

QDX-HARMOTEX

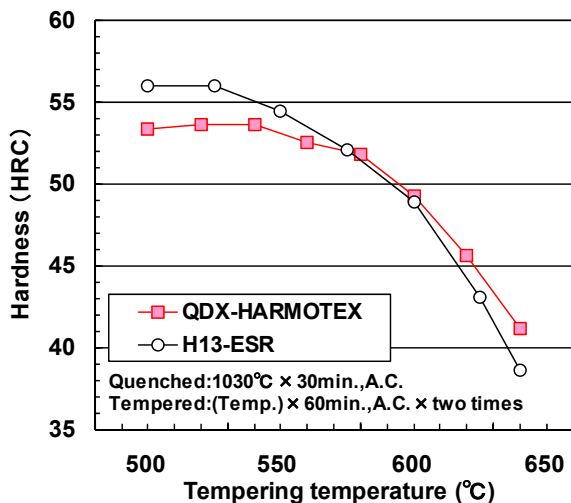
Hot Work Tool Steel with Highly-balanced Strength and Toughness
 -Grade C special quality steel approved by NADCA-

QDX-HARMOTEX is a modified H13 type hot work tool steel. QDX-HARMOTEX has achieved excellent toughness, good softening resistance and high temperature strength through optimal alloy design and manufacture process. With these features, when used as die-casting die, initiation of small heat-check as well as propagation of large crack can be reduced, which contributes to prolonged die life and improved productivity.

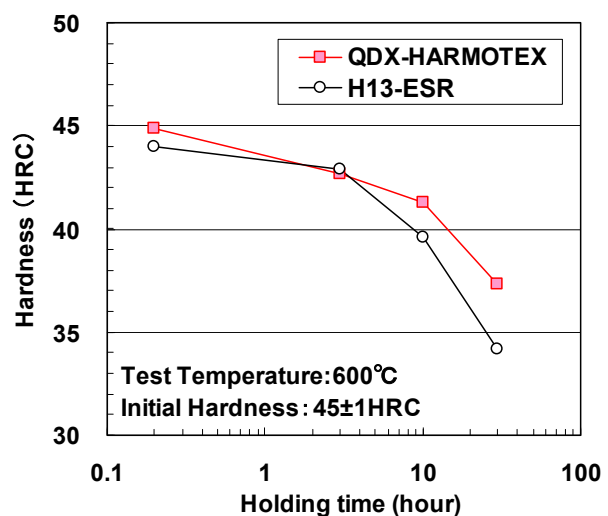
Characteristics

- Good hardenability of QDX-HARMOTEX enables it to have uniform hardness when it is applied to large-sized dies.
- Quenching condition for QDX-HARMOTEX is the same as that for H13. Tempered hardness of QDX-HARMOTEX is slightly higher than that of H13 when tempered at 600°C and over.
- QDX-HARMOTEX has better softening resistance than H13. Reduction of wear and heat-check is expected when QDX-HARMOTEX is applied to hot work dies instead of H13.
- Toughness of QDX-HARMOTEX is better than that of H13. It prevents dies from early chipping as well as propagation of heat-check.

