -25 -35	≥ 47 ≥ 47 ≥ 47
t ≤ 50 50 < t ≤ 100 100 < t	≤ 0.59 ≤ 0.62 ≤ 0.71	≤ 0.29 ≤ 0.33 ≤ 0.36	t ≤ 75 75 < t ≤ 100 100 < t	≥ 885 ≥ 865 ≥ 865	950/1130 950/1130 930/1110	t ≤ 16 16 < t ≤ 50 20 < t	≥ 12 ≥ 19 ≥ 12	No.5 No.5 No.4	t ≤ 32 32 < t	2.0t 2.5t	12 < t	-60	≥ 47

Note: *1) Test method: JIS Z 2241, Test specimen: JIS Z 2201

*2) Test method: JIS Z 2248, Test specimen: JIS Z 2204

*3) Test method/Test specimen: JIS Z 2242

JFE-HITEN STANDARDS

High Tensile Strength Steel Plates with Good Weldability

'U2' series, whose carbon content and P_{CM} values are controlled to less than 0.09 and 0.20% respectively along with careful control of tramp elements exhibits outstanding resistance to HAZ (Heat Affected Zone) hardening and weld cracking. These properties are required for the fabrication of structures such as spherical

Designation (Thickness mm)	Heat Treatment	Chemical Composition(%)												
		C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	B	
JFE-HITEN570U2 (6~100)	QT	≤0.09	0.15/0.55	≤1.60	≤0.025	≤0.010	≤0.30	≤0.30	≤0.30	≤0.30	≤0.06	≤0.03	—	
JFE-HITEN590U2 (6~75)	QT	≤0.09	0.15/0.55	1.20/1.60	≤0.025	≤0.010	≤0.30	≤0.30	≤0.30	≤0.30	≤0.06	≤0.03	—	
JFE-HITEN610U2 (6~75)	QT	≤0.09	0.15/0.55	1.20/1.60	≤0.025	≤0.010	≤0.30	≤0.30	≤0.30	≤0.30	≤0.06	≤0.03	—	
JFE-HITEN780EX (6~60)	QT	≤0.09	≤0.55	0.60/1.50	≤0.015	≤0.010	≤0.50	0.30/1.50	≤0.80	≤0.60	≤0.05	≤0.03	≤0.005	

High Tensile Strength Steel Plates for High Heat-input Welding

This series offer extremely low susceptibility to weld cracking by keeping their carbon content and P_{CM} values in low levels. They also possess superior HAZ toughness, even when high heat input welding such as

Designation (Thickness mm)	Heat Treatment	Chemical Composition(%)												
		C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	B	
JFE-HITEN570E (6~100)	QT	≤0.09	0.15/0.55	≤1.60	≤0.020	≤0.010	≤0.30	≤0.30	≤0.30	≤0.30	≤0.06	≤0.03	—	
JFE-HITEN590E (6~75)	QT	≤0.09	0.15/0.55	1.00/1.60	≤0.020	≤0.010	≤0.30	≤0.30	≤0.30	≤0.30	≤0.06	≤0.03	—	
JFE-HITEN610E (6~75)	QT	≤0.09	0.15/0.55	1.00/1.60	≤0.020	≤0.010	≤0.30	≤0.30	≤0.30	≤0.30	≤0.06	≤0.03	—	

tanks, penstocks and others, giving 'U1','U2' series a good reputation with customers.

JFE-HITEN 780EX, developed by the same product design as above, has high strength and good weldability especially for bridges.

			Tensile Test*1)						Bending Test (180°)*2)		Charpy Impact Test (2mmV)*3)		
Thickness (mm)	Ceq	PCM	Yield Strength		Tensile Strength (N/mm ²)	Elongation			Bending Radius (Test Specimen No.1)		Test Temperature		Absorbed Energy (J)
			Thickness (mm)	(N/mm ²)		Thickness (mm)	(%)	Test Specimen	Thickness (mm)	(Test Specimen No.1)	Thickness (mm)	(°C)	
—	—	≤0.20	t ≤ 16 16 < t ≤ 40 40 < t ≤ 75 75 < t	≥ 460 ≥ 450 ≥ 430 ≥ 420	570/700	t ≤ 16 16 < t ≤ 50 20 < t	≥ 20 ≥ 28 ≥ 20	No.5 No.5 No.4	t ≤ 32 32 < t	1.5t 2.0t	12 < t	- 5	≥ 47
—	—	≤0.20		≥ 450	590/710	t ≤ 16 16 < t ≤ 50 20 < t	≥ 20 ≥ 28 ≥ 20	No.5 No.5 No.4	t ≤ 32 32 < t	1.5t 2.0t	6 ≤ t ≤ 20 20 < t ≤ 32 32 < t ≤ 50 50 < t	5 - 5 -10 -20	≥ 47 ** ≥ 47 ≥ 47 ≥ 47
—	—	≤0.20		≥ 490	610/730	t ≤ 16 16 < t ≤ 50 20 < t	≥ 19 ≥ 27 ≥ 19	No.5 No.5 No.4	t ≤ 32 32 < t	1.5t 2.0t	6 ≤ t ≤ 20 20 < t ≤ 32 32 < t ≤ 50 50 < t	0 - 5 -15 -25	≥ 47 ** ≥ 47 ≥ 47 ≥ 47
t ≤ 34 34 < t ≤ 60	≤0.53 * ≤0.57 *	≤0.23 ≤0.25	t ≤ 50 50 < t ≤ 60	≥ 685 ≥ 665	780/930 760/910	t ≤ 16 16 < t ≤ 50 20 < t	≥ 16 ≥ 24 ≥ 16	No.5 No.5 No.4	t ≤ 32 32 < t	1.5t 2.0t	12 < t ≤ 32 32 < t ≤ 60	-20 -25	≥ 47 ≥ 47

Note: *1) Test method: JIS Z 2241, Test specimen: JIS Z 2201

*2) Test method: JIS Z 2248, Test specimen: JIS Z 2204

*3) Test method/Test specimen: JIS Z 2242

*WES + Cu/13 (Cu ≥ 0.30)

** 6 ≤ t ≤ 8

24J (1/2size)

** 8 < t ≤ 10.5

35J (3/4size)

** 10.5 < t < 12

39J (3/4size)

electro-gas welding is applied in the fabrication of tanks and other structures.

	Tensile Test*1)							Bending Test (180°)*2)		Charpy Impact Test (2mmV)*3)		
PCM	Yield Strength		Tensile Strength (N/mm²)	Elongation			Bending Radius (Test Specimen No.1)		Test Temperature		Absorbed Energy (J)	
	Thickness (mm)	(N/mm²)		Thickness (mm)	(%)	Test Specimen	Thickness (mm)	(Test Specimen No.1)	Thickness (mm)	(°C)		
≦0.20	t ≦ 16 16 < t ≦ 40 40 < t ≦ 75 75 < t	≧460 ≧450 ≧430 ≧420	570/700	t ≦ 16 16 < t ≦ 50 20 < t	≧20 ≧28 ≧20	No.5 No.5 No.4	t ≦ 32 32 < t	1.5t 2.0t	12 < t	- 5	≧47	
≦0.20	—	≧450	590/710	t ≦ 16 16 < t ≦ 50 20 < t	≧20 ≧28 ≧20	No.5 No.5 No.4	t ≦ 32 32 < t	1.5t 2.0t	6 ≦ t ≦ 20 20 < t ≦ 32 32 < t ≦ 50 50 < t	5 - 5 -10 -20	≧47 ** ≧47 ≧47 ≧47	
≦0.20	—	≧490	610/730	t ≦ 16 16 < t ≦ 50 20 < t	≧19 ≧27 ≧19	No.5 No.5 No.4	t ≦ 32 32 < t	1.5t 2.0t	6 ≦ t ≦ 20 20 < t ≦ 32 32 < t ≦ 50 50 < t	0 - 5 -15 -25	≧47 ** ≧47 ≧47 ≧47	

Note: *1) Test method: JIS Z 2241, Test specimen: JIS Z 2201

*2) Test method: JIS Z 2248, Test specimen: JIS Z 2204

*3) Test method/Test specimen: JIS Z 2242

** 6 ≤ t ≤ 8

24J (1/2size)

** 8 < t ≤ 10.5

35J (3/4size)

** 10.5 < t < 12

39J (3/4size)

JFE-HITEN STANDARDS

High Tensile Strength Steel Plates for Civil Engineering and Industrial Machinery

JFE-HITEN 590S/690S are economical and have good weldability with high toughness because they are produced by controlled rolling or TMCP with optimum chemical composition. They are, suitable for civil engineering and industrial machinery, even in cold regions.

