Brand Name of abrasion resistant Steel

ABREX™400
Available Thickness  4～100mm

SPECIFICATION

<table>
<thead>
<tr>
<th>Brinell Hardness (HBW)</th>
<th>300 ～ 440</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact Test</td>
<td>Temperature (℃)</td>
</tr>
<tr>
<td></td>
<td>Absorbed Energy (J)</td>
</tr>
<tr>
<td>Thickness (mm)</td>
<td>4≤t≤25</td>
</tr>
<tr>
<td>C</td>
<td>≤0.21</td>
</tr>
<tr>
<td>Si</td>
<td>≤0.70</td>
</tr>
<tr>
<td>Mn</td>
<td>≤2.00</td>
</tr>
<tr>
<td>P</td>
<td>≤0.025</td>
</tr>
<tr>
<td>S</td>
<td>≤0.010</td>
</tr>
<tr>
<td>Cr</td>
<td>≤1.20</td>
</tr>
<tr>
<td>Ni</td>
<td>≤1.00</td>
</tr>
<tr>
<td>Mo</td>
<td>≤0.60</td>
</tr>
<tr>
<td>B</td>
<td>≤0.0050</td>
</tr>
<tr>
<td>Pcm</td>
<td>≤0.30</td>
</tr>
<tr>
<td>CET</td>
<td>≤0.35</td>
</tr>
</tbody>
</table>

TYPICAL VALUE

<table>
<thead>
<tr>
<th>Thickness (mm)</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Composition (%)</td>
<td>Pcm</td>
</tr>
<tr>
<td></td>
<td>CEV</td>
</tr>
<tr>
<td></td>
<td>CET</td>
</tr>
<tr>
<td>Mechanical Properties</td>
<td>Yield Strength (MPa)</td>
</tr>
<tr>
<td></td>
<td>Tensile Strength (MPa)</td>
</tr>
<tr>
<td>Mechanical Properties</td>
<td>Bend Test</td>
</tr>
<tr>
<td>Hardness</td>
<td>HBW</td>
</tr>
<tr>
<td>Impact Test</td>
<td>Temperature (℃)</td>
</tr>
<tr>
<td></td>
<td>Absorbed Energy (J)</td>
</tr>
</tbody>
</table>

Pcm=C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B
CEV=C+Mn/6+ (Cu+Ni) /15+ (Cr+Mo+V) /5
CET=C+ (Mn+Mo) /10+ (Cr+Cu) /20+Ni/40
Element other than those listed in the table could be added as necessary.

Specific Information for this Grade (Designation)

- **Features & Application**
  As for hardness, this Grade is the lowest grade among ABREX series.
  In that sense, respective Fabrication (Weldability, Bendability, etc) is easier compared to the other harder Grade.
  (Application Example)
  Mining & Earthmoving wearparts, Agricultural & Tillage equipment, Ripper Tynes, Forestry equipment, Cutting edges, Mining liner plates, Conveyor & Chute Liners, Tipper for dump truck

- **Precaution for Fabrication**
  Especially Bending shall be paid attention to. Kindly refer to the brochure of “ABREX™” and try hard to comply to the described tips.
  Stress Relief Heat treatment is not recommendable. Heating above 200℃ will reduce its hardness.
  If it occurs magnetic arc blow during welding, kindly refer to our brochure of “Steel Plate”.

- **Product Size availability for width and length**
  Kindly refer to our brochure of “ABREX™”.

- **Primer Coating Colour** *If necessary*
  Brown (Low Zn type)

**Notice:** While every effort has been made to ensure the accuracy of the information contained within this publication, the use of the information is at the reader’s risk and no warranty is implied or expressed by NIPPON STEEL CORPORATION with respect to the use of the information contained herein. The information in this publication is subject to change or modification without notice. Please contact the NIPPON STEEL CORPORATION office for the latest information. Please refrain from unauthorized reproduction or copying of the contents of this publication. The names of our products and services shown in this publication are trademarks or registered trademarks of NIPPON STEEL CORPORATION, affiliated companies, or third parties granting rights to NIPPON STEEL CORPORATION or affiliated companies. Other product or service names shown may be trademarks or registered trademarks of their respective owners.
Inspection & Testing

- **Tolerances**
  Thickness: (Standard) Min. and Max. according to JIS G3193 (Special) Min. and Max. according to respective agreement.
  Width: (Standard) Min. 0 (Special) Min. 0 / Max. according to respective agreement.
  Length: (Standard) Min. 0 (Special) Min. 0 / Max. according to respective agreement.
  Weight: According to JIS G3193, that means values are by calculation, not an actual weight.

- **Flatness**
  Comply to JIS G 3193.

- **Ultrasonic Testing**
  (Standard) It is not a specification but we usually do for Internal quality control purpose.  (Option) Please ask us if any.

- **Visual Inspection**
  Comply to JIS G 3193 Clause 7.

- **Camber and Squareness**
  Comply to JIS G 3193.

- **Mechanical Testing**
  Comply to JIS G 3193.

- **Flatness**
  Test frequency is as per reheated slab unit and as per respective heat treatment condition.
  Brinell Hardness: JIS Z 2243  Decarburized layer is ground off by about 0.7mm, and the surface should be used as test location.

