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|-------------------------------|--|--------------------|-------------------|
| <b>Laboratory</b>             | <b>Testing Laboratory, Kalyani Carpenter Special Steels Ltd., Mundhwa, Pune, Maharashtra</b> |                    |                   |
| <b>Accreditation Standard</b> | <b>ISO/IEC 17025: 2005</b>   |                    |                   |
| <b>Discipline</b>             | <b>Mechanical Testing</b>  | <b>Issue Date</b>  | <b>24.10.2014</b> |
| <b>Certificate Number</b>     | <b>T-1442</b>  | <b>Valid Until</b> | <b>23.10.2016</b> |
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| <b>S.No.</b>                                 | <b>Product / Material of Test</b> | <b>Specific Test Performed</b>   | <b>Test Method Specification against which tests are performed</b>                      | <b>Range of Testing / Limits of Detection</b>  |
|--|-----------------------------------|--|---|--|
| <b>I. MECHANICAL PROPERTIES OF MATERIALS</b> |                                   |  |   |  |
| <b>1.</b>                                    | <b>Metal &amp; Metal alloys</b>   | Tensile Test :<br>-Tensile strength<br>-Yield Strength/<br>Proof strength (0.2-0.6%)<br>-%El<br>-%RA | ASTM E8-2013<br>IS 1608-2005<br>ISO 6892-Part-I,2009<br>JIS Z2241-2011                  | 5 kN to 250 kN<br><br>5 to 80%<br>15 to 80%  |
|  |                                   | Impact test  | ISO 148 Part –I, 2010<br>IS 1598-1977<br>IS 1499-1977<br>IS 1757-1988<br>JIS Z2242-2005 | Charpy:Upto 300 Joules<br>(At room temp & Sub - zero temp upto -45°C)<br>Izod : Upto168 Joules at Room temp. |
|  |                                   | Rockwell hardness Test   | ASTM E18-2012<br>IS 1586-2000<br>EN ISO 6508-2006<br>JIS Z2245-2011                     | (20 to70) HRC/0.5 HRC  |
|  |                                   | Brilnell hardness Test   | ASTM E10-2012<br>IS 1500-2005<br>ISO 6506-Part-I-2006<br>JIS Z 2243-2008                | (96 to 450) HBW<br>(3000 kg/10mm ball)   |
|  |                                   | Grain size test<br>(Comparison method)   | ASTME112-2013<br>IS 4748-2009<br>EN ISO 643-2003<br>JIS G 0551-2013                     | 0 to 10  |

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| <b>II. METALLOGRAPHY TEST</b> |                                 |   |   |  |
| <b>1.</b>                     | <b>Metal &amp; Metal Alloys</b> | Decarburization test (Microscopic method) | IS 6396-2000<br>SAE J419-1983<br>ISO 3887-2003<br>G0558-2007  | (0 to 1) mm /0.01 mm                   |
|                               |                                 | Inclusion test                            | IS 4163-2004 (Method A)<br>ASTM E-45-2013 (Method A,D, & E)<br>ISO 4967-2013(Method A)<br>DIN 50602-1985 (K method)<br>JIS G0555-2003(Point count method) | Qualitative                            |
|                               |                                 | Hardenability test                        | ASTM A255-2010<br>ISO 642-2000<br>IS 3848-1981<br>JIS Z2241-2011  | (20 to 70) HRC/0.5 HRC                 |
|                               |                                 | Macro test                                | IS 11371-1985<br>ASTM E381-2001(2012)<br>ASTM E340-2013<br>JIS G0553-2008   | Qualitative                            |

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