# JSW STEEL LTD.,

Vijayanagar Works, Vidyanagar Post, Bellary Dist, Karnataka INDIA

Regd.Office : JSW Centre,Bandra Kurla Complex, Bandra(East),Mumbai 400051

## MILL TEST CERTIFICATE
### ( According to EN 10204 - 3.1)

TO.
SALGITTER MANNAMANN INTERNATIONAL GMBH
SCHWANNSTR 12
40476 DUSSEIDORF
GERMANY

Date: 12-04-2014
Sales contract No.JSW/HRS/2013-14/2922 DATED:07.03.2014
Specification : EN 10149-2-2005, S355 MC

TC No:Gemany/Exp13-14/Sap00705
Product: Hot Rolled Steel Coils

| Specifications requirements:- | C % | Mn % | S % | P % | Si % | Al % | Cr % | Ni % | Nb % | Mo % | V % | Ti % | Cu % | N % | Si+2.5P % | C.E. % | YS MPa | UTS MPa | EL % | Impact @ 20°C | Bend test 0.5T, 180° |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (Reference: As per TDC no.: IM/JSW/2010-11/HRS/133 Dt. : 31-10-2010 and S355 MC) Min:→ | - | - | - | - | - | 0.015 | - | - | - | - | - | - | - | - | - | - | 355 | 430 | 23 | 40J | - |
| Max:→ | 0.12 | 1.50 | 0.020 | 0.025 | 0.030 | - | - | - | 0.090 | - | 0.20 | 0.15 | - | - | 0.090 | 0.400 | - | 550 | - | - | - |

