

API 620 Annex Q

Public Reference and Engineering Notes

Low-pressure storage tanks for liquefied gases

This guide is a compact public-facing reference for Annex Q. It combines the current public API scope description for API 620 with selected openly accessible detailed notes from the public 2002 Appendix Q text. Use it as a screening and review document, not as a substitute for the purchased current edition.

Current public Annex Q boundary	Liquefied gases at temperatures not lower than -325 deg F
Overall API 620 pressure limit	Gas or vapor space not more than 15 psig
Tank form	Large field-assembled welded aboveground tanks with a single vertical axis of revolution
Public detail used here	2002 public Appendix Q text for materials, component classes, and impact-testing notes

Edition note

The current public API catalog describes Annex Q as covering low-pressure storage tanks for liquefied gases at temperatures not lower than -325 deg F. The older public 2002 Appendix Q text is narrower in medium wording and temperature threshold, but it remains useful for openly available material and testing examples. This PDF keeps those two layers separate so the reader can see what is current public scope and what is historical public detail.

1. Scope and design boundary

Annex Q sits inside API 620 and addresses low-temperature tank service where the product is stored as a liquefied gas. In the current public API description, Annex Q is the low-pressure route for liquefied gases at temperatures not lower than -325 deg F. The wider API 620 scope still applies: the tank remains an aboveground welded low-pressure tank route, and the gas or vapor space stays within the API 620 pressure boundary.

Item	Public reference point	What it means in project review
Annex Q temperature	-325 deg F or warmer	Confirms the low-temperature path for liquefied gas service inside API 620
API 620 pressure boundary	Not more than 15 psig in gas or vapor space	Keeps the design in the low-pressure tank family rather than a pressure-vessel route
Tank geometry	Single vertical axis of revolution; flat-bottom tanks included	The code basis is oriented to large vertical field-built tanks
Horizontal tanks	Not directly covered by the standard	Would require careful engineering treatment outside the normal Annex Q path
Lift-type gas holders	Outside the stated scope	Shows Annex Q is not a catch-all gas storage provision

Public 2002 Appendix Q wording is useful in another way: it explains that refrigerated tanks in this annex may be single-wall insulated tanks or double-wall tanks with an inner liquid container and an outer tank enclosing insulation space. That distinction is still helpful when screening project scope because the inner and outer containers do not necessarily share the same function, materials, or testing burden.

2. Primary versus secondary components

The 2002 public Appendix Q text separates refrigerated-tank components into primary and secondary groups. That split is one of the most useful practical ideas in Annex Q because it drives material selection, impact-testing obligations, and documentation focus.

Component class	Simplified meaning	Typical examples
Primary components	Parts that can see significant refrigerated stress, can leak liquid if they fail, or can be hit by thermal shock	Shell, bottom, roof, knuckle plates, compression ring, stiffeners, manways, nozzles and reinforcement, anchors, related pipe / tubing / forgings / bolting
Secondary components	Parts not significantly stressed by refrigerated liquid, not expected to release liquid on failure, or having design metal temperature at -60 deg F or higher	Outer-tank items or attached parts exposed mainly to vapor or warmer service

3. Material routes visible in the public 2002 Appendix Q text

Annex Q does not work like a pipe standard with a fixed OD and wall-thickness list. The numeric content is instead tied to materials, temperature, impact testing, allowable stress, and fabrication controls. The public 2002 Appendix Q text includes a useful materials table for primary components. The table below is a reorganized summary, not a line-for-line reproduction.

Material family	Public examples visible in 2002 Appendix Q	Typical use note
9% / 5% nickel steels	ASTM A353, A553 Type I, A645	Primary plate / structural route for very low-temperature service
Austenitic stainless steel	ASTM A240 Type 304 / 304L; A213 / A312 / A358 TP304 family; A182 F304 / F304L	Primary components where low-temperature toughness is achieved without the same nickel-steel impact route
Nickel alloys	ASTM B444 Gr.1 / Gr.2; B619 / B622 UNS N10276	Special piping / tubing route where corrosion resistance or very low-temperature performance is needed
Aluminum alloys	B209, B210, B211, B221, B241, B247, B308 alloy families including 3003, 5052, 5083, 5086, 5154, 5456, 6061 variants	Alternative low-temperature route where alloy and temper selection become part of the review
Bolting	ASTM A320 grades B8, B8C, B8M, B8T	Fastener route visible in the public 2002 table for primary service

Design implication: Annex Q material review is not only a plate-grade exercise. It also extends into piping, forgings, bolting, and the distinction between inner liquid-containing parts and warmer or less critical supporting parts. That is why the component-class decision should be made before finalizing the material list.

4. Low-temperature impact-testing notes visible in the public text

Public 2002 Appendix Q note	Engineering meaning
Primary components of 9% or 5% nickel steel require impact testing	Nickel-steel selection is tied to a defined low-temperature toughness verification path
Austenitic stainless, nickel-alloy, and aluminum primary components are not put on the same impact-testing path in the public 2002 text	Material family choice changes the test route and the document package
Plate specimens are taken transverse to final rolling direction	Coupon orientation matters and should be visible in the MTR or test-report trail
For A353 / A553 / A645 steels, Charpy V-notch cooling temperature is listed as -320 deg F; the same public note accepts -220 deg F for ethylene and ethane service	The public text ties product service to toughness verification conditions
Each impact set consists of 3 specimens; each specimen needs at least 0.015 in. lateral expansion opposite the notch	The route is not only absorbed energy; specimen performance criteria also matter

5. What the buyer should actually check when Annex Q is specified

Annex Q usually appears when the tank route is no longer ordinary atmospheric storage and the project needs a credible low-temperature tank basis. The useful review points are practical: define the edition, identify the component class, lock the material family, and make sure the test and documentation route follow that logic.

Review item	What to verify
Edition and addenda	Confirm which API 620 edition and addenda the project is using, because the public 2002 Appendix Q detail and the current public Annex Q description are not identical
Design temperature and service	Check the product, storage temperature, and whether the project is being screened as current Annex Q service
Primary / secondary map	Verify which items are treated as primary refrigerated components, because that choice drives materials and testing
Material list	Check that plate, piping, forgings, and bolting are all reviewed, not only shell plate
Impact-testing route	Where nickel-steel primary components are used, verify specimen direction, test temperature, and acceptance route in the approved documents
Tank concept	Clarify whether the design is single-wall insulated or double-wall, and whether the outer tank is a full product container or an enclosing insulation shell
Final records	Make sure the project file can trace material, toughness verification, welding, and NDE to the final tank release package

References used in this guide

- API 2025 publications catalog / refining section: public scope description for API 620 and Annex Q.
- API 620 12th Edition preview pages: annex names and public scope language.
- Publicly accessible API 620:2002 PDF hosted by law.resource.org: detailed Appendix Q text used here for component classes, materials, and impact-testing notes.

Document note: This PDF deliberately separates current public API scope from historical public Appendix Q detail. Any procurement, design, or fabrication decision should be checked against the purchased current edition and the project specification.