JFE-HITEN 780S/980S quenched and tempered steel plates come in thicknesses of up to 50mm with alloying elements reduced to minimum amounts to provide good weldability and high economy. They suite

Designation (Thickness mm)	Heat Treatment	Chemical Composition(%)											
		Thickness (mm)	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb
JFE-HITEN590SA (6~40)	CR or TMCP	—	≤ 0.18	≤ 0.55	≤ 2.00	≤ 0.030	≤ 0.020	Other elements are added as required.					
JFE-HITEN590SB (6~40)		—	≤ 0.18	≤ 0.55	≤ 2.00	≤ 0.030	≤ 0.015	Other elements are added as required.					
JFE-HITEN590SL (6~50)	CR or TMCP	—	≤ 0.16	0.20/0.55	0.80/1.60	≤ 0.030	≤ 0.015	—	—	—	≤ 0.35	≤ 0.08	≤ 0.05
JFE-HITEN690S (6~25)	CR or TMCP	—	≤ 0.15	≤ 0.55	≤ 2.00	≤ 0.030	≤ 0.015	Other elements such as Nb, V and Ti are added as required.					
JFE-HITEN780S (6~200)	QT	t ≤ 50	≤ 0.25	≤ 0.55	≤ 1.60	≤ 0.030	≤ 0.015	—	—	≤ 0.70	≤ 0.30	≤ 0.10	Ti:0.005/0.02
		50 < t ≤ 100	≤ 0.20	≤ 0.55	≤ 1.60	≤ 0.030	≤ 0.015	≤ 0.50	≤ 0.50	≤ 1.50	≤ 0.60	≤ 0.10	Ti:0.005/0.02
		100 < t ≤ 160	≤ 0.18	≤ 0.55	≤ 1.60	≤ 0.030	≤ 0.015	≤ 0.50	≤ 0.50	≤ 1.50	≤ 0.60	≤ 0.10	Ti:≤0.03
		160 < t ≤ 200	≤ 0.18	≤ 0.55	≤ 1.60	≤ 0.030	≤ 0.015	≤ 0.60	≤ 0.75	≤ 1.50	≤ 0.60	≤ 0.10	Ti:≤0.03
JFE-HITEN780LE (6~40)	QT or TMCP	t ≤ 19	≤ 0.20	≤ 0.40	≤ 1.40	≤ 0.025	≤ 0.015	—	—	≤ 0.20	≤ 0.15	≤ 0.08	—
		19 < t ≤ 32											
		32 < t ≤ 40											
JFE-HITEN980S (6~50)	QT	—	≤ 0.18	≤ 0.35	≤ 1.20	≤ 0.020	≤ 0.020	≤ 0.70	≤ 2.00	≤ 0.80	≤ 0.80	≤ 0.08	≤ 0.02
JFE-HYD960LE (6~32)	QT or TMCP	—	≤ 0.18	≤ 0.70	≤ 1.70	≤ 0.020	≤ 0.010	—	—	≤ 1.00	≤ 0.60	≤ 0.08	—

Dimensional Tolerance, Shape, and Appearance

Designation	Dimensional Tolerance, Shape, and Appearance
590, 590U2, 590E 610, 610U2, 610E 690, 690M, 710, 710M 780M 980	Dimensional tolerances of thickness, width, and length, flatness, and shape are in accordance with JIS G 3115.
570U2, 570E 590S, 590SL 690S 780S, 780LE, 780EX 980S, HYD960LE	Dimensional tolerances of thickness, width, and length, flatness, and shape are in accordance with JIS G 3193.

Above specifications are negotiable in order to meet customer's requirement.

for uses in civil engineering and industrial machinery.

JFE-HITEN 780LE and JFE-HYD960LE are manufactured by using JFE's leading technologies including controlled rolling and minimum micro-alloying, consequently, providing good weldability and high toughness over in low temperature (-40°C) regions.

			Tensile Test*1)						Bending Test (180°)*2)		Charpy Impact Test (2mmV)*3)		
B	Ceq	PCM	Yield Strength		Tensile Strength (N/mm ²)	Elongation			Bending Radius (Test Specimen No.1)		Test Temperature		Absorbed Energy (J)
			Thickness (mm)	(N/mm ²)		Thickness (mm)	(%)	Test Specimen	Thickness (mm)	(Test Specimen No.1)	Thickness (mm)	(°C)	
	≤0.45	—	—	≥450	590/710	t ≤ 16	≥20	No.5	t ≤ 32	1.5t 2.0t	—	—	—
	≤0.45	—				16 < t ≤ 50	≥28	No.5 No.4			12 < t	-10	≥47
—	≤0.46	≤0.22	t ≤ 32 32 < t	≥450 ≥430	590/710 570/705	t ≤ 16 16 < t ≤ 20 20 < t	≥20 ≥26 ≥20	No.5 No.5 No.4	—	1.5t	6 ≤ t ≤ 36 36 < t	-40 -20	≥27 ** ≥27
	≤0.50	—	—	≥550	690/830	t ≤ 16 16 < t	≥17 ≥25	No.5 No.5	—	1.5t	12 < t	-10	≥47
≤0.005	≤0.53	—	t ≤ 75 75 < t ≤ 160 160 < t ≤ 200	≥685 ≥665 ≥610	780/930 780/930 700/850	t ≤ 16 16 < t ≤ 32 20 < t	≥16 ≥24 ≥16	No.5 No.5 No.4	t ≤ 32 32 < t	1.5t 2.0t	6 < t ≤ 12	—	—
≤0.005	≤0.61	—									12 < t ≤ 20	-5	≥35
≤0.005	≤0.70	—									20 < t ≤ 32	-15	≥35
≤0.005	≤0.75	—									32 < t ≤ 160	-20	≥35
											160 < t ≤ 200	-40	≥35
≤0.005	≤0.40 *	—	—	≥685	780/930	t ≤ 16 16 < t ≤ 40 20 < t	≥16 ≥24 ≥16	No.5 No.5 No.4	t ≤ 32 32 < t	1.5t 2.0t	6 ≤ t ≤ 40	-40	≥40 ***
	≤0.43 *												
	≤0.47 *												
≤0.005	≤0.65	—	—	≥885	950/1130	t ≤ 16 16 < t ≤ 50 20 < t	≥12 ≥19 ≥12	No.5 No.5 No.4	t ≤ 32 32 < t	2.0t 2.5t	12 < t ≤ 20 20 < t ≤ 32 32 < t	-10 -25 -30	≥35 ≥35 ≥35
≤0.004	≤0.64 *	—	—	≥960	980/1150	t ≤ 32	≥12	No.5	—	3.0t	6 < t ≤ 32	-40	≥27****

Note: *1) Test method: JIS Z 2241, Test specimen: JIS Z 2201

*2) Test method: JIS Z 2248, Test specimen: JIS Z 2204

*3) Test method/Test specimen: JIS Z 2242

* C+Mn/6+(Cu+Ni)/15+(Cr+Mo+V)/5

** 6 ≤ t < 8.5

19J (1/2size)

8.5 ≤ t ≤ 12

24J (3/4size)

*** 6 ≤ t < 8.5

20J (1/2size)