| Cast\ Heat No. | Coil No. | Nominal Size (mm) T | X | W | X | L | Weight(Net) Metric Tonnes | C % | Mn % | S % | P % | Si % | Al % | Cr % | Ni % | Nb % | Mo % | V % | Ti % | Cu % | N % | Si+2.5P % | C.E. % | YS Mpa | UTS Mpa | EL % | Impact Joules | Bend test 0.5T, 180° | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D609515 | 14542887 | 8.00 | x | 1,500 | x | coil | 27.430 | 0.078 | 1.00 | 0.010 | 0.013 | 0.014 | 0.047 | 0.015 | 0.013 | 0.025 | 0.001 | 0.001 | 0.014 | 0.005 | 0.0047 | 0.0465 | 0.249 | 439 | 523 | 28 | 196,220,232 | Pass | |
| D609518 | 14542886 | 8.00 | x | 1,500 | x | coil | 27.290 | 0.079 | 1.01 | 0.009 | 0.014 | 0.015 | 0.047 | 0.012 | 0.013 | 0.025 | 0.001 | 0.001 | 0.014 | 0.006 | 0.0049 | 0.0500 | 0.251 | 420 | 499 | 30 | 288,280,284 | Pass | |
| E609528 | 14544198 | 8.00 | x | 1,500 | x | coil | 27.320 | 0.071 | 1.00 | 0.010 | 0.011 | 0.015 | 0.055 | 0.016 | 0.014 | 0.030 | 0.001 | 0.001 | 0.017 | 0.006 | 0.0042 | 0.0425 | 0.242 | 469 | 540 | 26 | 182,172,168 | Pass | |
| E609543 | 14544143 | 8.00 | x | 1,500 | x | coil | 23.560 | 0.076 | 1.01 | 0.008 | 0.018 | 0.018 | 0.045 | 0.021 | 0.011 | 0.029 | 0.001 | 0.002 | 0.017 | 0.009 | 0.0047 | 0.0630 | 0.250 | 437 | 511 | 29 | 288,329,340 | Pass | |
| E609545 | 14544435 | 8.00 | x | 1,500 | x | coil | 23.910 | 0.077 | 1.05 | 0.007 | 0.014 | 0.012 | 0.041 | 0.016 | 0.013 | 0.030 | 0.001 | 0.001 | 0.016 | 0.006 | 0.0042 | 0.0470 | 0.256 | 433 | 496 | 34 | 360,358,362 | Pass | |
| F609538 | 14543754 | 8.00 | x | 1,500 | x | coil | 27.330 | 0.070 | 1.08 | 0.009 | 0.017 | 0.012 | 0.055 | 0.011 | 0.012 | 0.023 | 0.001 | 0.003 | 0.016 | 0.006 | 0.0036 | 0.0545 | 0.254 | 454 | 526 | 27 | 384,389,387 | Pass | |
| D609518 | 14542902 | 10.00 | x | 1,500 | x | coil | 27.240 | 0.079 | 1.01 | 0.009 | 0.014 | 0.015 | 0.047 | 0.012 | 0.013 | 0.025 | 0.001 | 0.001 | 0.014 | 0.006 | 0.0049 | 0.0500 | 0.251 | 424 | 508 | 29 | 288,280,284 | Pass | |
| D609542 | 14542903 | 10.00 | x | 1,500 | x | coil | 27.400 | 0.077 | 1.06 | 0.009 | 0.011 | 0.024 | 0.041 | 0.015 | 0.013 | 0.029 | 0.001 | 0.001 | 0.014 | 0.008 | 0.0040 | 0.0515 | 0.258 | 449 | 518 | 28 | 301,304,290 | Pass | |
| D609542 | 14542904 | 10.00 | x | 1,500 | x | coil | 27.570 | 0.077 | 1.06 | 0.009 | 0.011 | 0.024 | 0.041 | 0.015 | 0.013 | 0.029 | 0.001 | 0.001 | 0.014 | 0.008 | 0.0040 | 0.0515 | 0.258 | 449 | 518 | 28 | 301,304,290 | Pass | |
| E609521 | 14542905 | 10.00 | x | 1,500 | x | coil | 27.560 | 0.085 | 1.00 | 0.010 | 0.014 | 0.013 | 0.050 | 0.014 | 0.012 | 0.027 | 0.001 | 0.001 | 0.018 | 0.006 | 0.0064 | 0.0480 | 0.256 | 394 | 484 | 28 | 196,202,238 | Pass | |
| E609521 | 14542908 | 10.00 | x | 1,500 | x | coil | 27.270 | 0.085 | 1.00 | 0.010 | 0.014 | 0.013 | 0.050 | 0.014 | 0.012 | 0.027 | 0.001 | 0.001 | 0.018 | 0.006 | 0.0064 | 0.0480 | 0.256 | 394 | 484 | 28 | 196,202,238 | Pass | |
| E609524 | 14544022 | 10.00 | x | 1,500 | x | coil | 27.220 | 0.074 | 1.06 | 0.009 | 0.012 | 0.012 | 0.039 | 0.012 | 0.015 | 0.022 | 0.001 | 0.001 | 0.014 | 0.006 | 0.0045 | 0.0420 | 0.254 | 428 | 515 | 29 | 301,308,290 | Pass | |
| E609543 | 14542907 | 10.00 | x | 1,500 | x | coil | 27.355 | 0.076 | 1.01 | 0.008 | 0.018 | 0.018 | 0.045 | 0.021 | 0.011 | 0.029 | 0.001 | 0.002 | 0.017 | 0.009 | 0.0047 | 0.0630 | 0.250 | 437 | 519 | 27 | 288,329,340 | Pass | |
| E609545 | 14544020 | 10.00 | x | 1,500 | x | coil | 27.560 | 0.077 | 1.05 | 0.007 | 0.014 | 0.012 | 0.041 | 0.016 | 0.013 | 0.030 | 0.001 | 0.001 | 0.016 | 0.006 | 0.0042 | 0.0470 | 0.256 | 399 | 485 | 31 | 360,358,362 | Pass | |
| E609545 | 14544021 | 10.00 | x | 1,500 | x | coil | 24.290 | 0.077 | 1.05 | 0.007 | 0.014 | 0.012 | 0.041 | 0.016 | 0.013 | 0.030 | 0.001 | 0.001 | 0.016 | 0.006 | 0.0042 | 0.0470 | 0.256 | 399 | 485 | 31 | 360,358,362 | Pass | |
| F609550 | 14544018 | 10.00 | x | 1,500 | x | coil | 27.440 | 0.071 | 1.10 | 0.008 | 0.016 | 0.012 | 0.048 | 0.027 | 0.014 | 0.027 | 0.001 | 0.001 | 0.018 | 0.050 | 0.0042 | 0.0520 | 0.263 | 417 | 503 | 29 | 361,341,370 | Pass | |
| F609550 | 14544019 | 10.00 | x | 1,500 | x | coil | 27.510 | 0.071 | 1.10 | 0.008 | 0.016 | 0.012 | 0.048 | 0.027 | 0.014 | 0.027 | 0.001 | 0.001 | 0.018 | 0.050 | 0.0042 | 0.0520 | 0.263 | 417 | 503 | 29 | 361,341,370 | Pass | |
| D609542 | 14542890 | 12.00 | x | 1,500 | x | coil | 27.260 | 0.077 | 1.06 | 0.009 | 0.011 | 0.024 | 0.041 | 0.015 | 0.013 | 0.029 | 0.001 | 0.001 | 0.014 | 0.008 | 0.0040 | 0.0515 | 0.258 | 439 | 531 | 25 | 301,304,290 | Pass | |
| F609516 | 14542706 | 12.00 | x | 1,500 | x | coil | 27.570 | 0.070 | 1.02 | 0.008 | 0.011 | 0.009 | 0.044 | 0.012 | 0.013 | 0.025 | 0.001 | 0.003 | 0.019 | 0.006 | 0.0040 | 0.0365 | 0.244 | 420 | 511 | 27 | 230,210,227 | Pass | |

