

### 1.0 DESCRIPTION

Hydrogen Control - Steel

### 2.0 APPLICATION

1E1801 will be applied to steel specifications for which chemical composition, or experience indicates a susceptibility to hydrogen induced cracking in blooms, billets, bars or forged product. Documented practices at each mill (e.g., vacuum degassing, slow cooling, baking, etc.) will be used to insure against hydrogen induced cracking. This specification forces ongoing dialog between Caterpillar and the steel supplier to address hydrogen induced crack prevention practices.

### 3.0 REQUIREMENTS

**3.1** All products requiring 1E1801 control shall be vacuum degassed, unless waived and documented by the Metallurgical Department of the dispositioning Caterpillar facility. Hydrogen content, measured by an immersion probe such as HYDRIS or an equivalent method, shall be 2.0 ppm or less immediately after vacuum degassing with a maximum of 2.5 ppm in the tundish or the ingot mold.

**3.2** The maximum hydrogen value observed for a heat shall be reported in the test certificate or the heat data card submitted manually or through Electronic Data Interchange (EDI) to the Caterpillar dispositioning facility.

**3.3** Use of alternate methods of hydrogen control such as slow cooling, baking, etc., in lieu of vacuum degassing must show documentary evidence of effective hydrogen removal, adequate process controls, and be pre-approved by Caterpillar.

**3.4** Adequate protection of hygroscopic materials used in the steel making process (alloys, lime, spar, fluxes, etc.) from moisture pick-up must be documented.

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NO

03

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1E1801

### 4.0 SUBSIDIARY SPECIFICATIONS (FOR CATERPILLAR REFERENCE ONLY)

At the time of release of 1E1801, Change 03, the following subsidiary versions of 1E1801 were in use by Caterpillar facilities outside of the United States.

Caterpillar Belgium S.A. (Gosselies)	"H" Version
Caterpillar France S.A. (Grenoble)	"H" Version
CMRSA (Albaret)	"H" Version
Shin Caterpillar Mitsubishi (Sagami)	"X" Version
Shin Caterpillar Mitsubishi (Akashi)	"X" Version

Subsidiary versions may be changed, released, or canceled without a change to this version of 1E1801. The Engineering Data System (EDS) provides information on the status of subsidiary version specifications and should be referenced for current information.

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