8.5 ≤ t ≤ 12

30J (3/4size)

**** 6 ≤ t < 8.5

14J (1/2size)

8.5 ≤ t ≤ 12

20J (3/4size)



APPLICATIONS AND TYPICAL PLATE PRODUCTS

Bridges

JFE-HITEN570U2
JFE-HITEN570E
JFE-HITEN690M
JFE-HITEN780M
JFE-HITEN780EX



Oil Tanks

JFE-HITEN610
JFE-HITEN610U2
JFE-HITEN610E



Various Spherical Holders

JFE-HITEN590, 610
JFE-HITEN610U2



Various Offshore Structures

JFE-HITEN590, 610
JFE-HITEN590, 610U2
JFE-HITEN690M
JFE-HITEN780M



Gates, Penstocks

JFE-HITEN590, 610
JFE-HITEN590, 610U2
JFE-HITEN780M
JFE-HITEN980



Civil Engineering and Industrial Machinery

JFE-HITEN590S
JFE-HITEN690S
JFE-HITEN780S
JFE-HITEN780LE
JFE-HITEN980S
JFE-HYD960LE



TYPICAL PROPERTIES OF JFE-HITEN

JFE-HITEN 610U2 — 590N/mm² Class High Tensile Strength Steel Plates with good Weldability

Chemical composition

Designation	Thickness (mm)	C	Si	Mn	P	S	P _{CM}
JFE-HITEN610U2	75	0.08	0.26	1.44	0.005	0.002	0.18
Conventional 590N/mm ² grade	50	0.13	0.26	1.29	0.011	0.003	0.23

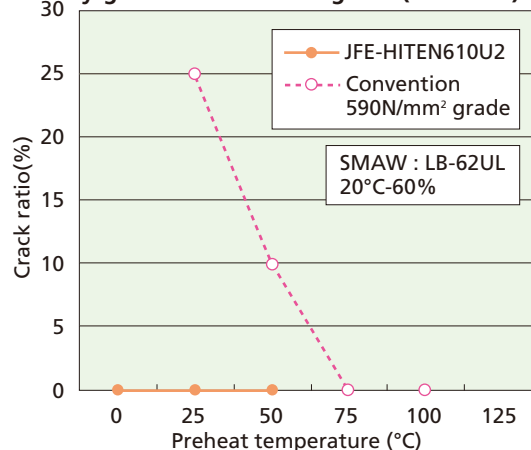
Other alloying elements are added.

Mechanical properties of plate

Designation	Tensile test			Charpy impact test		
	YS (N/mm ²)	TS (N/mm ²)	El (%)	Temp. (°C)	Dir.	Absorbed energy (J)
JFE-HITEN610U2	534	624	31*	-10	L	275
Conventional 590N/mm ² grade	566	668	50	-10	L	269

*JIS No.4

y-groove weld cracking test (JIS Z3158)



JFE-HITEN 610E — 590N/mm² Class High Tensile Strength Steel Plates for High Heat-input Welding

Chemical composition

Designation	Thickness (mm)	C	Si	Mn	P	S	P _{CM}
JFE-HITEN610E	25	0.08	0.20	1.33	0.008	0.003	0.17

Other alloying elements are added.

Mechanical properties of electro-gas arc welded joint

Welding condition				Charpy impact test		
Groove configuration	Welding material	Heat input (kJ/mm)	Tensile strength of welded joint (N/mm ²)	Test location	Test temp. (°C)	Absorbed energy (J)
 (mm)	DWS-1LG	12	617 618	Weld metal	0	113
					-25	82
				Fusion line	0	244
					-25	171
				Center of HAZ	0	271
					-25	171

JFE-HITEN 780EX — 780N/mm² Class High Tensile Strength Steel Plates with High Weldability

Chemical composition

Designation	Thickness (mm)	C	Si	Mn	P	S	P _{CM}
JFE-HITEN780EX	34	0.08	0.20	1.05	0.004	0.001	0.22

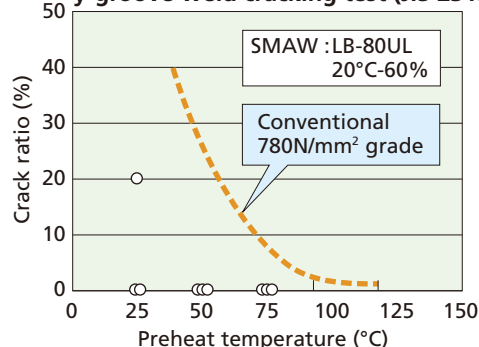
Alloying elements such as Cu, Ni, Cr are add.

Mechanical properties of plate

Tensile test			Charpy impact test		
YS (N/mm ²)	TS (N/mm ²)	El* (%)	Temp. (°C)	Dir.	Absorbed energy (J)
769	844	24	-40	L	286

*JIS No.4

y-groove weld cracking test (JIS Z3158)



JFE-HITEN 980 — 980N/mm² Class High Tensile Strength Steel Plates with High Weldability

Chemical composition

(%)

Thickness (mm)	C	Si	Mn	P	S	P _{CM}
75	0.09	0.25	1.14	0.005	0.001	0.27

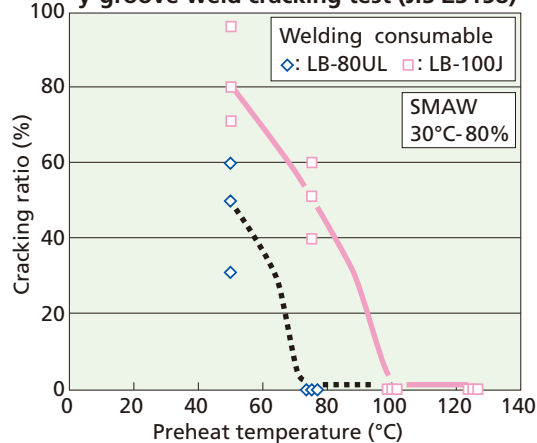
Alloying elements such as Cu, Ni, Cr are added.

Mechanical properties of plate

Tensile test (1/4t)			Charpy impact test (1/4t)		
YS (N/mm ²)	TS (N/mm ²)	EI* (%)	Temp. (°C)	Dir.	Absorbed energy (J)
930	977	25	0	T	208
			-60	T	158

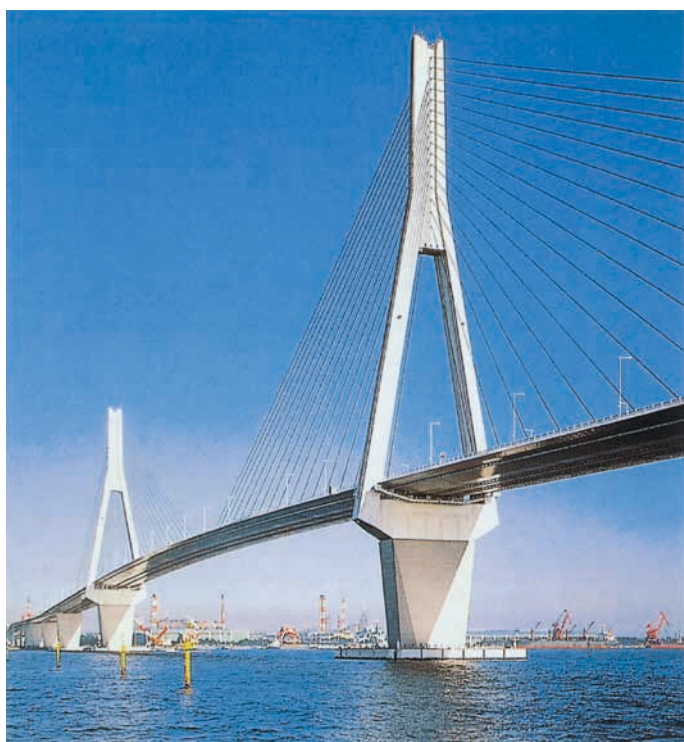
*JIS No.4

y-groove weld cracking test (JIS Z3158)



