Technical Data Sheet

Hydrochloric Acid 25% ACS Grade

ACS · 25%

Alliance Code	Revised	Revision
hydrochloric-acid-25-acs-grade	2026-10-20	1.9

CAS number 7647-01-0	UN number UN1789	Hazard class · packing group 8 · PG II
 Structure · PubChem	Grade ACS · 25%	Signal word **Danger**
Hazards Corrosive · Irritant / harmful · H290 H314 H335		
Proper shipping name Hydrochloric acid		

IDENTITY & COMPOSITION

PRODUCT NAME
Hydrochloric Acid 25% ACS Grade

ALLIANCE CODE
hydrochloric-acid-25-acs-grade

GRADE
ACS

CONCENTRATION
25% w/w

CAS NUMBER
7647-01-0 PubChem

FORMULA
HCl Adjudicated

MOLECULAR WEIGHT
36.46 PubChem

PRODUCT TYPE
Solution

SPECIFICATIONS

TEST	SPECIFICATION	TYPICAL	METHOD	SOURCE
Assay (HCl)	24.5 - 25.5 % w/w	—	—	Interpreted
Ammonium (NH4)	2 ppm max	—	—	Interpreted
Arsenic (As)	0.0068 ppm max	—	—	Interpreted
Bromide (Br)	0.0034% max	—	—	Interpreted
Extractable organic substances	3.4 ppm max	—	—	Interpreted
Free chlorine (Cl)	0.68 ppm max	—	—	Interpreted
Heavy metals (as Pb)	0.68 ppm max	—	—	Interpreted
Iron (Fe)	0.14 ppm max	—	—	Interpreted
Residue after ignition	4 ppm max	—	—	Interpreted
Sulfate (SO4)	1 ppm max	—	—	Interpreted
Sulfite (SO3)	0.68 ppm max	—	—	Interpreted
Color (APHA)	10 max	—	—	Interpreted
Composition	25 % hydrochloric acid in deionized water, by weight	—	By formulation; batch weights (scale ticket)	Interpreted

Values are reproduced from the current product reference. Source labels do not by themselves establish a supplier guarantee or a test result for your lot. Confirm applicable acceptance limits and request lot-specific documentation.

AVAILABLE GRADES SAME CAS, ALTERNATE GRADES AND CONCENTRATIONS

GRADE	CONCENTRATION	TYPICAL ASSAY	SKU
THIS GRADE ACS	25%	—	current
ACS Reagent	37%	—	hydrochloric-acid-37-acs-reagent-grade
Technical Grade	37%	—	hydrochloric-acid-37-hcl-37-technical-grade
ACS	31%	—	hydrochloric-acid-31-acs-grade
Technical Grade	31%	—	hydrochloric-acid-31-technical-grade
Technical	25%	—	hydrochloric-acid-25-technical-grade
ACS	20%	—	hydrochloric-acid-20-acs-grade
ACS	15%	—	hydrochloric-acid-15-acs-grade
Technical Grade	15%	—	hydrochloric-acid-15-technical-grade
ACS	10%	—	hydrochloric-acid-10-acs-grade
Technical	10%	—	hydrochloric-acid-10-technical-grade
ACS	5%	—	hydrochloric-acid-5-acs-grade
Technical Grade	5%	—	hydrochloric-acid-5-technical-grade

Typical assay for each grade is the average of its recent lots. Confirm a grade meets your specification before substituting it.

PHYSICAL & CHEMICAL PROPERTIES

PROPERTY	VALUE	SOURCE
Appearance	Clear, colorless to slightly yellow liquid with HCl odor	Adjudicated
Odor	Pungent, irritating odor	Adjudicated
pH	< 1	Adjudicated
Specific Gravity	1.126 at 20/20 °C (water = 1)	Adjudicated
Density	1.1237 g/cm^3 at 20 °C	Adjudicated
Boiling Point	About 105–108 °C (221–226 °F); the HCl–water azeotrope (20.2%) boils at 108.6 °C	Adjudicated
Melting Point	About -74 °C (-101 °F), freezing point	Adjudicated
Flash Point	Not applicable	Adjudicated
Solubility (water)	Completely miscible with water	Adjudicated

Strong acid — density and vapor-pressure values shown are at 20 °C; values shift markedly with concentration and temperature. Reference concentration-temperature curves before specifying equipment.

