# INSPECTION CERTIFICATE

EN10204-3.1 ■ / EN10204-3.2 □

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| CERTIFICATE NO. | : | IJQ20160331114 |
| DATE OF ISSUE | : | 31.MAR.2016 |
| CUSTOMER | : | AMERICAN PIPING PRODUCTS |
| CONTRACT(P/O) NO. | : | 15069 |
| COMMODITY | : | SEAMLESS CARBON STEEL HOT FINISHED PIPE |
| STANDARD | : | ASTM A53 2012 Edition/A106 2011 Edition/ A333 2011 Edition // ASME SA53/SA106/SA333 2015 Edition |

ILJIN Steel Corporation

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| O. | W/O (HEAT NO.) | ORDER SIZE ID | ORDER SIZE OD | ORDER SIZE WT | ORDER SIZE LENGTH | QUANTITY PCS | MASS lbs / ft | MASS TOTAL ( lbs/ft ) | TOTAL LENGTH | Manufacturing Process *1 | Pipe End (Type) *2 | HEAT TREATMENT *3 | Grade | REMARK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ST16030110 (D03079) | 6.065 " ( 154.1 mm ) | 6.625" ( 168.28 mm ) | 0.280 " ( 7.11 mm ) | 40 ' ( 12192 mm ) | 11 | 18.99 ( 28.26 kg ) | 8,355.60 ( 3793.00 kg ) | 440.00 ' ( 134.11 M ) | NF | BEP | N/A | ASTM A53 B<br>ASTM A106 B & C<br>ASTM A333 Gr.6<br>ASME SA53 B<br>ASME SA106 B & C<br>ASME SA333 Gr.6 | 1. THE HARDNESS DESCRIBED HEREIN COMPLIANCE WITH NACE MR-0175/ISO 15156 (22HRC MAX) |
| | | TOTAL | | | | 11 | 18.99 | 8355.60 | 440.00 | | | | | 2. *R - CHEMICAL COMPOSITION REQUIREMENT FOLLOWS NEXT<br>- ASTM A53 : TABLE 2 (REMARK C)<br>- ASTM A106B/C : TABLE 1 (REMARK B)<br>- ASTM A333 Gr.6 : TABLE 1 (REMARK A)<br>3. NO WELD REPAIR WAS PERFORMED<br>4. NO MERCURY, MERCURY COMPOUNDS OR MERCURY BEARING INSTRUMENTS AND/OR EQUIPMENT HAVE BEEN USED IN ANY MANNER WHICH MIGHT CAUSE CONTAMINATION IN MANUFACTURE, ASSEMBLY, OR TEST OF MATERIAL.<br>5. IMPACT TEST SAMPLE THICKNESS : 5 mm<br>6. NORMALIZING FORMING TEMP. : ASTM A333 4.3.1.3 ( 845 - 945 ℃ )<br>7. STEEL MELTED AND MANUFACTURED IN KOREA |

| O. | W/O (HEAT NO.) | STATUS | C | Si | Mn | P | S | Cr | Ni | Mo | Cu | Al | Ti | V | Nb | B | U4 | VN | V1 | V2 | CEQ | NDT | | HYDRO-STATIC TEST Sec. | PRESSURE | TENSILE TEST (GAGE LENGTH : 50.8±0.13mm) Width | YS 0.5% EUL | T.S | E.L | IMPACT TEST (ASTM E23) Energy (1) Temp: -45 ℃ (2) Unit: Jule | | HARDNESS (ASTM E18) ☐ HRB ☐ HRC ☐ HB ☐ HV | BENDING TEST | FLATTENING TEST H=(1.1e)t/(e+t/O.D.) | FLARING TEST | DWT Skg X 2m Temp: ℃ | HYDRO BURST MPa Temp: ℃ | VISUAL | DIMENSION | DRIFT TEST | STRAIGHTNESS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *4 | X100 | | *R | X1000 | | X100 | | | | X1000 | | | | | *5 | *6 | *7 | *8 | *9 | *10 | | | psi | *P | *L | MPa | MPa | % | *T | *L | | | | | | | | | | |
| Spec. | | MAX | 27 | | 120 | 25 | 25 | 30 | 40 | 12 | 40 | | | 80 | 20 | | 1.0 | | | | 0.50 | EC | UT | 5 | 2800 | 19.05 | | | | | | | | | | | | | | | |
| | | MIN | | 10 | 29 | | | | | | | | | | | | | | | | | | | | | | 275 | 485 | 28.3 | | 9 | | | 67.79 | | | | | | | |
| 1 | ST16030110 (D03079) | LA | 18 | 24 | 97 | 6 | 4 | 7 | 4 | 3 | 8 | 20 | 25 | 4 | 2 | 0.3 | 0.2 | | | | 0.37 | | | | | | | | | | | | | | | | | | | | | |
| | | BA | 19 | 28 | 99 | 6 | 3 | 7 | 4 | 3 | 8 | 23 | 26 | 3 | 4 | 0.2 | 0.2 | | | | 0.38 | | | | | | | | | | | | | | | | | | | | | |
| | | PA | 19 | 28 | 100 | 6 | 3 | 7 | 4 | 3 | 8 | 24 | 26 | 3 | 5 | 0.2 | 0.2 | | | | 0.38 | | *G | *G | | | 366<br>383 | 519<br>524 | 29.8<br>31.5 | | 74<br>46<br>80 | | | *G | | | | *G | *G | | *G |

NOTE

*1 - NF : Normalizing Forming / HF : Hot Finished / CF : Cold Finished
*2 - BEP : Bevelled End / PEP : Plain End
*3 - A : As Rolled / SRA : Stress Relieved Annealing
Q+T : Quenched & Tempered / N+T : Normalized & Tempered
N : Normalized / Iso : Isothermal Annealing

*4 - LA : Ladle Analysis / BA : Billet Analysis / PA : Product Analysis
*5 - Cu+Ni+Cr+Mo+V
*6 - Nb+V
*7 - Nb+V+Ti
*8 - Cr+Ni
*9 - C+Mn/6+(Cr+Mo+V)/5+(Cu+Ni)/15

*10 - UT : Ultrasonic Test / EC : Eddy Current Test / MT : Magnetic Particle Test/ EM : Electro Magnetic Inspection
*P - Tubular or Plate Type of ASTM E8 Fig.12
*F - Full Section Type of ASTM E8 Fig.11
*G - Good / *L - Longitudinal / *T - Transverse

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◆ WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH ABOVE SPECIFICATION AND THE RESULTS OF ALL TEST ARE ACCEPTABLE
◆ THE QUALITY SYSTEM OF OUR WORKS HAS BEEN ASSESSED AND REGISTERED AS MEETING THE REQUIREMENS OF ISO 9001. ANY WELDING HAS NOT BEEN PERFORMED ON THE MATERIAL
◆ THIS CERTIFICATION IS INTENDED ONLY FOR PRODUCTS LISTED. MODIFICATION TO OR UNAUTHORIZED USE OF THIS CERTIFICATION IS STRICTLY PROHIBITED. OFFENSES MAY BE REGARDED AS FORGERY OF DOCUMENTS AND BE SUBJECT TO CRIMINAL PROSECUTION.

YOUNG KYU SEO
Manager of Q.M Dept