Mechanical properties of submerged arc welded joint

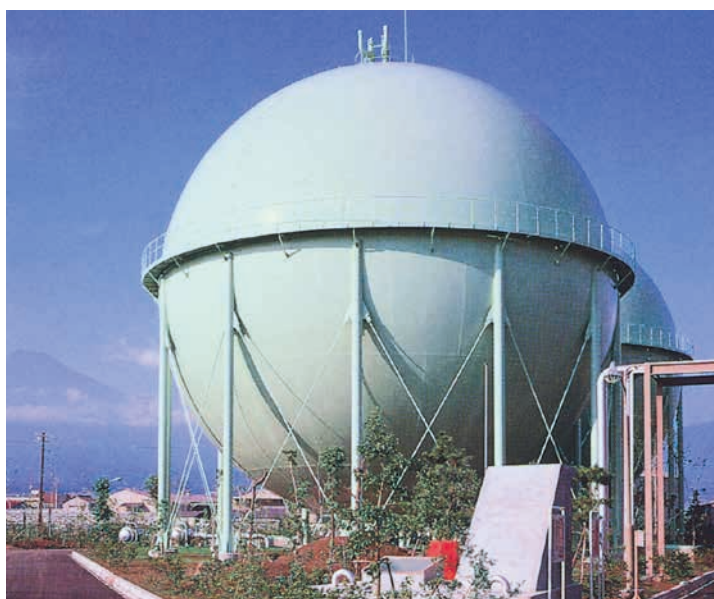
Welding condition			Tensile strength of welded joint (N/mm ²)	Charpy impact test		
Groove configuration	Welding material	Heat input (kJ/mm)		Test location	Test temp. (°C)	Absorbed energy (J)
Root Gap 0~1 (mm)	PFH-100J/US-100J	4.5	977 981	Weld metal	-10	109
				Fusion line	-10	136
				Center of HAZ	-10	248



APPROVED OR AUTHORIZED PRODUCTS

Japan Welding Engineering Society (WES)

JFE Designation	WES Approval
590	WES 3001
610	WES 3001
590S	WES 3001
590U2	WES 3001,3009
610U2	WES 3001,3009
590E	WES 3001,3009
610E	WES 3001,3009
690	WES 3001
710	WES 3001
690M	—
690S	—
780M	WES 3001
780S	—
980	WES 3001
980S	—



Ship's Class Society

Grades of Strength	Society		
	NK	LR	KR
570	A/D/E/F47	D/E46	A/D/E46
610	A/D/E/F51	D/E50	
670	A/D/E56	D/E55	
720	A/D/E63	D/E62	
	A/D63N		
770	A/D/E/F70	D/E69	
	A/D/E/F70N		

RECOMMENDED PRACTICES FOR WORKING AND FABRICATION

1. General

The JFE-HITEN series, despite their high strength, offers outstanding workability. In fabricating JFE-HITEN steel plates, however, it is recommended that the manufacturing process should be taken into full consideration in order not to impair mechanical properties.

2. Marking

Plates subjected to bending, should be avoided from chisel or punch marks on the outer surface because cracking might be induced.

3. Cutting and Drilling

Plates should not be punched for holes. Drilling is recommended. JFE-HITEN steels can be gas-cut as easily as mild steel. Gas cutting produces a hardened layer up to 2 mm in depth. When bending plates, particularly those of 690N/mm² or higher tensile-strength steels, removal of the hardened layer by grinding or other methods is recommended. Gas-cut edges supposed to be welded do not require this removal since the hardened layer is removed by the weld penetration.

4. Cold Working

Because of their high strength, JFE-HITEN steel plates require a larger bending force than mild steel, but their high ductility makes them easy to cold works.

High-strength steel plates exhibit a greater spring back than mild steel, so attention is necessary during the working process. It is desirable to bend these plates parallel to the direction of rolling, with a bend to a smaller radius, edges should be rounded by grinding, as the crack susceptibility of a plate edge increases as bend radius decreases.

5. Hot Forming and Warm Forming

Working quenched and tempered plates at a temperature over the tempering temperature: Excessive temperature causes deterioration in the properties of the steel. Hot working can also change the properties of control-rolled and TMCP plates, so the customer is requested to consult JFE about specific working conditions.

6. Post Weld Heat Treatment (PWHT)

JFE-HITEN steel plates exhibit outstanding welded-joint toughness in the as-welded condition, so they do not require post-weld heat treatment to recover toughness. Quenched and tempered plates may be post-weld heat treated, if necessary, at temperatures not exceeding the tempering temperature.

For TMCP plates, please consult JFE Steel in advance.

RECOMMENDED PRACTICES FOR WORKING AND FABRICATION

7. Welding

JFE-HITEN steel plates are welded by such conventional methods as shielded metal arc welding, submerged arc welding, gas metal arc welding, and electro-gas arc welding. Welding by any of these methods produces satisfactory weldments.

1) Welding materials

For the welding of quenched and tempered high strength steels, it is necessary to use welding rods with low hydrogen as well as automatic welding materials of high basicity and superior toughness, in order to prevent the occurrence of various possible weld defects, associated with the combination of steel plates and welding materials.

Typical welding materials are shown below.

Typical Welding Materials

Strength	JFE-HITEN	SMAW	SAW	CO ₂ Arc Welding	Ar + CO ₂ Arc Welding	Electro-gas Arc Welding
		KOBELCO	KOBELCO	KOBELCO	KOBELCO	KOBELCO
590N/mm ² Class	590, 610 590S, 590SL 570U2, 590U2, 610U2 570E, 590E, 610E	LB62 LB62U LB62UL KSA-86	MF38 × US40 MF38 × US49 KB-110 × KW-101B	MG60 DW60 KC-60	MIX60B KM-60	DWS60G, DWS1LG
690N/mm ² Class	690, 710, 690S 690M, 710M	LB106	MF38 × US70	MG70	MG570	—
780N/mm ² Class	780M, 780EX 780S, 780LE	LB116 LB80UL	PFH80AK × US80BN PFH80AK × US80LT	MG80	MG580	—
980N/mm ² Class	980S 980	LB100B LB100J	PFH100A × US100A PFH100J US100J	—	MG5100J	—

2) Re-Baking Before Use

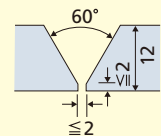
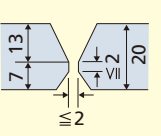
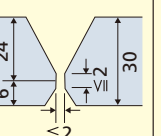
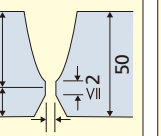
Low hydrogen type welding rods for shielded metal arc welding must be dried for about 1 hour at temperatures between 350 and 400°C before use. Fluxes for submerged arc welding must also be fully dried for about 1 hour at 250~350°C.

3) Edge Preparation

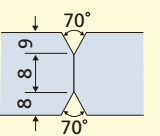
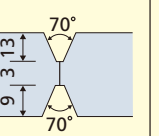
Edge preparation can be performed by gas cutting. When an intricate groove configuration is involved, or when high precision is required, edge preparation is performed by machining.

Typical Bevel Shapes

For Shielded Metal Arc Welding(SMAW)

Thickness (mm)	12	20	30	50
Unit : mm				

For Submerged Arc Welding(SAW)

Thickness (mm)	25	32
Unit : mm		

4) Preheating Treatment

In order to determine the preheating temperature, variables including welding materials, plate thickness, welding method, environmental conditions, constraint conditions, etc., must be taken into consideration. 590N/mm² class JFE-HITEN can be butt welded without preheating, however, preheating is recommended depending on the above conditions. Preheating temperatures between 50 and 100°C are sufficient.

With higher weldability steel 'U', 'E' series, the preheating temperature may be further lowered or unnecessary.