Supplied Condition

- **Identification on a Plate**
  (Standard items for Stencil) 1. NIPPON STEEL’s Brand Mark, 2. Name of material Grade (Designation),
  3. Plate Size (Thickness x Width x Length), 4. Plate Weight, 5. Plate No.
  (Option) If some other information, kindly let us know your request.
  (Standard items for Stamp) Plate No.
  (Option) If some other information, kindly let us know your request.

- **Supplied Condition of Heat Treatment**
  (Standard) As mill scale condition.
  (Option1) Shot blasted and Primer Coating.
  (Option2) Shot blasted and Primer Coating and Marking over the whole of a plate.

- **Surface Supplied Condition**
  (Standard) As mill scale condition.
  (Option1) Shot blasted and Primer Coating.
  (Option2) Shot blasted and Primer Coating and Marking over the whole of a plate.

Others

- **Contact**
  (Both Commercial & Technical for further information) Please contact to us NIPPON STEEL through Designated Trading House or Stockist.

- **Japanese Industry Standard (JIS)**
  The details of respective JIS Standard listed above are available at the following link. Kindly check the Web Site.
  http://www.jsa.or.jp/default_english.asp

- **Disclaimer**
  NIPPON STEEL will not take any responsibilities for damage, loss, and injury caused by using above mentioned information.
  Typical values of Chemical Composition and Mechanical Properties are just examples only, thus, any guarantee that a particular plate will have the same properties is not given.
  All information is subject to change without any prior notice to customers.
**Brand Name of abrasion resistant Steel**

**ABREX™ 400LT**

**Available Thickness** 4～60mm

### SPECIFICATION

<table>
<thead>
<tr>
<th>Brinell Hardness (HBW)</th>
<th>Temperature (ºC)</th>
<th>300 ～ 440</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact Test</td>
<td></td>
<td>-40</td>
</tr>
<tr>
<td>Absorbed Energy (J)</td>
<td></td>
<td>≥27</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Composition (%)</th>
<th>Thickness (mm)</th>
<th>C</th>
<th>Si</th>
<th>Mn</th>
<th>P</th>
<th>S</th>
<th>Cr</th>
<th>Ni</th>
<th>Mo</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 ≤ t ≤ 25</td>
<td>0.21</td>
<td>1.20</td>
<td>2.00</td>
<td>0.020</td>
<td>0.010</td>
<td>1.20</td>
<td>1.00</td>
<td>0.60</td>
<td>0.0050</td>
</tr>
<tr>
<td></td>
<td>25 &lt; t ≤ 60</td>
<td>0.25</td>
<td>1.20</td>
<td>2.00</td>
<td>0.020</td>
<td>0.010</td>
<td>1.20</td>
<td>1.00</td>
<td>0.60</td>
<td>0.0050</td>
</tr>
</tbody>
</table>

### TYPICAL VALUE

<table>
<thead>
<tr>
<th>Chemical Composition (%)</th>
<th>Thickness (mm)</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pcm</td>
<td></td>
<td>0.25</td>
</tr>
<tr>
<td>CEV</td>
<td></td>
<td>0.52</td>
</tr>
<tr>
<td>CET</td>
<td></td>
<td>0.29</td>
</tr>
</tbody>
</table>

| Mechanical Properties    | Yield Strength (MPa) | 1035 |
|                          | Tensile Strength (MPa) | 1274 |
| Bend Test                | JIS Z2248 No.1 R=3t, 180º, No crack |

| Hardness                 | HBW             | 403 |
| Impact Test              | Temperature (ºC) | -40 |
|                         | Absorbed Energy (J) | 47 |

Pcm=C+Si/30+Mn/20+Cu/20+Ni/80+Cr/20+Mo15+W10+5B
CEV=CE+C+Si+Mn+Ni/15+(Cr+Mo+W)/5
CET=C+Mn/6+(Cu+Ni)/15+(Cr+Mo+V)/5

Element other than those listed in the table could be added as necessary.

### Features & Application

As for hardness, this Grade is the lowest grade among ABREX series. In that sense, respective Fabrication (Weldability, Bendability, etc) is easier compared to the other harder Grade. It is also suitable for the region under Low Temperature and for the application that is seriously demanding better toughness.

*(Application Example)*

- Mining & Earthmoving wearparts, Agricultural & Tillage equipment, Ripper Tynes, Forestry equipme, Cutting edges,
- Mining liner plates, Conveyor & Chute Liners, Tipper for dump truck

### Precaution for Fabrication

Especially Bending shall be paid attention to. Kindly refer to the brochure of ‘ABREX™’ and try hard to comply to the described tips. Stress Relief Heat treatment is not recommendable. Heating above 200ºC will reduce its hardness.

If it occurs magnetic arc blow during welding, kindly refer to our brochure of ‘Steel Plate’.

### Product Size availability for width and length

Kindly refer to our brochure of ‘ABREX™’.

