



LEAN+ CLEAN

LNP™ STAT-KON™ COMPOUNDS
Product Environmental Summary



CHEMISTRY THAT MATTERS™

LNP STAT-KON

COMPOUNDS FOR HARD DISK DRIVE DISK SEPARATOR PLATES PRODUCT ENVIRONMENTAL SUMMARY

SABIC is an industry leader in providing cost-effective material solutions for hard disk drive (HDD) disk separator plates (DSPs). Our polyetherimide (PEI) based STAT-KON compounds deliver competitive part performance compared to nickel-plated aluminum, enable a simpler and cleaner production process, and have lower life cycle energy and greenhouse gas (GHG) footprints.

KEY BENEFITS*

- Eliminates electroless nickel (EN) plating process
- Lower shipping cost due to lower part weight
- 24-50% lower life cycle GHG footprint
- 22-38% lower life cycle energy footprint
- Third party standards compliance (EU Ecolabel, EPEAT, TCO, Blue Angel, Nordic Swan, Japan PC Green)
- No REACH Substances of Very High Concern, EU RoHS compliant, IEC 'halogen-free'

**see next page for full details*



PROCESS AVOIDANCE AND CLEANER CHEMISTRY

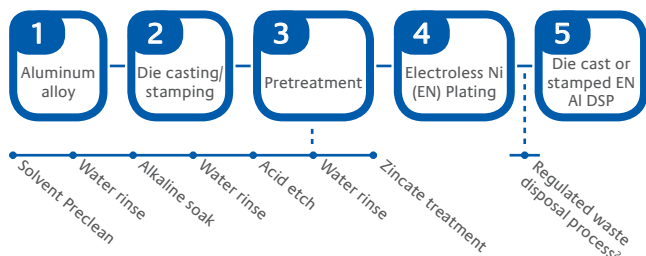
Unlike ones made with aluminum, DSPs made with SABIC's PEI-based STAT-KON compounds do not require nickel-plating and associated pretreatment, reducing cost and process time. Nickel substances are regulated in some markets and will likely require authorization to be used in the European Union.

PROCESS MAP COMPARISON

PEI-based STAT-KON compound DSP



Aluminum DSP



Some nickel compounds used in the plating process may become included in the "Candidate List" under EU's REACH Regulation and may be subsequently included in Annex XIV of REACH.¹ According to the Nickel Institute, "once included in Annex XIV, the substances, after a specified date, may no longer be placed on the market or used in the European Union unless an authorisation for use has been granted by the European Commission."

Because waste from most US facilities in the nickel-plating industry is regulated under the Clean Air Act, Clean Water Act, and Resource Conservation and Recovery Act,² eliminating this process may help US manufacturers reduce costs associated with processing, environmental compliance and waste treatment.

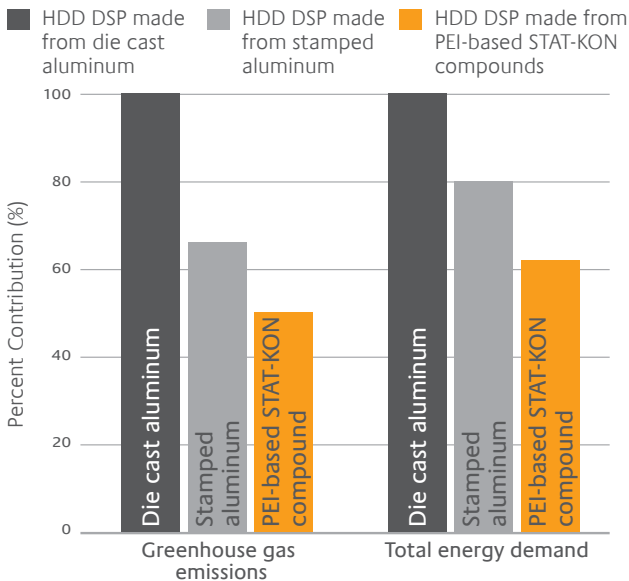
APPLICABILITY: The following is applicable to PEI-based STAT-KON EX08318C and PEI-based STAT-KON EX11318C compounds for HDD DSPs. Cases different from these may vary; please contact us to discuss your applications.

LOWER GHG AND ENERGY FOOTPRINTS^{3, 4}

DSPs made from PEI-based STAT-KON compounds have lower energy and GHG life cycle footprints compared to ones made from nickel-plated aluminum. A DSP made from PEI-based STAT-KON compounds has:

- A life cycle GHG footprint of 0.12 kg, versus 0.24 kg for one made from die cast aluminum, a 50% lower impact.
- A life cycle energy footprint of 2 MJ, versus 3.2 MJ for one made from die cast aluminum, a 38% lower impact.

FIGURE: LIFE CYCLE GHG AND ENERGY FOOTPRINT COMPARISON^{3,4}



LOWER PART WEIGHT AND SHIPPING COST^{4, 5}

DSPs made from PEI-based STAT-KON compounds are typically five grams lighter than those made from aluminum. For example, an HDD manufacturer making 320 million 2.5” DSPs could save approximately US\$ 12.8 million on air shipping by converting from aluminum to PEI-based STAT-KON compounds.

THIRD PARTY STANDARDS COMPLIANCE⁶

PEI-based STAT-KON compounds for HDD applications are designed to comply with the IEC 'halogen-free' standard (IEC 61249-2-21), with RoHS (Restriction of Hazardous Substances; EU Directive 2002/95/EC), and do not contain REACH Substances of Very High Concern above 0.1% by weight (SVHC; as defined by EU Regulation EC 1907/2006 and updated 18 Jun 2012). STAT-KON compounds for HDD applications meet the certification requirements and ecolabels for EU Ecolabel, EPEAT, TCO, Blue Angel, Nordic Swan, and Japan PC Green as of 1/2013.

VERIFIED ENVIRONMENTAL PERFORMANCE

SABIC partners with GreenOrder, a leading sustainability consulting firm, to provide third-party technical analysis and verification of Sustainability Solutions benefit claims.



REFERENCES

- 1) The Nickel Institute and Ni REACH Consortia: The REACH Authorisation Process Edition 2 April 2011.
- 2) Nickel Plating: Industry Practices Control Technologies and Environmental Management. US EPA/625/R-03/005 April 2003.
- 3) Scope of this LCA study includes material production, fabrication, and end of life with material recovery stages. Use phase impacts excluded from the LCA study as they are assumed to be identical for PEI-based STAT-KON DSPs and aluminum DSPs. The LCA study is performed based on ISO14040/44 framework. The functional unit used in this study is one disk separating plate (DSP).
- 4) Specifications of DSPs made from EN coated die cast aluminum: Weight = 10.55 g; density = 2.7 g/cm³; Specifications of DSPs made from EN coated stamped aluminum: Weight = 10.55 g, density = 2.7 g/cm³; Specifications of DSPs made from PEI-based STAT-KON compound: Weight = 5.39 g, density = 1.4 g/cm³.
- 5) Assumes a US\$4/kg air freight cost and two air freight shipments for DSPs, based on internal SABIC estimates.
- 6) The International Electrochemical Commission's (IEC) definition of halogen-free, the Restriction of Hazardous Substances Directive (RoHS), the EU REACH regulation EC 1907/2006, the European Commission's EU Ecolabel, the Green Electronics Council's Electronic Product Environmental Assessment Tools (EPEAT), TCO Development's TCO Certification, the Jury Umweltzeichen's Blue Angel, the Nordic Council of Ministers' Nordic Swan, and the PC 3R Promotion Association's PC Green Label for Japan are internationally recognized environmental directives, regulations, and certifications for hazardous materials.

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