

High Reliability Technology of the Weld Zone of High-Frequency Electric Resistance Welding Linepipe

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High-frequency electric resistance welding (HFW) steel pipe is used in high-grade pipelines and energy field. To address the significant need for weld seam reliability, we have developed welding technology, high sensitivity ultrasonic inspection technology, and quality assessment technology for HFW pipe. HFW phenomena were visualised dynamically using a high-speed video camera. Furthermore, an HFW numerical analysis model was constructed to develop optimization technology of HFW conditions and the homogeneous heating technology of the weld zone. The Charpy fracture transition temperature of the weld metal of the developed steel pipe was -90°C showing the high absorbed energy value at cryogenic temperature. Furthermore, real-time continuous detection technology of the oxide of the weld zone was developed by a point converging tandem beam ultrasonic inspection method. This technology achieved high sensitivity 10 times or more than that of the conventional method. It was possible to detect the oxide which decreases the toughness of weld metal. It was successfully achieved to guarantee the stabilized quality covering full length in the weld zone. By the evaluation test using a full-body pipe, it became clear that the developed steel pipe does not cause the brittle fracture at the low temperature environment of -45°C .

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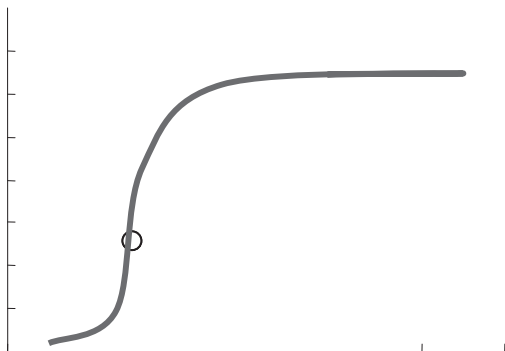
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K p " q t f g t " v q " c u u w t g " y g n f " u g c o " s w c n k v { " d { " f g v g e v k q p " q h " q z k f g " k p e n w u k q p u . " v j g " u v c v g " q h " q z k f g u " y j g p " v j g { " c h h g e v "



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Cu" cp" gswkr o gpv" eqphki wtcvkqp" hqt" eqpvkpwqu" uecp/ pkpi" qh" JHY" uvggn" rkrqu" kp" vjg" rtqfwevkqp" rtqeguu. " c" rtgekug" ugc o " vtce m k p i " v g e j p q n q i { " y c u " f g x g n q r g f " v q " g p c d n g " v j g " r t q d g u " v q " v t c e m " v j g " y g n f " u g c o " r q u k v k p . " y j k e j " x c t k g u " k p " v j g " e k t e w o h g t g p v k c n " f k t g e v k q p " f w t k p i " r k r g " r t q / f w e v k q p 0 " V j g " y g n f " u g c o " r q u k v k p " k u " o g c u w t g f " d c u g f " q p " v j g " v g o r g t c v w t g " f k u v t k d w k q p " d { " v j g " u g c o " v t c e m k p i " u { u v g o " w u k p i " v j g t o c n " k o c i g u . " c p f " v j g " u g c o " v t c e m k p i " u { u v g o " c n k i p u " v j g " r q u k v k p " q h " v j g " c t t c { " r t q d g u " v q " v t c e m " v j g " u g c o . " v j g t g d { " c e j k g x k p i " u v c d n g " q p n k p g " f g v g e v k q p 0 " " u j q y u " c p " g z c o r n g " q h " f g v g e v k q p " y j g p " v j g " o g e j c p k e c n " r t q r g t v k g u " q h " v j g " y g n f " | q p g " y g t g " f g i t c f g f " k p v g p v k q p c m n { " d { " f g e t g c u k p i " v j g " y g n f k p i " j g c v " k p r w v " v q " n q y g t " v j c p " v j g " q r v k o w o " x c n w g 0 " V j g " t g u w n v u " f g o q p u v t c v g " v j c v " v j g " g z k u / v g p e g " q h " f k u v t k d w v g f " o k e t q u e q r k e " q z k f g u " e c p " d g " f g v g e v f " y k v j " j k i j " t g n k c d k n k v { 0

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" 3+ " Vgkmqw" { qwugvwdwpkqmgw" mgmmcpp" vq" vqmwv { qw 0 " L 0 " Y 0 " U 0 . " Tgugcte j "
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