### Primer Coating Colour  ※If nessesary.

Brown (Low Zn type)

---

*Notices: While every effort has been made to ensure the accuracy of the information contained within this publication, the use of the information is at the reader’s risk and no warranty is implied or expressed by NIPPON STEEL CORPORATION with respect to the use of the information contained herein. The information in this publication is subject to change or modification without notice. Please contact the NIPPON STEEL CORPORATION office for the latest information. Please refrain from unauthorized reproduction or copying of the contents of this publication. The names of our products and services shown in this publication are trademarks or registered trademarks of NIPPON STEEL CORPORATION, affiliated companies, or third parties granting rights to NIPPON STEEL CORPORATION or affiliated companies. Other product or service names shown may be trademarks or registered trademarks of their respective owners.*
### Inspection & Testing

**Tolerances**
- Thickness: (Standard) Min. and Max. according to JIS G3193 (Special) Min. and Max. according to respective agreement.
- Width: (Standard) Min. 0 (Special) Min. 0 / Max. according to respective agreement.
- Length: (Standard) Min. 0 (Special) Min. 0 / Max. according to respective agreement.
- Weight: According to JIS G3193, that means values are by calculation, not an actual weight.

**Flatness**
- Comply to JIS G 3193.

**Ultrasonic Testing**
- (Standard) It is not a specification but we usually do for Internal quality control purpose. (Option) Please ask us if any.

**Visual Inspection**
- Comply to JIS G 3193 Clause 7.

**Camber and Squareness**
- Comply to JIS G 3193.

**Mechanical Testing**
- Test frequency is as per reheated slab unit and as per respective heat treatment condition.
- Brinell Hardness: JIS Z 2243  Decarburized layer is ground off by about 0.7mm, and the surface should be used as test location.
- Charpy impact*: JIS Z 2242  We guarantee the specified value under -40 °C and put onto MTC.
- Charpy testing shall be applied to thicker than 12mm, unless otherwise agreed for the thinner thickness.

### Supplied Condition

**Identification on a Plate**
- (Standard items for Stencil) 1. NIPPON STEEL's Brand Mark, 2. Name of material Grade (Designation), 3. Plate Size (Thickness x Width x Length) , 4. Plate Weight, 5. Plate No.
- (Option) If some other information, kindly let us know your request.
- (Standard items for Stamp) Plate No.
- (Option) If some other information, kindly let us know your request.

**Supplied Condition of Heat Treatment**
- Q or QT (or TMCP)

**Surface Supplied Condition**
- (Standard) As mill scale condition.
- (Option1) Shot blasted and Primer Coating,
- (Option2) Shot blasted and Primer Coating and Marking over the whole of a plate.

### Others

**Contact**
- (Both Commercial & Technical for further information) Please contact to us NIPPON STEEL through Designated Trading House or Stockist.

**Japanese Industry Standard (JIS)**
- The details of respective JIS Standard listed above are available at the following link. Kindly check the Web Site.
  - http://www.jisa.or.jp/default_english.asp

**Disclaimer**
- NIPPON STEEL will not take any responsibilities for damage, loss, and injury caused by using above mentioned information.
- Typical values of Chemical Composition and Mechanical Properties are just examples only, thus, any guarantee that a particular plate will have the same properties is not given.
- All information is subject to change without any prior notice to customers.
Brand Name of abrasion resistant Steel

ABREX™ 450

Available Thickness 6 (4.5)~100mm

SPECIFICATION

<table>
<thead>
<tr>
<th>Element other than those listed in the table could be added as necessary.</th>
</tr>
</thead>
<tbody>
<tr>
<td>As for hardness, this Grade is the middle grade among ABREX series. Compared to ABREX400, this 450 is more durable and compared to ABREX500 this is easier to fabricate. (Application Example) Mining &amp; Earthmoving wearparts, Agricultural &amp; Tillage equipment, Forestry equipment, Cutting edges, Conveyor &amp; Chute Liners, Tipper for dump truck</td>
</tr>
<tr>
<td>Precaution for Fabrication Especially Bending shall be paid attention to. Kindly refer to the brochure of &quot;ABREX™&quot; and try hard to comply to the described tips. Stress Relief Heat treatment is not recomendable. Heating above 200°C will reduce its hardness.</td>
</tr>
<tr>
<td>Product Size availability for width and length Kindly refer to our brochure of &quot;ABREX™&quot;.</td>
</tr>
<tr>
<td>Primer Coating Colour ※If nessesary. Green (Low Zn type)</td>
</tr>
</tbody>
</table>

**Notice:** While every effort has been made to ensure the accuracy of the information contained within this publication, the use of the information is at the reader’s risk and no warranty is implied or expressed by NIPPON STEEL CORPORATION with respect to the use of the information contained herein. The information in this publication is subject to change or modification without notice. Please contact the NIPPON STEEL CORPORATION office for the latest information. Please refrain from unauthorized reproduction or copying of the contents of this publication. The names of our products and services shown in this publication are trademarks or registered trademarks of NIPPON STEEL CORPORATION, affiliated companies, or third parties granting rights to NIPPON STEEL CORPORATION or affiliated companies. Other product or service names shown may be trademarks or registered trademarks of their respective owners.
Inspection & Testing

- **Tolerances**
  - Thickness: (Standard) Min. and Max. according to JIS G3193 (Special) Min. and Max. according to respective agreement.
  - Width: (Standard) Min. 0 (Special) Min. 0 / Max. according to respective agreement.
  - Length: (Standard) Min. 0 (Special) Min. 0 / Max. according to respective agreement.
  - Weight: According to JIS G3193, that means values are by calculation, not an actual weight.

- **Flatness**
  Comply to JIS G 3193.

