



# JAYASWAL NECO INDUSTRIES LIMITED

(STEEL PLANT DIVISION)

SILTARA INDUSTRIAL GROWTH CENTRE, RAIPUR (C.G.)

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## TEST CERTIFICATE

NO: BMS9880

QA/RM/F10

|                |   |                  |                      |
|----------------|---|------------------|----------------------|
| ORDER NO       | : HAPPY FORGINGS LTD, ELS) PO. JUGHIANA, LUDHIANA | INVOICE NO       | : 262097             |
| DESCRIPTION    | : HFL/TDC-18, MFR-514 (REV-01)                    | TRUCK NO         | : PB13AR9107         |
| DATE / REF NO  | : 05.25.10.2016                                   | DATE             | : 01/03/2018         |
| ITEM NO        | : D 59101   | NO OF PCS / BNDL | : 226 PCS / 12 BNDL  |
| ITEM CODE      | : 20MNCR5   | QUANTITY (MT)    | : 23.980             |
| ITEM DIM (MM)  | : 56 DIA  | COLOUR CODE      | : WHITE BASE+RED DOT |
| ITEM RATIO     | : 13.2  | SUPPLY CONDITION | : AS ROLLED          |
| ITEM SIZE (MM) | : 180 X 180                                       | MULTIPLE LENGTH  | : XL=5-6MTR          |
| ITEM ROUTE     | : BF/EOF/LRF/VD/CCM/SEN/M'EMS/AMLC                |                  |                      |

### CHEMICAL COMPOSITION % (Ladle/Product)

|        | %C    | %Mn   | %P    | %S    | %Si   | %Cr   | %Ni   | %Mo   | %Pb | %Cu   | %Sn   | %V    | %Ti    | %B     | %Al   | %Ca    |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-----|-------|-------|-------|--------|--------|-------|--------|
| T. MIN | 0.150 | 1.000 | --    | 0.015 | 0.150 | 1.000 | --    | --    | --  | --    | --    | --    | --     | --     | 0.020 | --     |
| C. MAX | 0.200 | 1.300 | 0.020 | 0.030 | 0.400 | 1.300 | 0.300 | 0.100 | --  | 0.300 | --    | --    | --     | 0.0005 | 0.050 | 0.0010 |
| ACTUAL | 0.190 | 1.290 | 0.013 | 0.024 | 0.210 | 1.290 | 0.021 | 0.003 | --  | 0.011 | 0.005 | 0.005 | 0.0020 | 0.0004 | 0.025 | 0.0006 |

### MECHANICAL PROPERTIES

|                                     | SPECIFIED      | ACTUAL      |
|-------------------------------------|----------------|-------------|
| TENSILE STRENGTH (5.65 Sq. rt. A) % | 930N/MM2 MIN   | 1136N/MM2   |
| REDUCTION AREA %                    | 1230-1570N/MM2 | 1287N/MM2   |
| IMPACT VALUE                        | 7% MIN         | 11.00       |
| TENSILE STRENGTH (BHN/HRB/HRC)      | 25J MIN.       | 36 JOUL     |
| BRINELL HARDNESS                    | 240BHN MX      | 170/190 BHN |

### METALLURGICAL PROPERTIES

|                                   |   |
|-----------------------------------|---|
| GRAIN STRUCTURE                   | : F+P (GR-IV MX-UN18449 FERRITE+PEARLITE) |
| GRAIN SIZE (ASTM E112/IS:4748)    | : 5-BASTM 6.5/7.5                         |
| GRAIN DECARB (MM) SAEJ419         | : 1% XDIA MX 0.28 MM PARTIAL              |
| GRAIN RATINGS (ASTM E-45/IS:4163) |   |

### SPECIFIC REQUIREMENT

#### ACTUAL

|   |
|---|
| THIN ; THICK ; THIN ; THICK ; THIN ; THICK ; THIN ; THICK ; |
| A-2.0/1.5 ; B-2.0/1.0 ; C-0.5/0.5 ; D-1.0/1.0               |
| 1.5 ; 0.0 ; 0.5 ; 0.0 ; 0.0 ; 0.0 ; 1.5 ; 0.0               |

|                               |             |                    |
|-------------------------------|-------------|--------------------|
| ENDURANCE TEST (ASTM E - 381) | : C2R3S3 MX | BETTER THAN C2R2S2 |
| D. I. VALUE (J406)            | : -         |                    |
| MINIMUM REQUIREMENT           | : JOMINY FB |                    |
| WELDABILITY IS:3848/A255-02   |             |                    |

TEST INCH/MM: 1.5MM; 5MM; 10MM; 15MM; 20MM; 25MM; 30MM;

VALUES (HRC): 45.50; 42.50; 35.50; 31.50; 29.00; 27.50; 26.00;

|                               |            |            |         |
|-------------------------------|------------|------------|---------|
| GAS LEVEL (PPM) SPECIFIED MAX | : O2: 20.0 | N2: 60-120 | H2: 2.5 |
| GAS LEVEL (PPM) ACHIEVED      | : O2: 16.6 | N2: 72.0   | H2: 1.8 |

REMARKS: 100% SPARK/SPECTRAL/MOBILE SPECTRO TEST :OK  
STEP DOWN TEST :OK  
UPSET TEST :NA  
100% BAR MPI & UT OK

AUTHORISED SIGNATORY