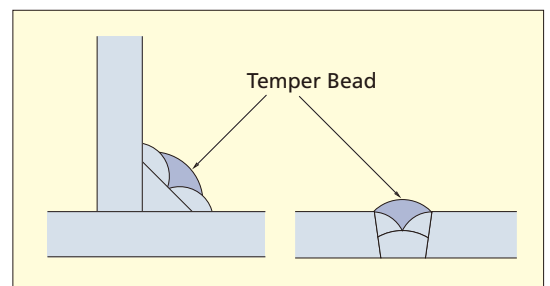
With 690N/mm² or higher tensile strength steel plates, a higher preheating temperature between 100 and 175°C is required to prevent cold cracking, though the specific temperature varies based on the above conditions. Please consult with us. Finally, these 690N/mm² and over class HITEN involves '-LE', '-EX' grades with relaxing preheating also.

5) Tack Welding

Tack welding conditions are the same as those for normal welding, however, it is recommended that welding beads be over 50mm in length. It is absolutely essential that arc striking be performed in the bevel or on other steel plate, and not on the base metal.

6) Welding

- i) In case of welding by covered electrodes, it is recommended at the outset that a back start be done for about 30mm in the groove, giving straight beading.
- ii) It is recommended that arc length be as short as possible.
- iii) Weaving will impair heat input required for welding. If weaving is applied, the width of weaving must be less than 1.5 times rod diameter.
- iv) In case of SMAW for 690N/mm² and over grade, please adopt the Temper Bead Methods, as shown right.
- v) Slag removal is not easy for low hydrogen type electrode, particularly compared to ilmenite type or cellulose type, but it is requested to do it by all means. Pre-heating helps to remove slag preferably.
- vi) In case of submerged-arc welding, phenomena such as embrittlement and softening at heat affected zone must be considered.
Care must therefore be taken concerning the heat input of welding.
- vii) Beside preheating, the control of interlayer temperature is recommended.



JFE Steel Corporation

<http://www.jfe-steel.co.jp/en/>

TOKYO HEAD OFFICE	Hibiya Kokusai Building, 2-3 Uchisaiwaicho 2-chome, Chiyodaku, Tokyo 100-0011, Japan Phone : (81)3-3597-3111 Fax : (81)3-3597-4860
NEW YORK OFFICE	JFE Steel America, Inc., New York Office 600 Third Avenue, 12th Floor, New York, NY 10016, U.S.A. Phone : (1)212-310-9320 Fax : (1)212-308-9292
HOUSTON OFFICE	JFE Steel America, Inc., Houston Office 10777 Westheimer, Suite 230, Houston, TX 77042, U.S.A. Phone : (1)713-532-0052 Fax : (1)713-532-0062
BRISBANE OFFICE	JFE Steel Australia Resources Pty Ltd. Level 19, CPA Centre, 307 Queen St, Brisbane, QLD 4001, Australia Phone : (61)7-3229-3855 Fax : (61)7-3229-4377
RIO DE JANEIRO OFFICE	JFE Steel do Brasil LTDA / JFE Steel Corporation, Rio de Janeiro Office Praia de Botafogo, 228 Setor B, Salas 508 & 509, Botafogo, CEP 22250-040, Rio de Janeiro-RJ, Brazil Phone : (55)21-2553-1132 Fax : (55)21-2553-3430
LONDON OFFICE	JFE Steel Europe Limited 15th Floor, The Broadgate Tower, 20 Primrose Street, London EC2A 2EW, U.K. Phone : (44)20-7426-0166 Fax : (44)20-7247-0168
DUBAI OFFICE	JFE Steel Corporation, Dubai Office P.O.Box 261791 LOB19-1208, Jebel Ali Free Zone Dubai, U.A.E. Phone : (971)4-884-1833 Fax : (971)4-884-1472
NEW DELHI OFFICE	JFE Steel India Private Limited 1101, 11th Floor, Unitech's Signature Tower, Tower-A, South City-I, NH-8, Gurgaon, Haryana, 122002, India Phone : (91)124-426-4981 Fax : (91)124-426-4982
MUMBAI OFFICE	JFE Steel India Private Limited Mumbai Office 308, A Wing, 215 Atrium, Andheri - Kurla Road, Andheri (East), Mumbai - 400093, Maharashtra, INDIA Phone : (91)22-3076-2760 Fax : (91)22-3076-2764
SINGAPORE OFFICE	JFE Steel Asia Pte. Ltd. 16 Raffles Quay, No. 15-03, Hong Leong Building, 048581, Singapore Phone : (65)6220-1174 Fax : (65)6224-8357
BANGKOK OFFICE	JFE Steel (Thailand) Ltd. / JFE Steel Corporation, Bangkok Office 22nd Floor, Abdulrahim Place 990, Rama IV Road, Bangkok 10500, Thailand Phone : (66)2-636-1886 Fax : (66)2-636-1891
VIETNAM OFFICE	JFE Steel Corporation, Vietnam Office Unit 1401, 14th Floor, Kumho Asiana Plaza, 39 Le Duan Street, Dist 1, HCMC, Vietnam Phone : (84)8-3825-8576 Fax : (84)8-3825-8562
JAKARTA OFFICE	JFE Steel Corporation, Jakarta Office 16th Floor Summitmas II, JL Jendral Sudirman Kav. 61-62, Jakarta 12190, Indonesia Phone : (62)21-522-6405 Fax : (62)21-522-6408
MANILA OFFICE	JFE Steel Corporation, Manila Office 23rd Floor 6788 Ayala Avenue, Oledan Square, Makati City, Metro Manila, Philippines Phone : (63)2-886-7432 Fax : (63)2-886-7315
SEOUL OFFICE	JFE Steel Korea Corporation 6th Floor, Geumgang-Tower, 889-13, Daechi-dong, Gangnam-gu, Seoul, 135-570, Korea Phone : (82)2-3468-4130 Fax : (82)2-3468-4137
BEIJING OFFICE	JFE Steel Corporation Beijing 1720 Beijing Fortune Building No.5, Dongsanhuan North Road, Chaoyang District, Beijing, 100004, P.R.China Phone : (86)10-6590-9051 Fax : (86)10-6590-9056
SHANGHAI OFFICE	JFE Consulting (Shanghai) Co., Ltd. Room 801, Building A, Far East International Plaza, 319 Xianxia Road, Shanghai 200051, P.R.China Phone : (86)21-6235-1345 Fax : (86)21-6235-1346
GUANGZHOU OFFICE	JFE Consulting (Guangzhou) Co., Ltd./ JFE Steel Corporation, Guangzhou Office Room 3901, Citic Plaza, 233 Tian He North Road, Guangzhou 510613, P.R.China Phone : (86)20-3891-2467 Fax : (86)20-3891-2469

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High Performance Steel Plates for Construction and Industrial Machinery Use —New Steel Plates for Construction and Industrial Machinery Use with High Strength and Superior Toughness Combined with Good Weldability and Formability—

MUROTA Yasuhiro^{*1} ABE Takashi^{*2} HASHIMOTO Masayuki^{*3}

Abstract:

The requirements placed on steel plates for construction and industrial machinery use have diversified in recent years, as exemplified by low temperature toughness to enable use in cold districts and improved weldability by lowering the preheating temperature for welding. To meet these requirements, JFE Steel has developed new abrasion resistant steel plates, “JFE-EH360LE/EH500LE,” and a new high strength steel plate, “JFE-HITEN780LE,” with good weldability and low temperature toughness guaranteed at -40°C . In the developed steel plates, high hardness or high strength was achieved by selecting the optimum C content and hardenability (D_I), while reducing the carbon equivalent (C_{eq}) in consideration of weldability. Low temperature toughness at -40°C was improved in the developed steel plates by applying microalloying and thermo-mechanical control process (TMCP)/controlled heat treatment process technologies to refine prior austenite grains.

