

## STEELS & ENERGY LTD. ď

## TEST CERTIFICATE

Regd. Office: Gut No. 78 to 81, Pangra Shiver Chilegaon, Paithan Road, Aurangabad - 431 107
Maharashtra, India. Phone: 02431-861231, 261163 Fax: 02431-251879
E-mail: qc@risteels.com, Website: www.risteels.com

Format No.: FT/QAD/01 Issue Dt:10/08/2014, Rev No.: 01

## Customer: M/S HAPPY FORGINGS.LTD.(UNIT II)

B- XXIX-2254/1 & OPP. HINDUSTAN TYRES (ADJ. WARYAM STEELS), KANGANWAL ROAD, PO-JUGIANA, LUDHIANA.

|  |  | TC NO.    | 0         | Date                | Invoice No. | No.                | Date            | Truck No.   | No.       | No. of Pcs  | Quantity in | Length        | Supp             | Supply Condition                 | _       | Colour code                 | - code               |
|--|--|-----------|-----------|---------------------|-------------|--------------------|-----------------|-------------|-----------|-------------|-------------|---------------|------------------|----------------------------------|---------|-----------------------------|----------------------|
| No.   Carde   As Cast Size   Product Size   Reduction Ratio   Re |  | 17-43     | 99        | 17-02-2018          | RL17-SI     | 4013               | 17-02-2018      | RJ 07 G     | C 3770    | 28          | 25.840      |               | AS               | ROLLED                           |         | YELL<br>BLUE+               | OW+                  |
|  |  | Pr        | ocess Rou | te l                | Heat        | No.                | Grac            | Ф           | As Cas    | st Size     | Produ       | ct Size       | Reductio         | n Ratio                          | Ö       | ustomer TI                  | 20                   |
|  | Signature   Composition & Transperies   Signature    | EAF/LRF/  | VD/CCP-wi | th MEMS             | 2-WE        | A-4                | EN3             | 23          | 280)      | (320        | 115         | DIA           | 8.63             | E                                |         |                             |                      |
|  |  | Chemical  | Compos    | ంఠ                  | ramp Ele    | ments              |                 |             |           |             |             |               |                  |                                  |         |                             |                      |
| 0.14     0.50     0.50     0.020     1.50   0.040     0.040     0.040     0.040       0.18   0.20   0.25   0.05   0.020   1.05   0.020   1.05   0.15   0.15     0.040       0.18   0.25   0.25   0.96   0.020   1.05   1.05   1.05   0.15     0.15     0.040       0.18   0.25   0.25   0.96   0.020   1.05   1.05   1.05   0.15     0.15     0.041     0.041       0.18   0.25   0.95   0.020   0.020   1.05     0.020     0.040     0.041     0.   | 0.14   0.20   0.25   0.20   0.025   0.020   1.25   1.00   0.015   0. | Element   | 3%        | is%                 | %Mn         | d%                 | s%              | %Cr         | %Ni       | %Mo         | %Cn         | ۸%            | %AI              | iT%                              | %B      | %Ca                         | %As                  |
|  | 0.185   0.250   0.035   0.040   1.05   1.05   0.135  | Min.      | 0.14      | 1                   | 0.50        |                    | 0.020           | 0.75        | 1.00      | 0.08        |             |               | 0.020            |                                  | . "     |                             |                      |
|  |  | Max.      | 0.20      | 0.35                | 1.00        | 0.035              | 0.040           | 1.25        | 1.50      | 0.15        |             |               | 0.040            |                                  |         |                             |                      |
| Name    | Name   | Acfiral   | 0.185     | 0.25                | 96.0        | 0.028              | 0.030           | 1.05        | 1.03      | 0.135       | ,           | ,             | 0.026            |                                  | ,       |                             |                      |
| Fig.    | Figure   F | Tramp El  | ements    | (Contd.) 8          | DI / CE     |                    |                 |             |           | 9           | as Analys   | sis.          |                  | Din                              | nension | Tolera                      | ээс                  |
| Specification   Section   Section  | Fig. 10   Fig. | Element   | us%       | %Pb                 | qs%         | CE                 | DI Va           | lue         |           |             | 02          | H2            | N2               | Size Tol.                        | (MM)    |                             |                      |
| Fig. 10   Fig. | Part    | Min       |           |                     |             |                    |                 |             | (Wdd      | Min         |             |               |                  |                                  |         |                             |                      |
| Part    | Series   Actual   10.00   1.20   76.00   1.20   76.00   1.20   76.00   1.20   76.00   1.20   76.00   1.20   76.00   1.20   76.00   1.20   1. | Мах       |           |                     |             |                    |                 |             | ) ss2     | Мах         | 20.00       | 2.50          | 90.00            | Specific                         | ation   | As per<br>Gra               | IS 3739,<br>ade I.   |
