

# API Standards – 20H

Heat Treatments Services – Batch Type for Equipment Used in  
the Petroleum and Natural Gas Industries

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# API Standards – 20H

This standard specifies requirements for the qualification of suppliers of batch heat treatment services.

- Applicable Materials: Carbon Steel, Low Alloy Steel, Stainless Steels--Martensitic, Precipitation Hardening (PH), Duplex and Super Duplex, and Nickel Base Alloys (Solution Annealed and PH)
- This Standard applies to batch heat treatment that affects the final properties. This includes normalizing, annealing, solution annealing, austenitizing, tempering, aging and stress relieving.
- Not addressed--case hardening, induction hardening, flame hardening, or continuous heat treating (being developed in API Standard 20N).

# API Standards – 20H

This Standard is comprised of three Heat Treatment Specification levels (HSLs), with increasing quality and technical requirements--Level Three is the highest.

## HSL 1:

- Meets the Temperature Uniformity Survey (TUS) requirements of API 6A Annex M. Survey performed at a minimum of every 12 months, over full temperature operating range.
- No variance in furnace by more than  $\pm 25^{\circ}\text{F}$  for temperatures above  $1400^{\circ}\text{F}$ . No variance by more than  $\pm 15^{\circ}\text{F}$  for tempering, aging or stress relieving.
- Records maintained of quench media temperature at start, peak, and finish of the quench cycle.

# API Standards – 20H

## HSL 2:

- A TUS performed every 6 months minimum over the full temperature operating range.
- Temperature variances during TUS are the same as listed in HSL 1.
- Additional temperatures added to the TUS at intermediate points.
- Quench media recorded continuously during the entire quench process.
- Temperature sensing thermocouples verified for accuracy or replaced every 3 months.

# API Standards – 20H

## HSL 3:

- Full compliance to AMS 2750, Pyrometry. This code has 5 furnace classes and stricter TUS and thermocouple requirements than API 6A, Annex M. This also includes special System Accuracy Tests (SAT).
- Quench media temperature recording during the entire quench process.
- Capability of using multiple contact or heat sink thermocouples.

# API Standards – 20H

## Additional Heat Treating Process Controls and Good Practice Requirements are Addressed:

- Proper furnace loading and proper spacing of parts to assure better quenching by allowing the quench media to flow more freely and evenly around the parts.
- Quenching Controls--limits on transfer time to quench (e.g. 60 seconds max for Duplex and Superduplex), quench temperature restrictions (e.g. 100°F maximum for water at start), proper agitation of quench media. Quench tank size to heat treat load ratio is addressed, to assure that the quench tank will not be overloaded (e.g. minimum of one gallon of quenchant for each pound of material).

# API Standards – 20H

Water Quench Tank--Very Good Agitation



# API Standards – 20H

## Additional Controls (continued):

- Heat treat equipment maintenance requirements.
- Training of heat treat personnel.
- Detailed requirements for heat treatment records and heat treat certificates.
- Informative Annex A--contains Heat Treatment Furnace Capability Forms for each furnace.



# API Standards – 20H

## Additional Controls (continued):

- Furnace Controlling and Recording Instrument Calibration--minimum of every 3 months
- Use of QTC (Qualification test coupon), Prolongation or Heat Sink for mechanical property testing
- Heat Treat Certs and minimum information required (e.g. material grade, heat treat times, temperatures, quenchant and quench temperature, furnace charts--if required)
- Hardness testing

## API Standards – 20H

Advantage of using an API 20H heat treat provider--API has done the technical auditing work for you, in providing a qualified heat treat supplier meeting the latest codes and good heat treating practices.

If you are interested in referencing 20H in your technical specification, there is proposed text at the end of this presentation for providing awareness, a recommendation or a requirement.

# API Standards – 20H

## Minimum Facility Requirements

Item	Process Activity	Location
1	Receiving Verification	On-site Activity
2	Final Heat Treatment	On-site Activity
3	Marking	On-site Activity
4	Final Inspection	On-site Activity

- Basically, you have to have the equipment necessary to perform the task.

# Questions?

# Sample Language for API Product Specifications

## Provide Awareness

- API Standard 20H contains requirements for qualification of batch heat treating services.

# Sample Language for API Product Specifications

## Provide Recommendation

- It is recommended that heat treating suppliers be qualified to the requirements of API 20H that are appropriate for the product line. API 20H has 3 heat treat levels with increasing levels of quality and technical requirements.

# Sample Language for API Product Specifications

## Provide Requirement

- Heat treatment suppliers used for heat treating API products shall meet the requirements of API 20H at a minimum of HSL 1.