1. Introduction

The requirements placed on steel plates for construction and industrial machinery include excellent abrasion

resistance, considering abrasion by ore, rock, or sand, and high strength, from the viewpoint of weight reduction in the equipment structure. For example, in parts such as dump truck beds and excavator buckets, high abrasion resistance is required. Because abrasion resistance has a strong correlation with the surface hardness of the steel plate¹⁾, abrasion resistant steel plates with high surface hardness are used in applications of this type. In parts such as crane booms and outriggers, high strength is required, and in many cases, steel plates with 780 MPa in tensile strength are used.

In recent years, the performance requirements for these steel plates for construction and industrial machinery use have diversified. For example, securing low temperature toughness to enable use in cold districts and improved weldability by lowering the preheating temperature for welding are required. Moreover, improved bending formability is also required in many cases.

To meet these requirements, JFE Steel has developed new abrasion resistant steel plates, “JFE-EH360LE/EH500LE,” and a new high strength steel plate, “JFE-HITEN780LE,” with good weldability and low temperature toughness guaranteed at -40°C . This paper describes the development details of these high

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^{*1} Senior Researcher Assistant Manager,
Plate & Shapes Research Dept.,
Steel Res. Lab.,
JFE Steel



^{*2} Dr. Eng.,
Staff Deputy General Manager,
Plate Business Planning Dept.,
JFE Steel



^{*3} Staff Deputy Manager,
Plate Sec.,
Products Design & Quality Control Dept.,
East Japan Works,
JFE Steel

performance steel plates for construction and industrial machinery use and the performance of the developed steels.

2. Development Details

2.1 Target Properties

The target properties for abrasion resistant steel plates and 780 MPa grade high strength steel plates for construction and industrial machinery use are shown in **Table 1** and **Table 2**, respectively. Considering actual use conditions, the plate thickness is set at a maximum of 32 mm for both abrasion resistant steel plates and high strength steel plates, and in consideration of weldability, the carbon equivalent (C_{eq}) is reduced corresponding to the standard and plate thickness. Moreover, in consideration of use in cold districts, Charpy absorbed energy at -40°C is guaranteed, depending on the standard.

2.2 Investigations for High Hardness and High Strength

In the abrasion resistant steel plates, first, improvement in the abrasion resistance of the plate, in other words, achieving high hardness in the plate, was studied. The hardness of steel plates is decisively determined by the C content and amount of martensite in the microstructure after quenching²⁾. Accordingly, a composition design which simultaneously secures the C content for obtaining the target hardness and hardenability in order to achieve a full martensite structure after quenching is important.

The authors studied the effect of the C content on the hardness of the full martensite structure. As samples,

steel plates with C contents of 0.10–0.32 mass% were used. Quenching was performed to these plates, and the surface Brinell hardness was measured after obtaining a full martensite structure (**Fig. 1**). It was found that the minimum C contents for obtaining HBW: 361 or higher or HBW: 477 or higher, which were the development targets for the hardness values of the abrasion resistant steel plates, were 0.14 mass% and 0.26 mass%, respectively.

Hardenability was studied with a maximum plate thickness of 32 mm, which was the development target, using the hardenability index D_1 (defined in Eq.(1))^{3,4)} as an index of hardenability, considering a full martensite structure is obtained stably.

$$D_1 = D_{IC} \times MF_{Si} \times MF_{Mn} \times MF_{Cr} \times MF_{Mo} \times MF_{Ni} \times MF_V \times MF_B \times MF_{Cu} \times 25.4 \text{ (mm)} \dots (1)$$

$$D_{IC} = (C/10)^{1/2} \times (1.70 - 0.09N)$$

N : Austenite grain number

$$MF_{Si} = 0.70Si + 1$$

$$MF_{Mn} = 3.33Mn + 1$$

$$MF_{Cr} = 2.16Cr + 1$$

$$MF_{Mo} = 3.00Mo + 1$$

$$MF_{Ni} = 0.36Ni + 1$$

$$MF_V = 1.75V + 1$$

$$MF_B = 1.3 \text{ (With B addition)}$$

$$= 1.0 \text{ (Without B addition)}$$

$$MF_{Cu} = 0.35Cu + 1$$

Small cylindrical test pieces ($3 \text{ mm}\phi \times 10 \text{ mm}$) were taken from a steel contains 0.14–0.15 mass% of C and various alloy elements including Cr, Cu, Ni, Mo, V, Ti, and B appropriately. Using a heat treatment simulator (Formastor; manufactured by Fuji Electronic Industrial Co., Ltd.), the samples were heated to above the A_{r3} point, then cooled under cooling rates of $0.5\text{--}40^{\circ}\text{C/s}$ to investigate the critical cooling rate for obtaining a full martensite structure with the various chemical composi-

Table 1 Target properties of new abrasion resistant steel plates “JFE-EH360LE/EH500LE”

Grade	Thickness (mm)	Surface hardness, HBW10/3000	C_{eq} * (mass%)
JFE-EH360LE	6 –19	361–440	≤ 0.40
	19.1–32		≤ 0.43
JFE-EH500LE	6 –19	477–556	≤ 0.55
	19.1–32		≤ 0.58

Charpy absorbed energy value is guaranteed at -40°C .

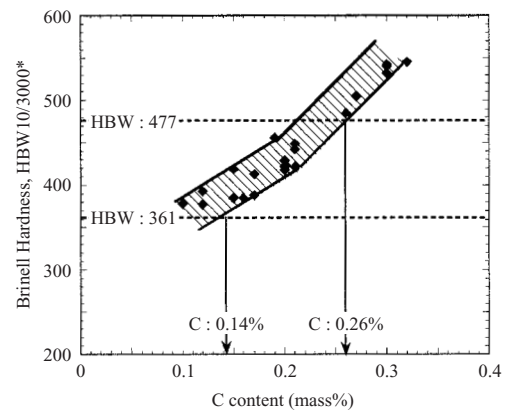
* $C_{eq} = C + Mn/6 + (Cu + Ni)/15 + (Cr + Mo + V)/5$

Table 2 Target properties of new high strength steel plates “JFE-HITEN780LE”

Grade	Thickness (mm)	YS (MPa)	TS (MPa)	C_{eq} * (mass%)
JFE-HITEN780LE	6 –19	≥ 685	780–930	≤ 0.40
	19.1–32			≤ 0.43

Charpy absorbed energy value is guaranteed at -40°C .

* $C_{eq} = C + Mn/6 + (Cu + Ni)/15 + (Cr + Mo + V)/5$



*With 10 mm ϕ ball subjected to a load of 3 000 kgf

Fig.1 Effect of C content on surface hardness

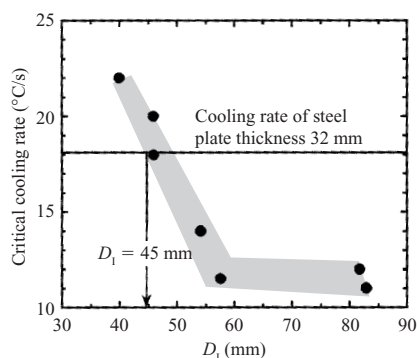


Fig.2 Relationship between D_1 and critical cooling rate to obtain martensitic structure

tions. At this time, the D_1 of the steels used in the investigation was set at 40–83 mm.

Figure 2 shows the relationship between the critical cooling rate and D_1 . In order to obtain a full martensitic structure after hardening under the cooling rate conditions for the thickness of 32 mm, which was the target maximum thickness, it was found that $D_1 \geq 45$ mm is necessary.

Accordingly, as the composition design of the abrasion resistant steel plates, C contents of 0.14% or more and 0.26% or more are necessary in order to obtain a high surface hardness HBW: 361 or higher or HBW: 477 or higher, respectively, and it is necessary to secure D_1 of 45 mm or more while also reducing C_{eq} in consideration of weldability. As the manufacturing process, application of controlled heat treatment, in which the cooling rate during quenching and the stop temperature of quenching, etc. are controlled appropriately is effective for preventing delayed fracture and quenching cracks, which occur easily in high hardness steels such as abrasion resistant steel plates, and manufacturing plates with reduced heat treatment strain.

