(3) using thermal barriers or insulation at the edge where specimens are to be removed. It shall be demonstrated (and this information shall be included in the Certified Material Test Report) that the cooling rates are equivalent to (a) or (b) above.

**WB-2213** Test Coupon Heat Treatment for Ductile Cast Iron

The tensile and impact coupon shall receive the same heat treatment as the casting.

**WB-2220** PROCEDURE FOR OBTAINING TEST COUPONS AND SPECIMENS FOR QUENCHED AND TEMPERED MATERIAL AND FOR DUCTILE CAST IRON

**WB-2221** General Requirements

The procedure for obtaining test coupons and specimens for quenched and tempered material is related to the product form. Coupon and specimen location and the number of tension test specimens shall be in accordance with the material specifications, except as required by the following paragraphs. References to dimensions signify nominal values.

**WB-2222** Plates

**WB-2222.1** Number of Tension Test Coupons. The number of tension test coupons required shall be in accordance with the material specification and with SA-20, except that from carbon steel plates weighing 42,000 lb (19 000 kg) and over and alloy steel plates weighing 40,000 lb (18 000 kg) and over, two tension test coupons shall be taken, one representing the top end of the plate and one representing the bottom end of the plate.

**WB-2222.2** Orientation and Location of Coupons. Coupons shall be taken so that specimens shall have their longitudinal axes at least \(1/4t\) from any surface and with the midlength of the specimen at least \(t\) from any heat-treated edge, where \(t\) is the nominal thickness of the material.

**WB-2222.3** Requirements for Separate Test Coupons. Where a separate test coupon is used to represent the component material, it shall be of sufficient size to ensure that the cooling rate of the region from which the test coupons are removed represents the cooling rate of the material at least \(1/4t\) deep and \(t\) from any edge of the product. Unless cooling rates applicable to the bulk pieces or product are simulated in accordance with WB-2212.2(b), the dimensions of the coupon shall be not less than \(3t \times 3t \times t\), where \(t\) is the nominal material thickness.

**WB-2223** Forgings

**WB-2223.1** Location of Coupons. Coupons shall be taken so that specimens shall have their longitudinal axes at least \(1/4t\) from any surface and with the midlength of the specimens at least \(t\) from any second surface, where \(t\) is the maximum heat-treated thickness. A thermal buffer as described in WB-2212.2(c) may be used to achieve these conditions, unless cooling rates applicable to the bulk forgings are simulated as otherwise provided in WB-2212.2.

**WB-2223.2** Very Thick or Complex Forgings. Test coupons for forgings that are very thick or complex and other forgings that are contour shaped or machined to essentially the finished product configuration prior to heat treatment may be removed from prolongations or other stock provided on the product. The Certificate Holder shall specify the surfaces of the finished product subjected to high tensile stresses in service. The coupons shall be taken so that specimens shall have their longitudinal axes at a distance below the nearest heat-treated surface, equivalent at least to the greatest distance that the indicated high tensile stress surface will be from the nearest surface during heat treatment, and with the midlength of the specimens a minimum of twice this distance from a second heat-treated surface. In any case, the longitudinal axes of the specimens shall not be nearer than \(1/4\) in. (19 mm) to any heat-treated surface and the midlength of the specimens shall be at least \(1\frac{1}{2}t\) in. (38 mm) from any second heat-treated surface.

**WB-2223.3** Coupons From Separately Produced Test Forgings. Test coupons representing forgings from one heat and one heat treatment lot may be taken from a separately forged piece under the conditions given in (a) through (e) below.

(a) The separate test forging shall be of the same heat of material and shall be subjected to substantially the same reduction and working as the production forging it represents.

(b) The separate test forging shall be heat-treated in the same furnace charge and under the same conditions as the production forging.

(c) The separate test forging shall be of the same nominal thickness as the production forging.

(d) Test coupons for simple forgings shall be taken so that specimens shall have their longitudinal axes at the region midway between midthickness and the surface, and with the midlength of the specimens no nearer any heat-treated edge than a distance equal to the forging thickness, except when the thickness-length ratio of the production forging does not permit, in which case a production forging shall be used as the test forging and the midlength of the specimens shall be at the midlength of the test forging.

(e) Test coupons for complex forgings shall be taken in accordance with WB-2223.2.