| Hand    | Handard Values (Joules)   Handard Values ( | Actual    | ,         |                     |             |                    |                 |             |           | Actual      | 10.00       | 1.20          | 76.00            |                                  |         |                             |                      |
| The contract of the contract | VS (Kg/mm²)   UTS (Kg/mm²)   %EI.   %RA   Izod   Charpy   Better Than C2R32   C2R2S2   C2R2 | Mechanic  | sal Prop  | erties              |             |                    |                 |             |           |             |             |               | Macrost          | ructure                          | Mi      | crostruc                    | ture                 |
| 120d   Charpy   Pet A3 INVESTITATION   | Caran Size   |           | Hardness  | Hardness<br>(H&T    |             | /mm <sup>2</sup> / | N STII          | /mm/s       | %EI       | %RA         | Impact Va   | lues (Joules) | Macrostru        | ucture As                        |         | Matrix                      |                      |
| Grain Size   Inclusion Rating (As per IS 4163/ ASTME-45A) Plate IR   Better Than C2R252   C21:252     Grain Size   Series   A   B   C   D     6:0 / 8:0   T / H   2:0 / 1.0   2:0 / 0.0   2:0 / 1.0     6:0 / 7:0   T / H   1.5 / 0.5   0.5 / 0.0   0.0 / 0.0   1.5 / 0.5   OK   OK   OK   OK  | Crain Size   Inclusion Rating (As per IS 4163/ ASTME 45A) Plate IR   Nagnaflux Test (100%   1.5 / 0.5)   | lest Code | (BHN)     | Condition)<br>(BHN) |             |                    |                 |             |           |             | pozi        | Charpy        | ber Ao           | ME-30                            |         |                             |                      |
| Grain Size   Inclusion Rating (As per IS 4163/ ASTME-45A) Plate IR   Magnafflux Test (100%   UT Tost   Spart/ Spectral as per   Series   A   B   C   D   Bars)   Bars   Bars   Bars   Bars   Bars   Bars   Bars   C   D   C   C   C   C   C   C   C   C  | Grain Size   Inclusion Rating (As per IS 4163/ASTME-45A) Plate IR   Magnaflux Test (100%   C21/2S2     Grain Size   Inclusion Rating (As per IS 4163/ASTME-45A) Plate IR   Magnaflux Test (100%   C1/00%   C1/00 | Spec.     | 240 Max.  | ,                   |             |                    |                 |             |           |             | 1           |               | Better Tha       | in C2R2S2                        | Uniform | distribution<br>plus Pearli | n of Ferrite<br>te   |
| Grain Size   Inclusion Rating (As per IS 4163/ ASTME-45A) Plate IR   Magnafflux Test (100%   UT Tost Spark/ Spectral Squeezes   Spectral Squeeze | Grain Size   Inclusion Rating (As per IS 4163/ASTME-45A) Plate IR   Magnaflux Test (100%   Control   Con | Actual    | 206-217   |                     |             |                    |                 |             |           |             | 1.          |               | C21              | 1282                             | Uniform | distributio<br>plus Pearl   | ı, of Ferrite<br>ite |
| Decarb   ASTM   State   ASTM   ASTM | Grain Size<br>ASTM<br>E112         Inclusion Rating (As per IS 4163/ASTME-45A) Plate IR<br>ASTM<br>E112         Magnaflux Test (100%<br>Bars)         UT Test<br>(100%<br>Bars)         Spectral<br>(100%<br>Bars)         Spectral<br>(100%<br>Bars)         -           6.0 / 7.0         T / H         2.0 / 1.0         2.0 / 0.0         2.0 / 1.0         -<   | Metallur  | gical Pro | perties             |             |                    |                 |             |           |             |             |               | O'her            | Fest Res                         | ults    |                             |                      |
| (mm)         ASIM<br>E112         Series         A         B         C         D         Dates         Bars         Bars           .         6.0780         T/H         2.071.0         2.070.0         2.070.0         2.071.0         .         .           .         6.017.0         T/H         1.570.5         0.570.0         0.070.0         1.570.5         OK         OK         OK   | ASTM ASTM Series A B C D Bars) Bars)  6.0/8.0 T/H 2.0/1.0 2.0/0.0 2.0/0.0 2.0/1.0  | Toet      | 900       | Decarb              | -           | Inclus             | sion Rating (As | per IS 4163 | ASTME-45  | 4) Plate IR | Magnaffu    | K Test (100%  | UT Test<br>(100% | Spark/<br>Spectral<br>Test (100% | 1       |                             |                      |
| 6.0/8.0 T/H 2.0/1.0 2.0/0.0 2.0/0.0 2.0/1.0  | 6.0/8.0 T/H 2.0/1.0 2.0/0.0 2.0/0.0 2.0/1.0  |           |           | (mm)                |             | Series             | А               | В           | U         | ۵           |             | odis)         | Bars)            | Bars)                            |         |                             |                      |
| . 6,0/7,0 T/H 1,5/0,5 0,5/0,0 0,0/0,0 1,5/0,5 OK OK  | 6.0/7.0 T/H 1.5/0.5 0.5/0.0 0.0/0.0 1.5/0.5 OK OK OK   | Sp        | ec.       | ,                   | 6.0 / 8.0   | 1/Н                | 2.0 / 1.0       | 2.0 / 0.0   | 2.0 / 0.0 | 2.0 / 1.0   |             |               |                  |                                  |         |                             |                      |
|  | Hardenability Test Result  | Actual    | Value     |                     | 6.0 / 7.0   | 1/Н                | 1.5 / 0.5       | 0.5 / 0.0   | 0.0 / 0.0 | 1.5/0.5     |             | OK.           | Š                | OK                               | ,       |                             | . ,                  |

