IDI
Isothermal Ductile Iron
IDI: Perferritic Isothermal Ductile Iron

Isothermal Ductile Iron (IDI) is produced by heat-treating an unalloyed ductile iron, casted with a special preconditioning of the metal bath. IDI is a new intermediate grade between ADI and pearlitic ductile iron. Zanardi Standard 101:2007.

Perferritic Spheroidal graphite cast iron

Cast material, iron and carbon based, carbon being present mainly in the form of spheroidal graphite particles, subjected to an isothermal heat treatment in order to produce a Perferritic Matrix.

Graphite spheroidizing treatment

Process which brings the liquid iron into contact with a substance to produce graphite in spheroidal form during solidification.
IDI: Perferritic Isothermal Ductile Iron

Isothermal heat treatment of spheroidal graphite cast iron

Process, consisting of heating the casting above the Ac1 (temperature at which austenite starts to form during heating), cooling at a rate able to promote the formation of pearlite, and transforming the matrix structure for a time and a temperature (above the martensite start temperature) sufficient to produce the desired properties.

This process produces a microstructure that consists predominantly of interconnected ferrite and pearlite. This microstructure, when obtained by an isothermal heat treatment, is called Perferritite.
Isothermal Ductile Iron Process

Ductile Iron

+ Isothermal Heat treatment

= Perferritite
## IDI: MECHANICAL PROPERTIES

### Minimum Zanardi Values

<table>
<thead>
<tr>
<th>IDI Minimum Values</th>
<th>Relevant wall thickness</th>
<th>Tensile strength</th>
<th>0,2% Proof strength</th>
<th>Elongation</th>
<th>Brinell Hardness Range</th>
<th>Typical impact resistance values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material designation</td>
<td>t (mm)</td>
<td>$R_m$ (min) (N/mm²)</td>
<td>$R_{p0.2}$ (min) (N/mm²)</td>
<td>$A_5$ (%)</td>
<td>HBW</td>
<td>+23°C (J)</td>
</tr>
<tr>
<td>JS/700-2/S ISO1083:2004</td>
<td>t ≤ 30</td>
<td>700</td>
<td>420</td>
<td>2</td>
<td>225÷305</td>
<td>(27)</td>
</tr>
<tr>
<td>GH75/45/5 52215</td>
<td>t ≤ 30</td>
<td>735</td>
<td>440</td>
<td>5 *</td>
<td>265÷300</td>
<td>-</td>
</tr>
<tr>
<td>IDI/S ZND101:2007</td>
<td>t ≤ 30</td>
<td>730</td>
<td>440</td>
<td>7</td>
<td>240÷290</td>
<td>60</td>
</tr>
<tr>
<td>GGG70BA/S 15-2223</td>
<td>t ≤ 30</td>
<td>700</td>
<td>500</td>
<td>10</td>
<td>240÷290</td>
<td>-</td>
</tr>
<tr>
<td>JS/800-10/S ISO17804:2005</td>
<td>t ≤ 30</td>
<td>800</td>
<td>500</td>
<td>10</td>
<td>250÷310</td>
<td>110 (125)</td>
</tr>
</tbody>
</table>
### Examples of microstructure and static fracture behaviour

<table>
<thead>
<tr>
<th>MICRISTRUCTURE</th>
<th>FRACTURE SURFACE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>100 x</strong></td>
</tr>
<tr>
<td>GS 600-3</td>
<td><img src="image1" alt="Image" /></td>
</tr>
<tr>
<td>IDI</td>
<td><img src="image3" alt="Image" /></td>
</tr>
<tr>
<td>ADI80C-8</td>
<td><img src="image5" alt="Image" /></td>
</tr>
</tbody>
</table>
IDI: BENEFITS

IDI has shown

- Good static properties
- Fatigue = Pearlitic DIs
- Machinability ≥ Pearlitic DIs
- Impact > Pearlitic DIs
HYDRAULIC ENGINE MADE OF IDI

Upgrade of traditional ductile iron and substitution of Inox Steel. Operating pressure up to 400 bar

STANDARD MATERIAL

IDI

DELIVERY CONDITIONS

Weight: 65 kg
IDI POTENTIAL APPLICATION

Housing Cover

STANDARD MATERIAL
EN-GJS-400-15

DELIVERY CONDITIONS
Weight: ~ 5 kg
IDI POTENTIAL APPLICATION

Housing Cover

STANDARD MATERIAL
GGG 40 DIN 1693

DELIVERY CONDITIONS
Weight: ~ 1 kg
IDI POTENTIAL APPLICATION

Housing Cover

STANDARD MATERIAL
EN-GJS-600-3

DELIVERY CONDITIONS
Weight: ~ 1,4 kg
IDI POTENTIAL APPLICATION

Housing Cover

STANDARD MATERIAL
EN-GJS-500-7

DELIVERY CONDITIONS
Weight: ~ 15 kg
IDI POTENTIAL APPLICATION
Suspension Arm – Off-Road Vehicles

Production started on 1987
Previous technology: steel welded / assembled parts

ADVANTAGES
Cost savings; one rigid piece

STANDARD MATERIAL
ADI 800-10

DELIVERY CONDITIONS
Weight: 50 – 70 kg
Painted
IDI POTENTIAL APPLICATION
Steerable Stub Axle

ADVANTAGES
Weight & Cost reduction
Reduction of machining operations

ACTUAL MATERIAL
Forged Steel