

HEAT TREATING SPECIFICATIONS

1. SCOPE

1.1 The following heat treating standard defines processes and related designations for drawings.

1.2 For case hardening, through hardening, and zone induction hardening, show only the measurable end results as shown in the examples given below.

1.3 The metallurgist must be consulted on all heat treating specifications and his initials must be on all prints calling for heat treating before final release.

2. RELATED SPECIFICATIONS

2.1 REFERENCE STANDARDS

2.1.1 SAE J423 - Methods of Measuring Case Depth

2.1.2 Definitions per SAE J423

Total Case Depth is the distance (measured perpendicularly) from the surface of the hardened or unhardened case to a point where the differences in chemical or physical properties of the case and core no longer can be distinguished.

Effective Case Depth is the perpendicular distance from the surface of a hardened case to the furthest point where a specified level of hardness is maintained. The hardness criterion is 50 RC, except where otherwise specified.

2.2 This standard replaces the following company standard:

New Holland

2.50.80

3. DESIGNATION

3.1 CASE HARDENING

3.1.1 Design Factors: Case Hardening - Carburizing

Case hardening is applied to parts to achieve wear resistance and for parts where through hardening would cause the part to be too brittle, whereby it would fail under pressure or impact loading. Depth of hardness is dependent on strength requirements, material thickness, allowable part wear and removal of surface material after case hardening. Case hardness depth need not be deeper than what is required to fulfill the need of part usefulness. Case hardened parts are harder at the surface with decreasing hardness at deeper penetration.

For smaller parts, case depth (total both sides) should not exceed 20% of the total material thickness. For this reason, case hardening of material thinner than 16 gage is not recommended. The recommended case hardness depth should be at least five (5) times the tolerable part wear.

3.1.2 When it's necessary to finish a part to size after case hardening, the part size before case hardening should also be specified.

Example: "Carb. .012/.020 Total Depth After Finish Temper to 87/90 Rock. 15N"

3.1.3 Case hardening of all components EXCEPT GEARS.

Example: "Carb. .012/.020 total depth-temper to 87/90 Rock. 15N".

					NAME	STD HEAT TREAT SPECS				
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									FRAME 1	OF 4
									PART NUMBER	
									86516521	
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RAW MATERIALS / MATERIAL PROCESS

FNHA-2-P-004.00

3.1.4 For gears, the depth is specified as Effective Case Depth as defined in 2.2. Consult Design Analysis and the Metallurgist for appropriate hardness ranges and case depths.

Example: "Carb. .030/.045 Effective Depth-Temper to 58/64 R.C."

NOTE: When core hardness is essential, consult Metallurgist.

3.2. THROUGH HARDENING

3.2.1 Quench and Temper - Through hardening by heating and quenching produces materials that are hard throughout the material section. However, the hardness decreases from the outer surface toward the center, and any point between the center and the outer surface could be of lesser hardness than the outer surface. This is due to the material's hardenability characteristics. The center is normally the softest point. Tempering after quenching tends to soften and stress relieve the material which produces an optimum combination of strength, toughness and ductility. When specifying the quench and temper practice, specify the lowest hardness that will provide the part strength, toughness and wear characteristics desired.

Hardness specified on the drawing is surface hardness of the part after heat treat.

Example: "Q & T 52/60 Rock. C"

3.2.2 Typical hardness ranges for through-hardened parts are as follows:

56/64 ROCK "C"*
52/60 ROCK "C"
48/56 ROCK "C"
38/48 ROCK "C"
28/38 ROCK "C"
18/28 ROCK "C"*

*Restricted treatments

(Specify one hardness range on drawing).

3.3. ZONE INDUCTION HARDENING

3.3.1 Zone induction hardening is a quench and temper process. The hardening process is confined to a specific location on the part. Typical hardness ranges are the same as those for quench and temper heat treatments, as defined in 3.2.2. Hardness specified on the drawing is surface hardness of the part after heat treat.

Example: "Zone Induction Hardening and Temper to 48/56 Rock C - 1/8 ± 1/32 Deep".

3.3.2 Zone Induction Hardening Rules:

- Length tolerance of area to be hardened +1/8, -0.
- Depth tolerance of hardened zone ± 1/32 (Min. basic dimension 3/32) unless otherwise specified.
- The hardened zone may not extend closer than 1/8" to the end of the shaft.
- When used on splines the dimension covering the depth should be the depth of the hardened zone below the minor diameter of the spline.

Example: "Zone Induction Harden and Temper to 38-48 ROCK C to 1/8 Below Minor Dia."

3.4 OTHER TREATMENTS

3.4.1 For other specialized treatment (austempering, flame hardening, etc.) consult with the metallurgist.

3.4.2 Ductile Iron: When carbides are encountered in the casting process and cannot be controlled by the foundry, the following note will be added to the drawing after having consulted with the metallurgist and any other involved individuals. "Casting must be heat treated to remove carbides with resulting hardness of BHN 190/255.

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