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Product: Hot Rolled Steel Coils

| Specifications requirements:- | C % | Mn % | S % | P % | Si % | Al % | Cr % | Ni % | Nb % | Mo % | V % | Ti % | Cu % | N % | Si+2.5P % | C.E. % | YS MPa | UTS MPa | EL % | Impact @ 20°C | Bend test 0.5T, 180° |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (Reference: As per TDC no.: IM/JSW/2010-11/HRS/133 Dt. : 31-10-2010 and S355 MC) Min:→ | - | - | - | - | - | 0.015 | - | - | - | - | - | - | - | - | - | - | 355 | 430 | 23 | 40J | - |
| Max:→ | 0.12 | 1.50 | 0.020 | 0.025 | 0.030 | - | - | - | 0.090 | - | 0.20 | 0.15 | - | - | 0.090 | 0.400 | - | 550 | - | - | - |

| Cast\ Heat No. | Coil No. | Nominal Size (mm) T | X | W | X | L | Weight(Net) Metric Tonnes | C % | Mn % | S % | P % | Si % | Al % | Cr % | Ni % | Nb % | Mo % | V % | Ti % | Cu % | N % | Si+2.5P % | C.E. % | YS Mpa | UTS Mpa | EL % | Impact Joules | Bend test 0.5T, 180° | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F609532 | 14543759 | 12.00 | x | 1,500 | x | coil | 27.260 | 0.088 | 1.05 | 0.007 | 0.013 | 0.019 | 0.049 | 0.014 | 0.011 | 0.026 | 0.001 | 0.003 | 0.017 | 0.006 | 0.0050 | 0.0515 | 0.267 | 433 | 521 | 31 | 227,230,233 | Pass | |
| F609538 | 14543757 | 12.00 | x | 1,500 | x | coil | 27.230 | 0.070 | 1.08 | 0.009 | 0.017 | 0.012 | 0.055 | 0.011 | 0.012 | 0.023 | 0.001 | 0.003 | 0.016 | 0.006 | 0.0036 | 0.0545 | 0.254 | 447 | 540 | 27 | 384,389,387 | Pass | |
| E609524 | 14542891 | 15.00 | x | 1,500 | x | coil | 27.305 | 0.074 | 1.06 | 0.009 | 0.012 | 0.012 | 0.039 | 0.012 | 0.015 | 0.022 | 0.001 | 0.001 | 0.014 | 0.006 | 0.0045 | 0.0420 | 0.254 | 370 | 466 | 30 | 319,328,341 | Pass | |
| E609524 | 14542892 | 15.00 | x | 1,500 | x | coil | 27.640 | 0.074 | 1.06 | 0.009 | 0.012 | 0.012 | 0.039 | 0.012 | 0.015 | 0.022 | 0.001 | 0.001 | 0.014 | 0.006 | 0.0045 | 0.0420 | 0.254 | 370 | 466 | 30 | 319,328,341 | Pass | |
| D609518 | 14542893 | 15.00 | x | 1,500 | x | coil | 27.240 | 0.079 | 1.01 | 0.009 | 0.014 | 0.015 | 0.047 | 0.012 | 0.013 | 0.025 | 0.001 | 0.001 | 0.014 | 0.006 | 0.0049 | 0.0500 | 0.251 | 365 | 458 | 31 | 245,236,208 | Pass | |
| D609518 | 14542894 | 15.00 | x | 1,500 | x | coil | 27.560 | 0.079 | 1.01 | 0.009 | 0.014 | 0.015 | 0.047 | 0.012 | 0.013 | 0.025 | 0.001 | 0.001 | 0.014 | 0.006 | 0.0049 | 0.0500 | 0.251 | 365 | 458 | 31 | 245,236,208 | Pass | |
| E609528 | 14542895 | 15.00 | x | 1,500 | x | coil | 25.305 | 0.071 | 1.00 | 0.010 | 0.011 | 0.015 | 0.055 | 0.016 | 0.014 | 0.030 | 0.001 | 0.001 | 0.017 | 0.006 | 0.0042 | 0.0425 | 0.242 | 381 | 460 | 30 | 182,172,158 | Pass | |