On the other hand, in order to satisfy both high strength and good weldability requirements in high strength steel plates, it is necessary to achieve high strength with a lower C_{eq} . The authors therefore investigated the effect of the C content and D_1 on tensile strength. The results revealed that it is possible to satisfy both high strength of the 780 MPa class and good weldability requirements by selecting an appropriate C content and D_1 and, furthermore, applying microalloying technology using micro-addition of elements such as Nb, Ti, V, etc. and a TMCP process with the on-line accelerated cooling device, *Super-OLAC*⁵⁾, which was developed and applied practically by JFE Steel originally.

2.3 Investigations for Improvement of Low Temperature Toughness

In martensitic steels, the fundamental unit of microstructure controlling toughness is a packet, and it is

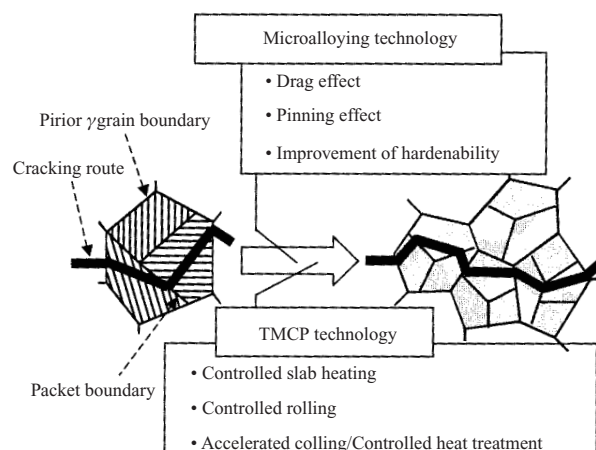


Fig.3 Effects of microalloying and TMCP technology on refinement of packet size

known that the packet size is reduced accompanying refinement of the prior austenite grain size⁶⁾. In the present research, as shown in **Fig. 3**, prior austenite grains in martensitic steel were refined applying microalloying and TMCP technologies.

Microalloying elements, represented by Nb, Ti, and V, contribute to refinement of austenite grains through a drag effect due to solid solution atoms and a pinning effect due to precipitates. Furthermore, by dissolving in austenite, these elements also have the effect of improving hardenability. Based on the alloy design which is capable of obtaining these effects, refinement of austenite grains by slab reheating temperature control and controlled rolling/controlled heat treatment was studied as the manufacturing process.

Photo 1 shows the results of observation of the prior austenite grains in martensitic steel with the chemical composition in **Table 3**. By applying the above-mentioned austenite grain refining technologies, prior austenite grains, which were conventionally coarse, with a size on the order of 40–50 μm , were successfully refined to approximately 20 μm or less. **Photo 2** shows the cracking paths in the Charpy impact test with steel plates having the prior austenite grain size shown in Photo 1. Tests of the observed test pieces were performed at -196°C , which is the lowest possible temperature in the Charpy impact test. The photos show cross-sections of the microstructure of the fracture surface when brittle fracture was caused intentionally. In comparison with the conventional steel, irregularities in the fracture surface are fine in the developed steel. This shows that the size of the packet, which is the microstructural unit that controls toughness, has become smaller. Based on this result, it can be confirmed that refinement of packets has been achieved in the developed steel accompanying refinement of the prior austenite grains. The relationship between the prior

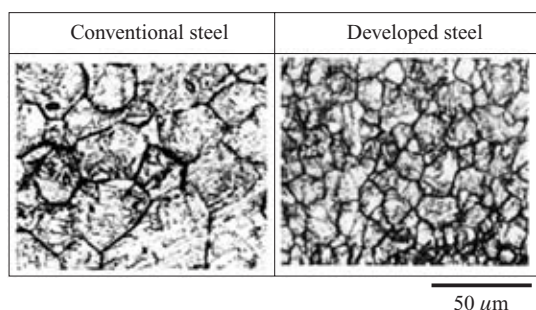


Photo 1 Prior austenite grains of developed and conventional steels

Table 3 Chemical compositions of developed and conventional steels (mass%)

	C	Si	Mn	P	S	Others	C_{eq}^*	D_1 (mm)
Developed steel	0.15	0.41	1.20	0.013	0.002	Nb, V, Ti, etc.	0.39	46
Conventional steel	0.15	0.34	1.44	0.020	0.006	Cr, Ti, B	0.45	48

* $C_{eq} = C + Mn/6 + (Cu + Ni)/15 + (Cr + Mo + V)/5$

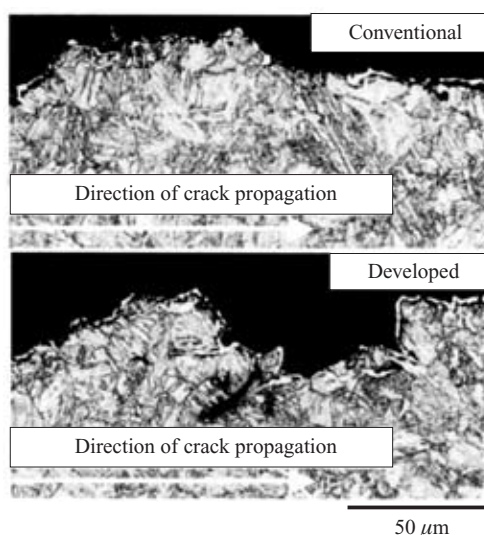


Photo 2 Cracking paths of developed and conventional steels

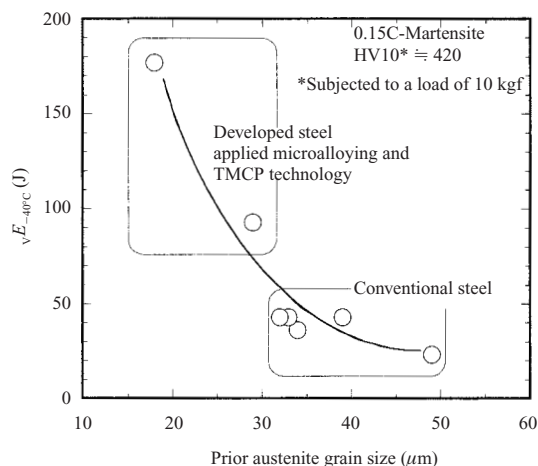


Fig.4 Influence of prior austenite grain size on Charpy impact energy at -40°C

austenite grain size and low temperature toughness was investigated using 0.15 mass% C steel plates with a martensitic structure. The results are shown in Fig. 4. It was confirmed in advance that the hardness around the plate center-of-thickness position, where Charpy impact test pieces were taken, was substantially uniform in all of the steel plates, at approximately HV10: 420. As shown in Fig. 4, low temperature toughness improved accompanying refinement of the prior austenite grains. In the developed steel, a prior austenite grain size of $30\text{ }\mu\text{m}$ or less was obtained, and low temperature toughness improved remarkably.

3. Performance of Developed Steels

3.1 Abrasion Resistant Steel Plates for Construction and Industrial Machinery Use, “JFE-EH360LE/500LE”

Table 4 shows the typical chemical compositions of the developed abrasion resistant steel plates, “JFE-EH360LE” and “JFE-EH500LE.” The maximum C contents, C_{eq} , and D_1 values were selected considering the balance of plate surface hardness and weldability, and microalloying elements were added to achieve refinement of prior austenite grains. Figure 5 shows the results of y-groove cold cracking tests of the developed steels. “JFE-EH360LE” is free of cracking at preheating temperature of 25°C and has excellent weldability. “JFE-EH500LE” has good enough weldability as the highest grade of hardness in abrasion resistant steel plates currently in use, its cracking stop temperature is 75°C . Figure 6 shows the hardness and toughness of the developed steels. The developed steels has extremely good low temperature toughness as abrasion resistant steels, while also showing the same level of hardness as the conventional steels.