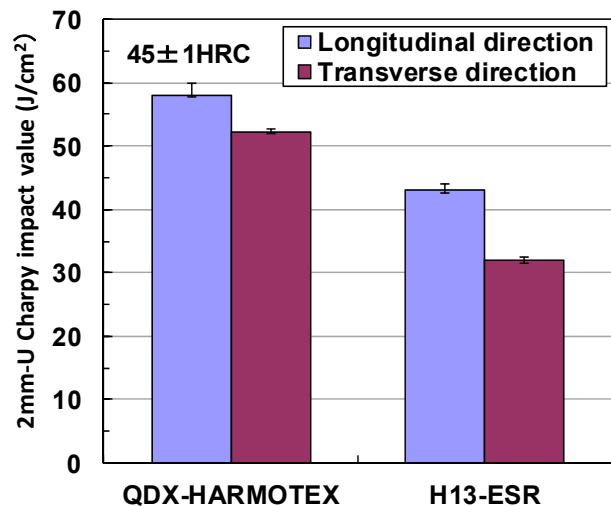
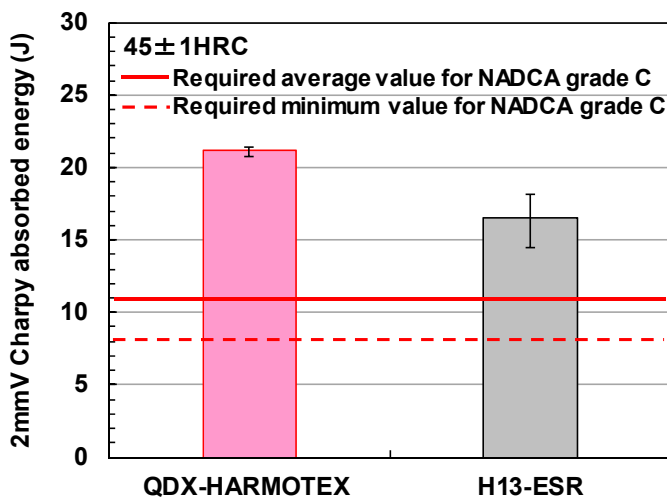
Tempered hardness