| E609528 | 14542906 | 15.00 | x | 1,500 | x | coil | 25.500 | 0.071 | 1.00 | 0.010 | 0.011 | 0.015 | 0.055 | 0.016 | 0.014 | 0.030 | 0.001 | 0.001 | 0.017 | 0.006 | 0.0042 | 0.0425 | 0.242 | 381 | 460 | 30 | 182,172,158 | Pass | |
| E609528 | 14543074 | 15.00 | x | 1,500 | x | coil | 25.390 | 0.071 | 1.00 | 0.010 | 0.011 | 0.015 | 0.055 | 0.016 | 0.014 | 0.030 | 0.001 | 0.001 | 0.017 | 0.006 | 0.0042 | 0.0425 | 0.242 | 381 | 460 | 30 | 182,172,158 | Pass | |
| D609515 | 14544202 | 15.00 | x | 1,500 | x | coil | 26.125 | 0.078 | 1.00 | 0.010 | 0.013 | 0.014 | 0.047 | 0.015 | 0.013 | 0.025 | 0.001 | 0.001 | 0.014 | 0.005 | 0.0047 | 0.0465 | 0.249 | 396 | 496 | 26 | 227,230,233 | Pass | |
| D609546 | 14544203 | 15.00 | x | 1,500 | x | coil | 27.160 | 0.074 | 1.04 | 0.010 | 0.012 | 0.012 | 0.046 | 0.014 | 0.013 | 0.022 | 0.001 | 0.001 | 0.018 | 0.006 | 0.0036 | 0.0420 | 0.251 | 370 | 468 | 35 | 238,224,232 | Pass | |
| E609528 | 14544436 | 15.00 | x | 1,500 | x | coil | 25.610 | 0.071 | 1.00 | 0.010 | 0.011 | 0.015 | 0.055 | 0.016 | 0.014 | 0.030 | 0.001 | 0.001 | 0.017 | 0.006 | 0.0042 | 0.0425 | 0.242 | 381 | 460 | 30 | 240,244,248 | Pass | |
| D609546 | 14543801 | 20.00 | x | 1,500 | x | coil | 27.500 | 0.074 | 1.04 | 0.010 | 0.012 | 0.012 | 0.046 | 0.014 | 0.013 | 0.022 | 0.001 | 0.001 | 0.018 | 0.006 | 0.0036 | 0.0420 | 0.251 | 380 | 487 | 24 | 238,224,232 | Pass | |
| E609545 | 14543808 | 20.00 | x | 1,500 | x | coil | 24.390 | 0.077 | 1.05 | 0.007 | 0.014 | 0.012 | 0.041 | 0.016 | 0.013 | 0.030 | 0.001 | 0.001 | 0.016 | 0.006 | 0.0042 | 0.0470 | 0.256 | 393 | 492 | 29 | 252,258,265 | Pass | |
| E609545 | 14543809 | 20.00 | x | 1,500 | x | coil | 24.045 | 0.077 | 1.05 | 0.007 | 0.014 | 0.012 | 0.041 | 0.016 | 0.013 | 0.030 | 0.001 | 0.001 | 0.016 | 0.006 | 0.0042 | 0.0470 | 0.256 | 393 | 492 | 29 | 252,258,265 | Pass | |
| F609541 | 14543800 | 20.00 | x | 1,500 | x | coil | 27.520 | 0.090 | 1.01 | 0.009 | 0.015 | 0.010 | 0.044 | 0.017 | 0.011 | 0.030 | 0.001 | 0.003 | 0.019 | 0.006 | 0.0053 | 0.0475 | 0.263 | 398 | 496 | 28 | 192,208,212 | Pass | |
| F609544 | 14543799 | 20.00 | x | 1,500 | x | coil | 27.400 | 0.073 | 1.10 | 0.009 | 0.012 | 0.025 | 0.051 | 0.012 | 0.011 | 0.028 | 0.001 | 0.003 | 0.019 | 0.006 | 0.0040 | 0.0550 | 0.260 | 395 | 512 | 29 | 168,125,153 | Pass | |

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Regd.Office : JSW Centre,Bandra Kurla Complex, Bandra(East),Mumbai 400051