| (mm/inch)          | mm/inch)                       |   |               |             |                   |         |             |                |        |                       |           |  |  |
|--------------------|--------------------------------|---|---------------|-------------|-------------------|---------|-------------|----------------|--------|-----------------------|-----------|--|--|
| Spec<br>(HRC)      | 34-38                          |   |               | ,           |                   |         |             |                |        |                       |           |  |  |
| Actual<br>Hardness | 35.00                          |   |               |             |                   |         |             | 1              |        |                       | 1         | 101  | 7  |
| Remark             | s: Material is<br>This materia | Remarks : Material is conforming to the customer specification.  NOTE: This material is made for AL, and is complying to AL Std 258.02                          | the customer, | specificati | on.<br>Std 258.02 |         |             |                |        | For R L STEELS ENERGY | ELS & ENE | RGY.   | A CONTRACTOR OF THE PARTY OF TH |
| DECLAR<br>PLAN. T  | ATION: TEST F                  | DECLARATION : TEST RESULTS ARE BASED ON ACTUAL TESTS CARRIED OUT ON SAMPLES DRAWN AS PER QUALITY ASSURANCE PLAN. TEST CERTIFICATE CONFORMS TO THE CUSTOMER TDC. | SED ON ACTUAL | TESTS CAR   | RRIED OUT ON      | SAMPLES | DRAWN AS PE | R QUALITY ASSI | JRANCE | (AUTHORISED)          |           | The state of the s |  |

Steel