Softening resistance

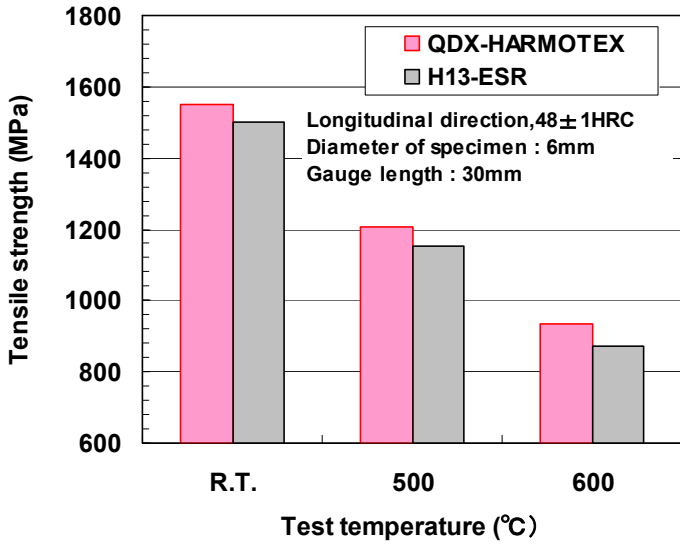


Toughness

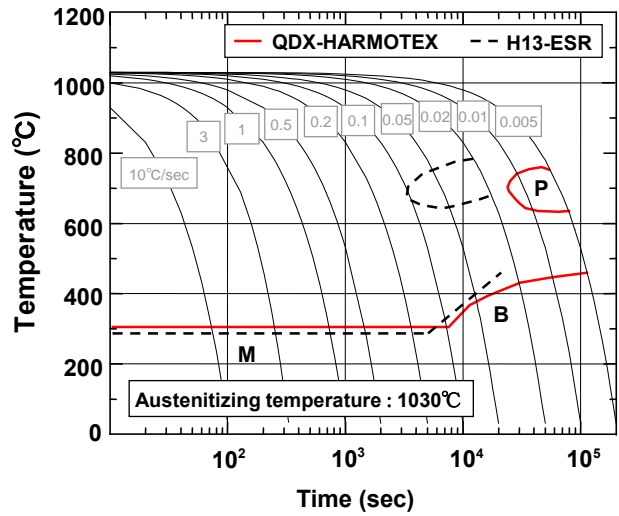


* Charpy impact test performed in accordance with the NADCA standard

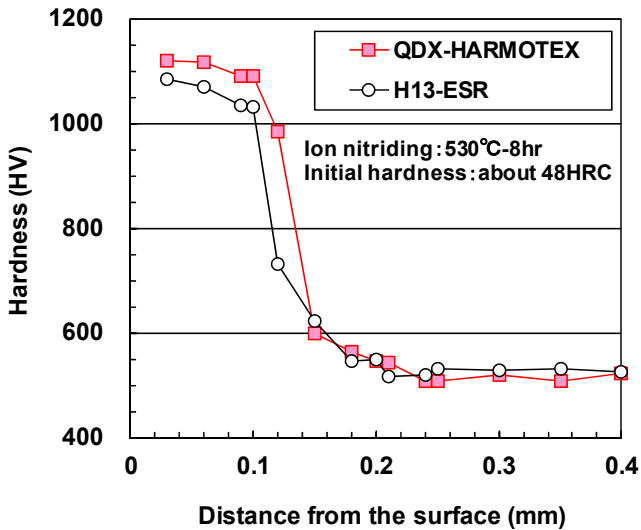
• Tensile strength



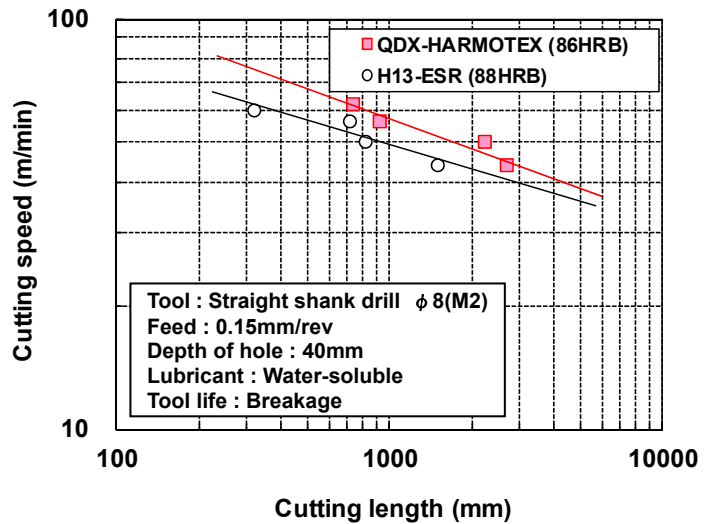
• CCT curves



• Nitriding property

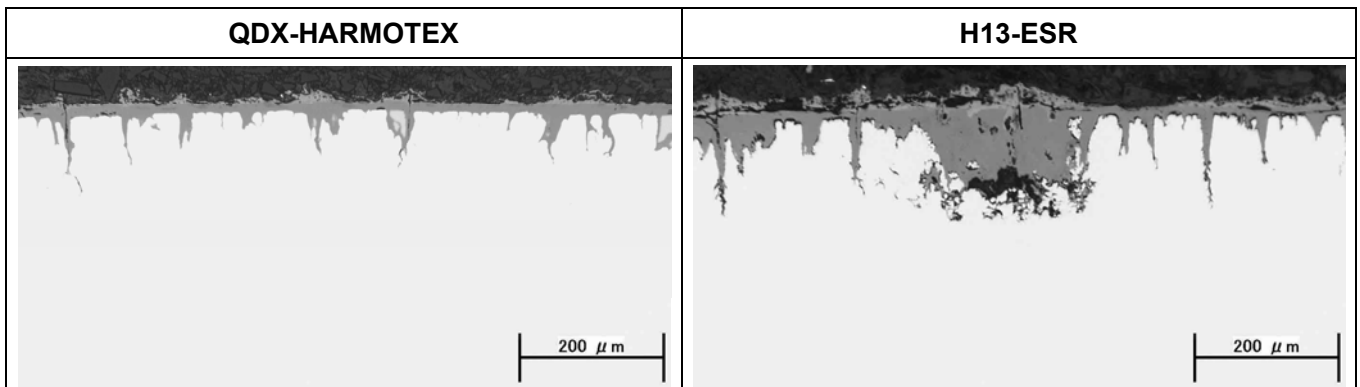


• Machinability



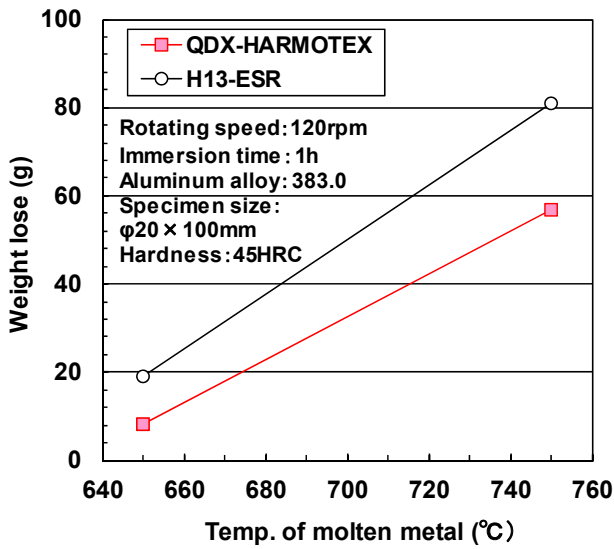
• Heat check resistance

•Rapid heating to 600°C ⇔ Water cooling to R.T. •Number of heating/cooling cycle : 1000 •Initial hardness : 45HRC

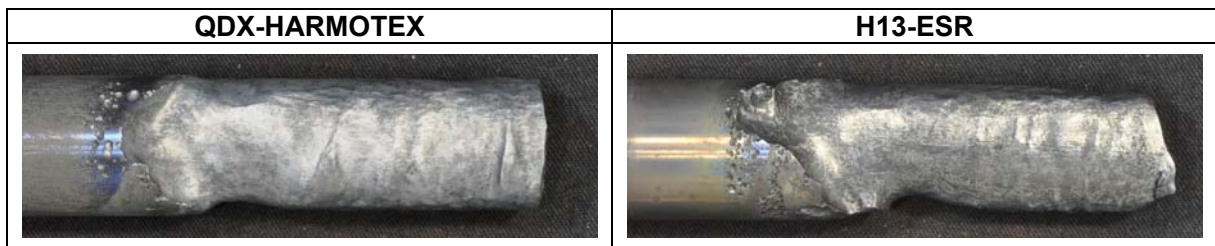
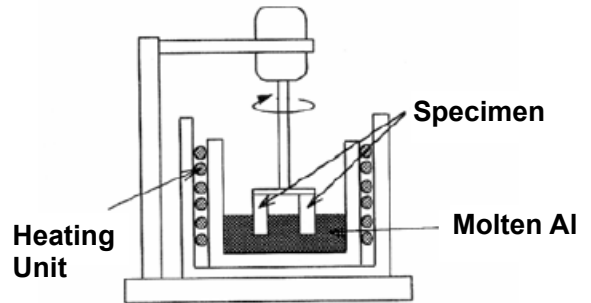


Heat check morphology in cross-sectioned test piece after 1000 cycles

• Erosion resistance in molten Al alloy



〈Schematic illustration of erosion resistance test equipment〉



specimen after erosion resistance test at 750°C for 1 hour in molten aluminum alloy (ASTM B85 383.0)

• Physical properties

Steel grade	Thermal expansion coefficient ($\times 10^{-6}$)			Thermal conductivity (W/m·K)				Young's modulus (GPa)
	R.T.~200°C	R.T.~400°C	R.T.~600°C	R.T.	200°C	400°C	600°C	
QDX-HARMOTEX	12.1	13.4	14.2	31.0	33.0	31.8	31.4	213
H13-ESR	11.4	12.4	13.1	25.6	28.5	28.8	29.6	207

Applications

- Die-casting dies, Hot work forging dies, Hot extrusion dies, Mill rolls etc.

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* 「HARMOTEX」 is a registered trademark of Sanyo Special Steel Co.,Ltd.

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