- **Ultrasonic Testing**
  (Standard) It is not a specification but we usually do for Internal quality control purpose. (Option) Please ask us if any.

- **Visual Inspection**
  Comply to JIS G 3193 Clause 7.

- **Camber and Squareness**
  Comply to JIS G 3193.

- **Mechanical Testing**
  Test frequency is as per reheated slab unit and as per respective heat treatment condition.
  Brinell Hardness: JIS Z 2243 Decarburized layer is ground off by about 0.7mm, and the surface should be used as test location.

Supplied Condition

- **Identification on a Plate**
  (Standard items for Stencil) 1. NIPPON STEEL's Brand Mark, 2. Name of material Grade (Designation), 3. Plate Size (Thickness x Width x Length) , 4. Plate Weight, 5. Plate No.  
  (Option) If some other information, kindly let us know your request.  
  (Standard items for Stamp) Plate No.  
  (Option) If some other information, kindly let us know your request.

- **Supplied Condition of Heat Treatment**
  Q or QT (or TMCP)

- **Surface Supplied Condition**
  (Standard) As mill scale condition.  
  (Option1) Shot blasted and Primer Coating,  
  (Option2) Shot blasted and Primer Coating and Marking over the whole of a plate.

Others

- **Contact**
  (Both Commercial & Technical for further information) Please contact to us NIPPON STEEL through Designated Trading House or Stockist.

- **Japanese Industry Standard (JIS)**
  The details of respective JIS Standard listed above are available at the following link. Kindly check the Web Site.  
  http://www.jsa.or.jp/default_english.asp

- **Disclaimer**
  NIPPON STEEL will not take any responsibilities for damage, loss, and injury caused by using above mentioned information.  
  Typical values of Chemical Composition and Mechanical Properties are just examples only, thus, any guarantee that a particular plate will have the same properties is not given.  
  All information is subject to change without any prior notice to customers.
### SPECIFICATION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brinell Hardness (HBW)</td>
<td>410 ~ 490</td>
</tr>
<tr>
<td>Impact Test</td>
<td></td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td></td>
</tr>
<tr>
<td>Absorbed Energy (J)</td>
<td>≥27</td>
</tr>
<tr>
<td>Chemical Composition (%)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>≤0.28</td>
</tr>
<tr>
<td>Si</td>
<td>≤1.20</td>
</tr>
<tr>
<td>Mn</td>
<td>≤2.00</td>
</tr>
<tr>
<td>P</td>
<td>≤0.020</td>
</tr>
<tr>
<td>S</td>
<td>≤0.010</td>
</tr>
<tr>
<td>Cr</td>
<td>≤1.50</td>
</tr>
<tr>
<td>Ni</td>
<td>≤1.00</td>
</tr>
<tr>
<td>Mo</td>
<td>≤0.60</td>
</tr>
<tr>
<td>B</td>
<td>≤0.0050</td>
</tr>
<tr>
<td>Pcm</td>
<td>≤0.36</td>
</tr>
</tbody>
</table>

### TYPICAL VALUE

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Composition (%)</td>
<td></td>
</tr>
<tr>
<td>Thickness (mm)</td>
<td>25</td>
</tr>
<tr>
<td>Pcm</td>
<td>0.31</td>
</tr>
<tr>
<td>CEV</td>
<td>0.50</td>
</tr>
<tr>
<td>CET</td>
<td>0.33</td>
</tr>
<tr>
<td>Mechanical Properties</td>
<td></td>
</tr>
<tr>
<td>Yield Strength (MPa)</td>
<td>1089</td>
</tr>
<tr>
<td>Tensile Strength (MPa)</td>
<td>1465</td>
</tr>
<tr>
<td>Bend Test</td>
<td>JIS Z2248 No.1 R=3t, 180°, No crack</td>
</tr>
<tr>
<td>Hardness</td>
<td>HEBW 469</td>
</tr>
<tr>
<td>Impact Test</td>
<td></td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>-40</td>
</tr>
<tr>
<td>Absorbed Energy (J)</td>
<td>43</td>
</tr>
</tbody>
</table>

Notice: While every effort has been made to ensure the accuracy of the information contained within this publication, the use of the information is at the reader’s risk and no warranty is implied or expressed by NIPPON STEEL CORPORATION with respect to the use of the information contained herein. The information in this publication is subject to change or modification without notice. Please contact the NIPPON STEEL CORPORATION office for the latest information. Please refrain from unauthorized reproduction or copying of the contents of this publication. The names of our products and services shown in this publication are trademarks or registered trademarks of NIPPON STEEL CORPORATION, affiliated companies, or third parties granting rights to NIPPON STEEL CORPORATION or affiliated companies. Other product or service names shown may be trademarks or registered trademarks of their respective owners.

### Features & Application

As for hardness, this Grade is the middle grade among ABREX series. Compared to ABREX400, this 450 is more durable and compared to ABREX500 this is easier to fabricate. It is also suitable for the region under Low Temperature and for the application that is seriously demanding better toughness. (Application Example) Mining & Earthmoving wearparts, Agricultural & Tillage equipment, Forestry equipment, Cutting edges, Conveyor & Chute Liners, Tipper for dump truck

### Precaution for Fabrication

Especially Bending shall be paid attention to. Kindly refer to the brochure of ‘ABREX™’ and try hard to comply to the described tips. Stress Relief Heat treatment is not recommendable. Heating above 200°C will reduce its hardness. If it occurs magnetic arc blow during welding, kindly refer to our brochure of ‘Steel Plate’.