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (Reference: As per TDC no.: IM/JSW/2010-11/HRS/133 Dt. : 31-10-2010 and S355 MC) Min:→ | - | - | - | - | - | 0.015 | - | - | - | - | - | - | - | - | - | - | 355 | 430 | 23 | 40J | - |
| Max:→ | 0.12 | 1.50 | 0.020 | 0.025 | 0.030 | - | - | - | 0.090 | - | 0.20 | 0.15 | - | - | 0.090 | 0.400 | - | 550 | - | - | - |

| Cast\ Heat No. | Coil No. | Nominal Size (mm) T | X | W | X | L | Weight(Net) Metric Tonnes | C % | Mn % | S % | P % | Si % | Al % | Cr % | Ni % | Nb % | Mo % | V % | Ti % | Cu % | N % | Si+2.5P % | C.E. % | YS Mpa | UTS Mpa | EL % | Impact Joules | Bend test 0.5T, 180° | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F609547 | 14543810 | 20.00 | x | 1,500 | x | coil | 27.170 | 0.072 | 1.07 | 0.008 | 0.018 | 0.015 | 0.050 | 0.015 | 0.013 | 0.026 | 0.001 | 0.001 | 0.018 | 0.007 | 0.0038 | 0.0600 | 0.254 | 406 | 519 | 26 | 148,152,148 | Pass | |
| F609550 | 14543811 | 20.00 | x | 1,500 | x | coil | 27.540 | 0.071 | 1.10 | 0.008 | 0.016 | 0.012 | 0.048 | 0.027 | 0.014 | 0.027 | 0.001 | 0.001 | 0.018 | 0.050 | 0.0042 | 0.0520 | 0.263 | 400 | 509 | 27 | 252,260,270 | Pass | |
| F609553 | 14543802 | 20.00 | x | 1,500 | x | coil | 27.150 | 0.082 | 1.03 | 0.008 | 0.015 | 0.022 | 0.055 | 0.018 | 0.013 | 0.026 | 0.002 | 0.001 | 0.018 | 0.013 | 0.0034 | 0.0595 | 0.259 | 443 | 528 | 26 | 212,218,220 | Pass | |
| F609553 | 14543803 | 20.00 | x | 1,500 | x | coil | 27.700 | 0.082 | 1.03 | 0.008 | 0.015 | 0.022 | 0.055 | 0.018 | 0.013 | 0.026 | 0.002 | 0.001 | 0.018 | 0.013 | 0.0034 | 0.0595 | 0.259 | 443 | 528 | 26 | 212,218,220 | Pass | |
| F609553 | 14544438 | 20.00 | x | 1,500 | x | coil | 27.590 | 0.082 | 1.03 | 0.008 | 0.015 | 0.022 | 0.055 | 0.018 | 0.013 | 0.026 | 0.002 | 0.001 | 0.018 | 0.013 | 0.0034 | 0.0595 | 0.259 | 443 | 528 | 26 | 212,218,220 | Pass | |
| F609556 | 14543812 | 20.00 | x | 1,500 | x | coil | 27.245 | 0.071 | 1.04 | 0.008 | 0.014 | 0.014 | 0.040 | 0.014 | 0.011 | 0.025 | 0.001 | 0.001 | 0.019 | 0.006 | 0.0039 | 0.0490 | 0.248 | 384 | 498 | 28 | 228,234,230 | Pass | |

| | | |
|---|---|---|
| Total Weight in Metric Tonnes | 1124.660 | MT |
| Grand Total of coils | 42 | |
| Grand Total of Weight | 1124.660 | MT |

We hereby certify that the material (Hot Rolled Steel Coils) described herein have been tested and inspected with satisfactory results in accordance with the requirements of the above specification.

Grade code:JVTRS3
Product : Hot rolled Steel coils, Fully killed, mill edge, unpickeled. Unoilied and nonskinpassed
Process Route: BOF-LHF-CCM-HSM
Legend: BOF = Basic Oxygen Furnace, LHF = Laddle Heating Furnace
CCM = Continuous Casting Machine, HSM = Hot Strip Mill
T x W x L= Thickness X Width X Length

1Mpa=1N/mm2
YS= Yield Strength.
UTS = Ultimate Tensile Strength.

EL=%ge Elongation on standard gauge length $5.65\sqrt{A0}$ for > 3.0mm and 80 mm GL for < 3.0 mm nominal thickness.
CE=[C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15]

chemistry = Laddle sample analysis.
Tensile Test Piece: Longiludinal
Test Temperature: Ambient (25°C ±2°)

Impact values are calculated to full size specimen

Certified By

Authorised signetory
(HSM Technology & Excellence)
For JSW Steel Ltd.,