

CryoGetter® 5A13X Technical Datasheet

Calcium-Type A Zeolite Composite Adsorbent — For Vacuum Jacketed Pipe Systems
High-Performance Dual-Pore Adsorbent for Cryogenic Vacuum Integrity



Compliance: AIGA 106/19

PRODUCT DESCRIPTION

Type: Calcium-type A zeolite composite (Ca5A + 13X blend)

Operating Temperature: 4K (–269°C) to 623K (350°C)

KEY PROPERTIES

- ✓ Dual-pore structure (5Å + 10Å)
 - ✓ Excellent CO₂ adsorption (≥15 wt%)
 - ✓ High crush strength (≥30 N/particle)
 - ✓ Compatible with LOX service
- ✓ High water adsorption capacity (≥21 wt%)
 - ✓ Spherical bead form for uniform packing
 - ✓ Regenerable ≥500 cycles
 - ✓ Non-hazardous disposal

TECHNICAL DATA

Parameter	Unit	Specification
Product Designation	—	CryoGetter 5A13X
Zeolite Type	—	Ca5A + 13X blend
Primary Pore Size	Å (nm)	5Å (0.5 nm)
Secondary Pore Size	Å (nm)	10Å (1.0 nm)
Particle Form	—	Spherical beads
Particle Size	mm (mesh)	1.6–2.5 (8×12)
Bulk Density	g/cm ³	≥0.65
Water Adsorption Capacity (25°C, RH 50%)	wt%	≥21
CO ₂ Adsorption Capacity	wt%	≥15
Crush Strength	N/particle	≥30
Target Gases	—	H ₂ O, CO ₂ , N ₂ , O ₂ , light hydrocarbons

CRYOGENIC TANK PERFORMANCE DATA

Data for adsorbent application in the vacuum interlayer of cryogenic storage tanks (LN₂, LOX, LAR, LH₂).

Sources: Bai et al., *VACUUM* 58(1):45–50, 2021 (Lanzhou Univ. of Technology / Lanzhou Institute of Physics); NASA KSC LC-39 Cryogenic Systems Study (1970); Chen et al., *Chinese Journal of Vacuum Science and Technology* 37(5):443–448, 2017.

Parameter	Unit	Value
N ₂ adsorption capacity at 77K (vacuum, equilibrium 10 ^{–3} –10 ³ Pa)	Pa·L/g	~10 ⁴ (5A ≈ 13X > 4A)
O ₂ adsorption capacity at 77K (vacuum)	Pa·L/g	~10 ⁴
Air adsorption rate at 77K (5A vs 13X)	—	5A > 13X (faster kinetics)
CO ₂ adsorption at 195K (equilibrium, 800 torr → cryo)	wt%	~30%
Recommended vacuum interlayer pressure	Pa	< 10 ^{–2}
Typical cryogenic tank loading (interlayer)	g/m ²	200–500 (depending on vessel size)
Vacuum lifetime extension (with getter)	years	>10 (maintaining <10 ^{–2} Pa)

Key insight: In cryogenic tank vacuum interlayers, leaked air (N₂ + O₂) accounts for 20–30% of residual gas; the remaining 70–80% is H₂ from metal/insulation outgassing. CryoGetter 5A13X efficiently captures N₂, O₂, CO₂ and H₂O at 77K, but cannot retain H₂. For complete vacuum integrity, pair with CryoGetter AG450 hydrogen getter.

***Dosage note:** Tank dosage cannot follow a fixed per-meter rule — it depends on vacuum interlayer volume, insulation type (perlite/MLI), service temperature, and vessel geometry. **Please contact East Far Materials engineering for tank-specific dosage recommendations.**

Ref: Bai et al., *VACUUM* 58(1):45–50, 2021; DOI: 10.13385/j.cnki.vacuum.2021.01.10; NASA KSC LC-39 Study, 1970.

ACTIVATION & REGENERATION

Parameter	Specification
Activation Temperature	350°C
Activation Duration	6 hours
Activation Condition	Vacuum <10 Pa or dry N ₂ purge
Regeneration Temperature	250–300°C
Regeneration Duration	4–6 hours
Regeneration Condition	Vacuum or dry gas purge
Regeneration Cycles	≥500 times (capacity retention >90%)
Service Life	10+ years (design life)

DOSAGE FOR DN50 VJ PIPE

Parameter	Unit	Value
Dosage per Meter	g/m	80
3 m Spool (10 ft)	g	240
6 m Spool (20 ft)	g	480
9 m Spool (30 ft)	g	720
12 m Spool (40 ft)	g	960

INSTALLATION METHOD

Spiral Wrap (Recommended) End Capsule (Redundancy) SS304 Mesh Tube (200µm) 300mm Wire Tie Spacing Install within 2h of Activation

Primary Method: **Spiral wrap around inner pipe** Backup Method: **End capsules at spool ends**

ITARGET APPLICATIONS & MARKETS

Vacuum Jacketed Pipe	Cryogenic Transfer Line	Superconducting Cable	LNG Pipeline	ISO Container	Dewar	Cryogenic Storage Tank (LN ₂ /LOX/LAr/LH ₂)
Semitrailer / Rail Tank	MRI	Nuclear Fusion Cryogenic Module				

Technical Note: CryoGetter 5A13X physically adsorbs condensable gases (H₂O, CO₂, N₂) but cannot capture H₂ (kinetic diameter 2.89Å passes through 5Å pores without retention). For complete vacuum integrity, pair with CryoGetter AG450 for H₂ chemisorption. (Ref:)