MATERIALS OF CONSTRUCTION SERVICE ENVELOPE ≈ 25%

MATERIAL	RATING	MAX T (°C)	NOTES	SOURCE
Buna-N (NBR) Elastomer	Poor	—	Hardens and cracks; do not use.	Parker O-ring Chemical Compatibility
EPDM Elastomer	Good	80	Standard for HCl and H2SO4 gaskets.	Parker O-ring Chemical Compatibility

MATERIAL	RATING	MAX T (°C)	NOTES	SOURCE
Viton (FKM) Elastomer	Good	80	Acceptable for HCl gaskets up to 37 %.	Parker O-ring Chemical Compatibility
PTFE Fluoropolymer	Excellent	200	Universal acid compatibility.	Cole-Parmer Chemical Compatibility
PVDF (Kynar) Fluoropolymer	Excellent	120	Excellent for HCl piping at elevated temperature.	Cole-Parmer Chemical Compatibility
Borosilicate Glass Glass Ceramic	Excellent	100	Inert to most strong acids (avoid HF).	Cole-Parmer Chemical Compatibility
316 stainless steel Metal	Poor	25	Severe pitting; use only for vapors	Cole-Parmer Chemical Compatibility
Aluminium Metal	Not recommended	—	Reacts to form H2 gas	Cole-Parmer Chemical Compatibility
Carbon Steel Metal	Not recommended	—	Catastrophic corrosion; never use.	Cole-Parmer Chemical Compatibility
Hastelloy C-276 Metal	Excellent	80	Preferred metal for concentrated HCl service.	Haynes International C-276 datasheet
Inconel 625 Metal	Good	60	Acceptable for dilute service	Cole-Parmer Chemical Compatibility
Tantalum Metal	Excellent	100	Best-in-class but expensive	Cole-Parmer Chemical Compatibility
CPVC Thermoplastic	Excellent	90	Higher-temp variant of PVC.	Cole-Parmer Chemical Compatibility
FRP (vinyl ester) Thermoplastic	Good	60	Common bulk-storage tank material	Cole-Parmer Chemical Compatibility

MATERIAL	RATING	MAX T (°C)	NOTES	SOURCE
HDPE Thermoplastic	Excellent	60	Standard tank/drum material for HCl up to 37 %.	Cole-Parmer Chemical Compatibility
PVC Thermoplastic	Excellent	60	Common for piping; verify rating for service > 50 °C.	Cole-Parmer Chemical Compatibility

Ratings reflect the service envelope (concentration × temperature) shown. Always confirm against your specific duty cycle and contact-time before equipment selection. The most cautious rating across overlapping references is shown.

REGULATORY & TRANSPORT

DOT / 49 CFR

UN NUMBER
UN1789 Adjudicated

HAZARD CLASS
8 Adjudicated

PACKING GROUP
II Adjudicated

PROPER SHIPPING NAME
Hydrochloric acid Adjudicated

GHS / OSHA HCS 2024

SIGNAL WORD
Danger Adjudicated

H-CODES (HAZARD STATEMENTS)
H290, H314, H335 Adjudicated

P-CODES (PRECAUTIONARY STATEMENTS)
P234, P260, P261, P264, P271, P280, P301+P330+P331, P303+P361+P353, P304+P340, P305+P351+P338, P310, P321, P363, P390, P403+P233, P405, P406, P501

Adjudicated

OCCUPATIONAL EXPOSURE LIMITS

OSHA PEL (29 CFR 1910.1000)
5 ppm ceiling OSHA 29 CFR 1910.1000

ACGIH TLV
2 ppm Ceiling Adjudicated

NIOSH REL
5 ppm Ceiling Adjudicated

NIOSH IDLH
50 ppm Adjudicated

Transport descriptions reflect 49 CFR 172.101 lookup at time of publication. Sourced data: NIOSH Pocket Guide for REL/IDLH, OSHA Z-Tables for PEL. Always verify against the latest regulatory text before shipment-critical decisions.