### Product Size availability for width and length

Kindly refer to our brochure of ‘ABREX™’.

### Primer Coating Colour

*If necessary.*

*Green (Low Zn type)*
**Inspection & Testing**

- **Tolerances**
  Thickness: (Standard) Min. and Max. according to JIS G3193 (Special) Min. and Max. according to respective agreement.
  Width: (Standard) Min. 0 (Special) Min. 0 / Max. according to respective agreement.
  Length: (Standard) Min. 0 (Special) Min. 0 / Max. according to respective agreement.
  Weight: According to JIS G3193, that means values are by calculation, not an actual weight.

- **Flatness**
  Comply to JIS G 3193.

- **Ultrasonic Testing**
  (Standard) It is not a specification but we usually do for Internal quality control purpose. (Option) Please ask us if any.

- **Visual Inspection**
  Comply to JIS G 3193 Clause 7.

- **Camber and Squareness**
  Comply to JIS G 3193.

- **Mechanical Testing**
  Test frequency is as per reheated slab unit and as per respective heat treatment condition.
  Brinell Hardness: JIS Z 2243 Decarburized layer is ground off by about 0.7mm, and the surface should be used as test location.
  Charpy impact*: JIS Z 2242 We guarantee the specified value under -40 °C and put onto MTC.
  Charpy testing shall be applied to thicker than 12mm, unless otherwise agreed for the thinner thickness.

**Supplied Condition**

- **Identification on a Plate**
  (Standard items for Stencil) 1. NIPPON STEEL’s Brand Mark, 2. Name of material Grade (Designation), 3. Plate Size (Thickness x Width x Length), 4. Plate Weight, 5. Plate No.
  (Option) If some other information, kindly let us know your request.
  (Standard items for Stamp) Plate No.
  (Option) If some other information, kindly let us know your request.

- **Supplied Condition of Heat Treatment**
  Q or QT (or TMCP)

- **Surface Supplied Condition**
  (Standard) As mill scale condition.
  (Option1) Shot blasted and Primer Coating.
  (Option2) Shot blasted and Primer Coating and Marking over the whole of a plate.

**Others**

- **Contact**
  (Both Commercial & Technical for further information) Please contact us NIPPON STEEL through Designated Trading House or Stockist.

- **Japanese Industry Standard (JIS)**
  The details of respective JIS Standard listed above are available at the following link. Kindly check the Web Site.
  http://www.jsa.or.jp/default_english.asp

- **Disclaimer**
  NIPPON STEEL will not take any responsibilities for damage, loss, and injury caused by using above mentioned information. Typical values of Chemical Composition and Mechanical Properties are just examples only, thus, any guarantee that a particular plate will have the same properties is not given.
  All information is subject to change without any prior notice to customers.
Brand Name of abrasion resistant Steel

**ABREX™500**

Available Thickness 6 (4.5)~100mm

### SPECIFICATION

<table>
<thead>
<tr>
<th>Brinnel Hardness (HBW)</th>
<th>450 ~ 550</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact Test</td>
<td>Temperature (°C)</td>
</tr>
<tr>
<td></td>
<td>Absorbed Energy (J)</td>
</tr>
<tr>
<td>Chemical Composition (%)</td>
<td>Thickness (mm)</td>
</tr>
<tr>
<td></td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>Si</td>
</tr>
<tr>
<td></td>
<td>Mn</td>
</tr>
<tr>
<td></td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Cr</td>
</tr>
<tr>
<td></td>
<td>Ni</td>
</tr>
<tr>
<td></td>
<td>Mo</td>
</tr>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Pcm</td>
</tr>
</tbody>
</table>

**Notice:** While every effort has been made to ensure the accuracy of the information contained within this publication, the use of the information is at the reader’s risk and no warranty is implied or expressed by NIPPON STEEL CORPORATION with respect to the use of the information contained herein. The information in this publication is subject to change or modification without notice. Please contact the NIPPON STEEL CORPORATION office for the latest information. Please refrain from unauthorized reproduction or copying of the contents of this publication. The names of our products and services shown in this publication are trademarks or registered trademarks of NIPPON STEEL CORPORATION, affiliated companies, or third parties granting rights to NIPPON STEEL CORPORATION or affiliated companies. Other product or service names shown may be trademarks or registered trademarks of their respective owners.