“JFE-EH360LE” and “JFE-EH500LE” are the first abrasion resistant steels in the world to guarantee toughness at -40°C . In addition to enabling use in cold districts, the life duration of parts is also extended as a result of their improved impact damage resistance.

Table 4 Typical chemical compositions of JFE-EH360LE and JFE-EH500LE (mass%)

Grade	C	Si	Mn	P	S	Others	C_{eq}^*
JFE-EH360LE	0.15	0.41	1.20	0.013	0.002	Nb, V, Ti, etc.	0.39
JFE-EH500LE	0.26	0.31	1.33	0.010	0.002	Nb, V, Ti, etc.	0.53

* $C_{eq} = C + Mn/6 + (Cu + Ni)/15 + (Cr + Mo + V)/5$

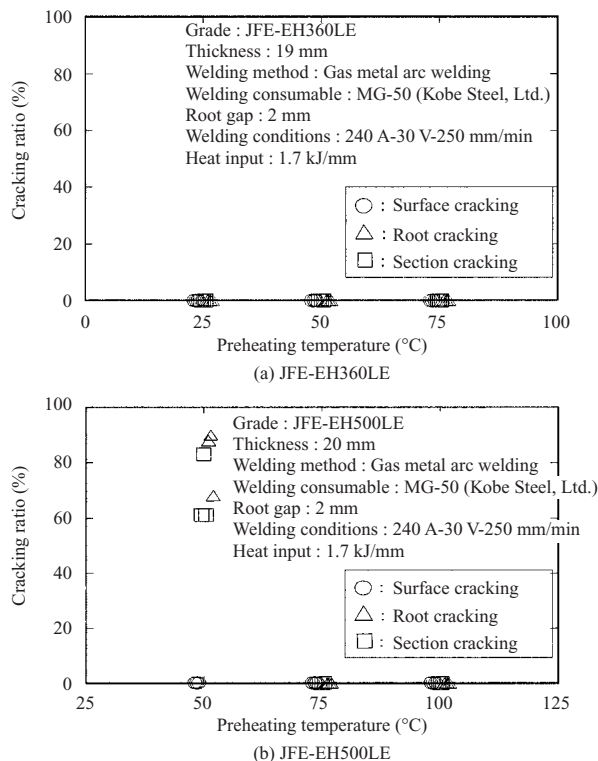


Fig.5 y-groove cold cracking test results

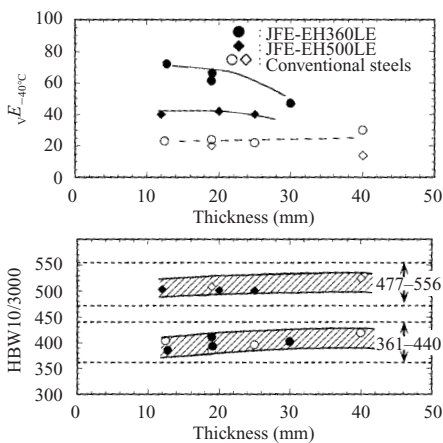


Fig.6 Brinell hardness and Charpy impact test results of JFE-EH360LE and JFE-EH500LE

3.2 High Strength Steel Plate for Construction and Industrial Machinery Use, “JFE-HITEN780LE”

Table 5 shows the typical chemical composition of the developed high strength steel plate “JFE-HITEN780LE.” In this developed steel, the low tem-

Table 5 Typical chemical composition of JFE-HITEN780LE (mass%)

C	Si	Mn	P	S	Others	C_{eq}^*
0.15	0.38	1.18	0.012	0.002	Nb, V, Ti, etc.	0.39

* $C_{eq} = C + Mn/6 + (Cu + Ni)/15 + (Cr + Mo + V)/5$

perature toughness of 780 MPa grade high strength steel plate was markedly improved by applying microalloying technology and the thermo-mechanical control process, as represented by JFE Steel’s *Super-OLAC*⁵⁾, and controlled heat treatment technology.

Figure 7 shows the strength and low temperature toughness of the developed steel. It has an adequate strength as 780 MPa high tensile strength steel, combined with toughness significantly exceeding that of conventional steel plates. Moreover, as shown in Table 6, this steel also provides excellent formability, showing no cracking at a bending radius of 1.5 times the plate thickness, in the more severe 200 mm width bending test. In the results of a y-groove cold cracking test, as shown in Fig. 8, the developed steel has excellent weldability, with no cracking at a preheating temperature of 25°C.

The developed steel is the first in the world to guarantee toughness at -40°C , in the field of steel plates for construction and industrial machinery use enabling use in cold districts, and also offers excellent performance

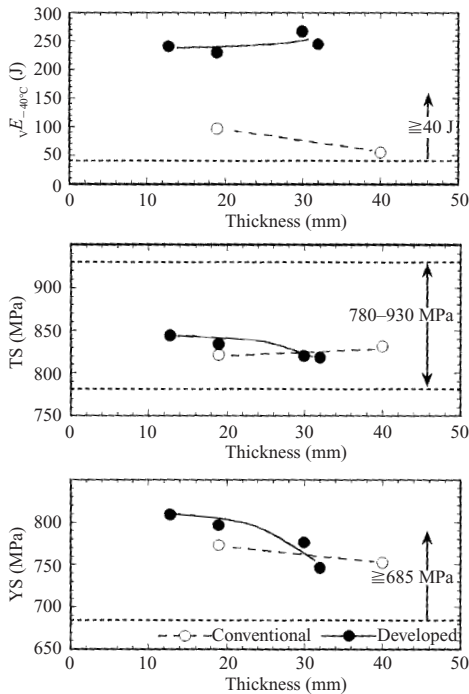


Fig.7 Mechanical properties of JFE-HITEN780LE

Table 6 Bending test results of JFE-HITEN780LE (Bending radius: 1.5t)

Thickness (mm)	Specimen size Thickness × Width (mm)	Direction	Result
12.8	Full thickness × 38	L	Good
	Full thickness × 200	C	Good
32.0	Full thickness × 38	L	Good
	Full thickness × 200	C	Good

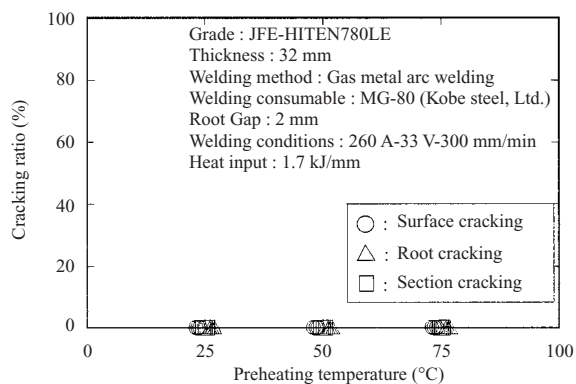


Fig.8 y-groove cold cracking test result

in terms of impact resistance and safety. Because C_{eq} is reduced to secure weldability, the developed steel plate has good weldability, with no cracking at a preheating temperature of 25°C, making it an excellent product in terms of weldability as well. Moreover, because the new plate also has excellent bending formability, it can be used in a wide range of parts applications.

4. Conclusion

The developed steels, “JFE-EH360LE/EH500LE” and “JFE-HITEN780LE” (LE Series) are the world’s first

abrasion resistant steel plates/high tensile strength steel plates for construction and industrial machinery use to guarantee toughness at -40°C . These are outstanding products in many respects. In addition to enabling use in cold districts, they also offer excellent impact resistance and safety, and as a result of a reduced carbon equivalent (C_{eq}), they also provide superior weldability.

Since the start of sales of the developed steel in the “LE Series” in May 2001, these products have won an excellent reputation with many manufacturers of construction and industrial machinery, processing manufacturers, and transportation contractors around the world, and particularly in the Americas, Europe, and Australia. The cumulative total of orders received to date exceeds 30 000 t.

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