CATALOG EQUIVALENTS CROSS-REFERENCE VS MAJOR CHEMICAL SUPPLIERS

HONEYWELL

SKU	GRADE	CONC.	MATCH	NOTES
258148	ACS	37%	Unverified candidate	Fluka brand, ACS grade

SIGMA-ALDRICH

SKU	GRADE	CONC.	MATCH	NOTES
258148	Technical	37%	Unverified candidate	Technical grade — lower spec but same chemistry
320331	ACS Reagent	37%	Unverified candidate	ACS Reagent grade, 37% in water

Cross-references are informational. Confirm against the manufacturer's current specification before substitution. Competitor trademarks are property of their respective owners.

APPLICATIONS

Pickling and metal cleaning agent in metal processing, to remove oxides and scale chemceed.com

Oil well acidizing — dissolves calcium and magnesium carbonate rock formations to increase permeability and production

chemceed.com

Beneficiation of ores and rock phosphate; stimulation of oil and gas wells in carbonate and sandstone reservoirs

itwreagents.com

Metallurgical pickling, etching and brazing itwreagents.com

Removal of calcium carbonate (scale) deposits from equipment and cleaning of boreholes and gravel-pack filters after drilling

itwreagents.com

Dilute acid used in construction to remove mortar residue from masonry and lime film from tiles after grouting

itwreagents.com

ACS reagent purity makes it acceptable for analytical applications and research laboratories laballey.com

Batteries, reagent use, descaling agent, reducing agent laballey.com

Petroleum well operations, ore reduction, food processing, pH adjustment and general cleaning

chemceed.com

Listed product uses include acid cleaners, boiler water treatment, electroplating, galvanizing, high fructose corn syrup, pH control, rust and scale removers, sugar refining, swimming pool and toilet bowl cleaner

chemceed.com

Applications are drawn from published manufacturer and supplier documentation; each is sourced. Suitability for a specific use is the buyer's to confirm.

STORAGE & HANDLING

RECOMMENDED STORAGE

Store in a cool, well-ventilated area in closed, vented, corrosion-resistant containers (polyethylene or glass). Keep away from bleach and other oxidizers, bases and metals.

Adjudicated

HANDLING PRECAUTIONS

Use full PPE including face shield, acid-resistant gloves and apron. Add acid to water slowly with stirring; never reverse. Ventilation required.

Class-level guidance — not product-specific; the SDS controls.

INCOMPATIBILITIES

Bases, hydroxides, carbonates, amines and ammonia; oxidizers, including sodium hypochlorite (bleach) (release chlorine gas); most metals (release flammable hydrogen); cyanides and sulfides (release toxic gas).

Adjudicated

SHELF LIFE

Consult Technical Services for product-specific shelf life

For full hazard, PPE, and emergency response guidance, refer to the Safety Data Sheet (SDS) for this product. The SDS controls in all cases where guidance differs.

PACKAGING & LOGISTICS

SHIPPING DESCRIPTION (US DOT)

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UN1789, Hydrochloric acid, 8, PG II
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Sourced from 49 CFR 172.101. Confirm against shipping documents and carrier requirements before tender.

NMFC CLASS	PLACARD	PACKING GROUP
60	Corrosive	PG II

REVISION HISTORY

Last reviewed 2026-10-20 by Andre Taki, Chief Commercial Officer, DOT Hazmat–certified (49 CFR 172.704).