### TYPICAL VALUE

<table>
<thead>
<tr>
<th>Thickness (mm)</th>
<th>Pcm</th>
<th>0.36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Composition (%)</td>
<td>CEV</td>
<td>0.54</td>
</tr>
<tr>
<td>Mechanical Properties</td>
<td>CET</td>
<td>0.38</td>
</tr>
<tr>
<td>Yield Strength (MPa)</td>
<td>1373</td>
<td></td>
</tr>
<tr>
<td>Tensile Strength (MPa)</td>
<td>1552</td>
<td></td>
</tr>
<tr>
<td>Bend Test</td>
<td>JIS Z2248 No.1 R=3t, 180°, No crack</td>
<td></td>
</tr>
<tr>
<td>Hardness</td>
<td>HBW</td>
<td>514</td>
</tr>
<tr>
<td>Impact Test</td>
<td>Temperature (°C)</td>
<td>0</td>
</tr>
<tr>
<td>Absorbed Energy (J)</td>
<td>43</td>
<td></td>
</tr>
</tbody>
</table>

**Element other than those listed in the table could be added as necessary.**

### Particular Information for this Grade (Designation)

#### Features & Application

This is the second hardest grade among ABREX and is more suitable for fixed liner parts which require severe wear resistance. It is possible to fabricate, but its have to care to fabicate. If you use under high binding effect, you have to care to occur a cruck. (Application Example) Concrete pumping equipment, Cutting edges, Mining liner plates, Mixing blades, Shredder blades, Conveyor & Chute Liners.

#### Precaution for Fabrication

Welding (including welding material) and Bending shall be paid attention to. Kindly refer to the brochure of ‘ABREX™’.

Stress Relief Heat treatment is not recommandable. Heating above 200°C will reduce its hardness. If it occurs magnetic arc blow during welding, kindly refer to our brochure of ‘Steel Plate’.

#### Product Size availability for width and length

Kindly refer to our brochure of ‘ABREX™’.

#### Primer Coating Colour

*If nessesary.*

Gray (Low Zn type)
Inspection & Testing

● **Tolerances**
  Thickness: (Standard) Min. and Max. according to JIS G3193 (Special) Min. and Max. according to respective agreement.
  Width: (Standard) Min. 0  (Special) Min. 0 / Max. according to respective agreement.
  Length: (Standard) Min. 0  (Special) Min. 0 / Max. according to respective agreement.
  Weight: According to JIS G3193, that means values are by calculation, not an actual weight.

● **Flatness**
  Comply to JIS G 3193.

● **Ultrasonic Testing**
  (Standard) It is not a specification but we usually do for internal quality control purpose.  (Option) Please ask us if any.

● **Visual Inspection**
  Comply to JIS G 3193 Clause 7.

● **Camber and Squareness**
  Comply to JIS G 3193.

● **Mechanical Testing**
  Test frequency is as per reheated slab unit and as per respective heat treatment condition.
  Brinell Hardness: JIS Z 2243  Decarburized layer is ground off by about 0.7mm, and the surface should be used as test location.

Supplied Condition

● **Identification on a Plate**
  (Standard items for Stencil) 1. NIPPON STEEL’s Brand Mark, 2. Name of material Grade (Designation), 3. Plate Size (Thickness \( x \) Width \( x \) Length) , 4. Plate Weight, 5. Plate No.
  (Option) If some other information, kindly let us know your request.
  (Standard items for Stamp) Plate No.
  (Option) If some other information, kindly let us know your request.

● **Supplied Condition of Heat Treatment**
  Q or QT (or TMCP)

● **Surface Supplied Condition**
  (Standard) As mill scale condition.
  (Option1) Shot blasted and Primer Coating.
  (Option2) Shot blasted and Primer Coating and Marking over the whole of a plate.

Others

● **Contact**
  (Both Commercial & Technical for further information) Please contact to us NIPPON STEEL through Designated Trading House or Stockist.

● **Japanese Industry Standard (JIS)**
  The details of respective JIS Standard listed above are available at the following link. Kindly check the Web Site.
  http://www.jsa.or.jp/default_english.asp

● **Disclaimer**
  NIPPON STEEL will not take any responsibilities for damage, loss, and injury caused by using above mentioned information.
  Typical values of Chemical Composition and Mechanical Properties are just examples only, thus, any guarantee that a particular plate will have the same properties is not given.
  All information is subject to change without any prior notice to customers.
Brand Name of abrasion resistant Steel

ABREX™ 500LT
Available Thickness 6 (4.5) ~ 80mm

SPECIFICATION

<table>
<thead>
<tr>
<th>Brinell Hardness (HBW)</th>
<th>Temperature (℃)</th>
<th>450 ~ 550</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Thickness (mm)</td>
<td>≥21</td>
</tr>
<tr>
<td></td>
<td>≥4</td>
<td>≥25</td>
</tr>
</tbody>
</table>

Impact Test

<table>
<thead>
<tr>
<th>Chemical Composition (%)</th>
<th>Brinell Hardness (HBW)</th>
<th>Temperature (℃)</th>
<th>450 ~ 550</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Thickness (mm)</td>
<td>≥21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥4</td>
<td>≥25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Composition (%)</th>
<th>Brinell Hardness (HBW)</th>
<th>Temperature (℃)</th>
<th>450 ~ 550</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Thickness (mm)</td>
<td>≥21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥4</td>
<td>≥25</td>
</tr>
</tbody>
</table>

Element other than those listed in the table could be added as necessary.

This is the second hardest grade among ABREX and is more suitable for fixed liner parts which require severe wear resistance. It is possible to fabricate, but its have to care to fabricate. If you use under high binding effect, you have to care to occur a crack. It is suitable for the region under Low Temperature and for the application that is seriously demanding better toughness.

**TYPICAL VALUE**

<table>
<thead>
<tr>
<th>Thickness (mm)</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Composition (%)</td>
<td>Pcm</td>
</tr>
<tr>
<td></td>
<td>CEV</td>
</tr>
<tr>
<td></td>
<td>CET</td>
</tr>
</tbody>
</table>

**Mechanical Properties**

Yield Strength (MPa) 1198
Tensile Strength (MPa) 1680
Bend Test: JIS Z2248 No.1 R=3t, 180°, No crack

**Hardness**

HEW 508

**Impact Test**

Temperature (℃) -40
Absorbed Energy (J) 38

Pcm=C+Si/30+Mn/20+Ni/60+Cr/20+Mo/15+V/10+5B
CEV=C+Si/10+Cr/15+Mo/15+V/10+5B
CET=C+(Mn+Mo)/10+(Cr+Cu)/20+Ni/40

Notice: While every effort has been made to ensure the accuracy of the information contained within this publication, the use of the information is at the reader’s risk and no warranty is implied or expressed by NIPPON STEEL CORPORATION with respect to the use of the information contained herein. The information in this publication is subject to change or modification without notice. Please contact the NIPPON STEEL CORPORATION office for the latest information. Please refrain from unauthorized reproduction or copying of the contents of this publication. The names of our products and services shown in this publication are trademarks or registered trademarks of NIPPON STEEL CORPORATION, affiliated companies, or third parties granting rights to NIPPON STEEL CORPORATION or affiliated companies. Other product or service names shown may be trademarks or registered trademarks of their respective owners.

Particular Information for this Grade (Designation)

**Features & Application**

This is the second hardest grade among ABREX and is more suitable for fixed liner parts which require severe wear resistance. It is possible to fabricate, but its have to care to fabricate. If you use under high binding effect, you have to care to occur a crack. It is also suitable for the region under Low Temperature and for the application that is seriously demanding better toughness.

(Application Example)
Concrete pumping equipment, Cutting edges, Mining liner plates, Mixing blades, Shredder blades, Conveyor & Chute Liners

**Precaution for Fabrication**

Welding (including welding material) and Bending shall be paid attention to. Kindly refer to the brochure of ‘ABREX™’.
Stress Relief Heat treatment is not reccomendable. Heating above 200℃ will reduce its hardness.

If it occurs magnetic arc blow during welding, kindly refer to our brochure of ‘Steel Plate’.

**Product Size availability for width and length**

Kindly refer to our brochure of ‘ABREX™’.

**Primer Coating Colour**

※If nessesary.
Gray (Low Zn type)
Inspection & Testing

- **Tolerances**
  Thickness: (Standard) Min. and Max. according to JIS G3193 (Special) Min. and Max. according to respective agreement.
  Width: (Standard) Min. 0  (Special) Min. 0 / Max. according to respective agreement.
  Length: (Standard) Min. 0  (Special) Min. 0 / Max. according to respective agreement.
  Weight: According to JIS G3193, that means values are by calculation, not an actual weight.

- **Flatness**
  Comply to JIS G 3193.

- **Ultrasonic Testing**
  (Standard) It is not a specification but we usually do for Internal quality control purpose.  (Option) Please ask us if any.

- **Visual Inspection**
  Comply to JIS G 3193  Clause 7.

- **Camber and Squareness**
  Comply to JIS G 3193.

- **Mechanical Testing**
  Test frequency is as per reheated slab unit and as per respective heat treatment condition.
  Brinell Hardness: JIS Z 2243   Decarburized layer is ground off by about 0.7mm, and the surface should be used as test location.
  Charpy impact*: JIS Z 2242   We guarantee the specified value under -40 °C and put onto MCT.
  Charpy testing shall be applied to thicker than 12mm, unless otherwise agreed for the thinner thickness.

Supplied Condition

- **Identification on a Plate**
  (Standard items for Stencil)  1. NIPPON STEEL’s Brand Mark, 2. Name of material Grade (Designation), 3. Plate Size (Thickness x Width x Length), 4. Plate Weight, 5. Plate No.
  (Option) If some other information, kindly let us know your request.
  (Standard items for Stamp) Plate No.
  (Option) If some other information, kindly let us know your request.

- **Supplied Condition of Heat Treatment**
  Q or QT (or TMCP)

- **Surface Supplied Condition**
  (Standard) As mill scale condition.
  (Option) Shot blasted and Primer Coating.

Others

- **Contact**
  (Both Commercial & Technical for further information) Please contact to us NIPPON STEEL through Designated Trading House or Stockist.

- **Japanese Industry Standard (JIS)**
  The details of respective JIS Standard listed above are available at the following link. Kindly check the Web Site.
  http://www.jsa.or.jp/default_english.asp

- **Disclaimer**
  NIPPON STEEL will not take any responsibilities for damage, loss, and injury caused by using above mentioned information.
  Typical values of Chemical Composition and Mechanical Properties are just examples only, thus, any guarantee that a particular plate will have the same properties is not given.
  All information is subject to change without any prior notice to customers.
Brand Name of abrasion resistant Steel

**ABREX™ 600**

Available Thickness 8~25mm

### Particular Information for this Grade (Designation)

#### Features & Application

This is the hardest grade among ABREX and is suitable for fixed liner parts which require extreme wear resistance.

It’s impossible to bend. You have to use special weld material. It has low toughness. You have to care to fabricate.