VERSION	DATE	CHANGE	TRIGGER
1.9	2026-10-20	Canonical data updated: 2 fields changed via the provenance/adjudication pipeline. • `density` · canonical change (coa.data_provenance / adjudication) • `specificGravity` · canonical change (coa.data_provenance / adjudication)	canonical_change

VERSION	DATE	CHANGE	TRIGGER
1.8	2026-10-08	Canonical data updated: 20 fields changed via the provenance/adjudication pipeline. • formula · canonical change (coa.data_provenance / adjudication) • synonyms · canonical change (coa.data_provenance / adjudication) • restrictions_on_use · canonical change (coa.data_provenance / adjudication) • odor · canonical change (coa.data_provenance / adjudication) • pH · canonical change (coa.data_provenance / adjudication) • meltingPoint · canonical change (coa.data_provenance / adjudication) • boilingPoint · canonical change (coa.data_provenance / adjudication) • flashPoint · canonical change (coa.data_provenance / adjudication) • specificGravity · canonical change (coa.data_provenance / adjudication) • solubility · canonical change (coa.data_provenance / adjudication) • oel_acgih_tlv · canonical change (coa.data_provenance / adjudication) • oel_niosh_rel · canonical change (coa.data_provenance / adjudication) • oel_idlh · canonical change (coa.data_provenance / adjudication) • incompatible_materials · canonical change (coa.data_provenance / adjudication) • conditions_to_avoid · canonical change (coa.data_provenance / adjudication) • hazardous_decomposition_products · canonical change (coa.data_provenance / adjudication) • storage_precautions · canonical change (coa.data_provenance / adjudication) • rcra_waste_codes · canonical change (coa.data_provenance / adjudication) • cercla_rq · canonical change (coa.data_provenance / adjudication) • recommended_use · canonical change (coa.data_provenance / adjudication)	canonical_change
1.7	2026-10-07	Canonical data updated: 3 fields changed via the provenance/adjudication pipeline. • ghsClassification · canonical change (coa.data_provenance / adjudication) • hazard_h_codes · canonical change (coa.data_provenance / adjudication) • hazard_p_codes · canonical change (coa.data_provenance / adjudication)	canonical_change
1.6	2026-10-05	Canonical data updated: 1 field changed via the provenance/adjudication pipeline. • oel_osha_pel · canonical change (coa.data_provenance / adjudication)	canonical_change
1.5	2026-09-30	Canonical data updated: 2 fields changed via the provenance/adjudication pipeline. • meltingPoint · canonical change (coa.data_provenance / adjudication) • appearance · canonical change (coa.data_provenance / adjudication)	canonical_change

VERSION	DATE	CHANGE	TRIGGER
1.4	2026-08-27	Canonical data updated: 2 fields changed via the provenance/adjudication pipeline. • oel_niosh_rel · canonical change (coa.data_provenance / adjudication) • oel_idlh · canonical change (coa.data_provenance / adjudication)	canonical_change
1.3	2026-08-05	Canonical data updated: 3 fields changed via the provenance/adjudication pipeline. • hazardClass · canonical change (coa.data_provenance / adjudication) • packingGroup · canonical change (coa.data_provenance / adjudication) • unNumber · canonical change (coa.data_provenance / adjudication)	canonical_change
1.2	2026-07-22	Canonical data updated: 2 fields changed via the provenance/adjudication pipeline. • dotSubsidiaryHazardClass · canonical change (coa.data_provenance / adjudication) • dotProperShippingName · canonical change (coa.data_provenance / adjudication)	canonical_change
1.1	2026-07-17	Canonical data re-verified: 4 fields updated against independent vendor SDSs, CLP Annex VI, 49 CFR, and OSHA HazCom 2024 (GHS classification, hazard/precautionary codes, signal word, physical properties as applicable). • countryOfOrigin · canonical adjudication / reground (coa.data_provenance) • ghsClassification · canonical adjudication / reground (coa.data_provenance) • hazard_p_codes · canonical adjudication / reground (coa.data_provenance) • hsCode · canonical adjudication / reground (coa.data_provenance)	canonical_change
1.0	2026-05-20	Initial URL-first TDS published from canonical chemistry registry.	initial

This Technical Data Sheet is provided for technical reference. The Safety Data Sheet (SDS) controls in all cases where guidance differs. Values reflect Alliance Chemical canonical data at time of generation; subsequent revisions are recorded in the Revision History above.