*Application Example*

Mining liner plates, Conveyor & Chute Liners

#### Precaution for Fabrication

Welding (including welding material) and Bending shall be paid attention to. Kindly refer to the brochure of ‘ABREX™’.

Stress Relief Heat treatment is not recommendable. Heating above 200°C will reduce its hardness.

If it occurs magnetic arc blow during welding, kindly refer to our brochure of ‘Steel Plate’.

#### Product Size availability for width and length

Basically, Thickness: 8-25mm, width: 2000mm x length: 6000mm is standard size, if there is any other size demand, please contact us.

#### Primer Coating Colour

*If nessesary.

Blue (Low Zn type)

---

**SPECIFICATION**

<table>
<thead>
<tr>
<th>Chemical Composition (%)</th>
<th>Brinell Hardness (HBW) 550 ~ 650</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pcm</td>
<td>0.50</td>
</tr>
<tr>
<td>CEV</td>
<td>0.72</td>
</tr>
<tr>
<td>CET</td>
<td>0.54</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical Properties</th>
<th>Yield Strength (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>606</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impact Test</th>
<th>Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impact Test</th>
<th>Absorbed Energy (J)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impact Test</th>
<th>Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impact Test</th>
<th>Absorbed Energy (J)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Composition (%)</th>
<th>Thickness (mm) 8~25</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>≤0.45</td>
</tr>
<tr>
<td>Si</td>
<td>≤0.70</td>
</tr>
<tr>
<td>Mn</td>
<td>≤2.00</td>
</tr>
<tr>
<td>P</td>
<td>≤0.015</td>
</tr>
<tr>
<td>S</td>
<td>≤0.010</td>
</tr>
<tr>
<td>Cr</td>
<td>≤1.20</td>
</tr>
<tr>
<td>Ni</td>
<td>≤1.00</td>
</tr>
<tr>
<td>Mo</td>
<td>≤0.60</td>
</tr>
<tr>
<td>B</td>
<td>≤0.0050</td>
</tr>
</tbody>
</table>

Pcm=C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo15+W10+5B

CEV=C+Mn/6+(Cu+Ni)/15+(Cr+Mo+V)/5

CET=C+ (Mn+Mo)/10+ (Cr+Cu)/20+Ni/40

Element other than those listed in the table could be added as nesessary.

---

**TYPICAL VALUE**

<table>
<thead>
<tr>
<th>Thickness (mm) 25</th>
<th>Pcm 0.50</th>
</tr>
</thead>
</table>

---

*NIPPON STEEL CORPORATION*

Notice: While every effort has been made to ensure the accuracy of the information contained within this publication, the use of the information is at the reader’s risk and no warranty is implied or expressed by NIPPON STEEL CORPORATION with respect to the use of the information contained herein. The information in this publication is subject to change or modification without notice. Please contact NIPPON STEEL CORPORATION office for the latest information. Please refrain from unauthorized reproduction or copying of the contents of this publication. The names of our products and services shown in this publication are trademarks or registered trademarks of NIPPON STEEL CORPORATION, affiliated companies, or third parties granting rights to NIPPON STEEL CORPORATION or affiliated companies. Other product or service names shown may be trademarks or registered trademarks of their respective owners.
Inspection & Testing

- **Tolerances**
  Thickness: (Standard) Min. and Max. according to JIS G3193 (Special) Min. and Max. according to respective agreement.
  Width: (Standard) Min. 0 (Special) Min. 0 / Max. according to respective agreement.
  Length: (Standard) Min. 0 (Special) Min. 0 / Max. according to respective agreement.
  Weight: According to JIS G3193, that means values are by calculation, not an actual weight.

- **Flatness**
  Comply to ASTM A6.

- **Ultrasonic Testing**
  (Standard) It is not a specification but we usually do for Internal quality control purpose. (Option) Please ask us if any.

- **Visual Inspection**
  Comply to JIS G3193 Clause 7.

- **Camber and Squareness**
  Comply to JIS G3193.

- **Mechanical Testing**
  Test frequency is as per reheated slab unit and as per respective heat treatment condition.
  Brinell Hardness: JIS Z 2243 Decarburized layer is ground off by about 0.7mm, and the surface should be used as test location.

Supplied Condition

- **Identification on a Plate**
  (Standard items for Stencil) 1. NIPPON STEEL's Brand Mark, 2. Name of material Grade (Designation), 3. Plate Size (Thickness x Width x Length), 4. Plate Weight, 5. Plate No.
  (Option) If some other information, kindly let us know your request.

- **Supplied Condition of Heat Treatment**
  Q or QT (or TMCP)

- **Surface Supplied Condition**
  (Standard) As mill scale condition.
  (Option) Shot blasted and Primer Coating.

Others

- **Contact**
  (Both Commercial & Technical for further information) Please contact to us NIPPON STEEL through Designated Trading House or Stockist.

- **Japanese Industry Standard (JIS)**
  The details of respective JIS Standard listed above are available at the following link. Kindly check the Web Site.
  http://www.jsa.or.jp/default_english.asp

- **Disclaimer**
  NIPPON STEEL will not take any responsibilities for damage, loss, and injury caused by using above mentioned information.
  Typical values of Chemical Composition and Mechanical Properties are just examples only, thus, any guarantee that a particular plate will have the same properties is not given.
  All information is subject to change without any prior notice to customers.