

# Spherical catalyst carriers with unprecedented size uniformity

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An increased demand for small diameter (less than 4 mm) spherical catalyst carriers led to the development of Saint-Gobain NorPro's Accu® Spheres. They can be used effectively in fixed or moving bed reactors, and are especially well suited where coking and/or catalyst regeneration is required.

The size of the carrier can be optimised to balance pressure drop and external geometric surface area, while the internal surface area and porosity are tailored to improve the performance of a specific catalyst and chemical reaction. They are available in multiple formulations, compositions and properties in a range of sizes, from 0.3 mm to 4 mm.

What sets Accu Spheres apart from other catalyst carriers is that they are produced with a narrow size distribution. This allows for a high geometric surface area, uniform packing and even flow distribution, which has drawn wide appeal

in numerous markets, including chemical, petrochemical and refinery applications.

The key attributes of Accu Spheres are:

- Narrow size distribution
- Excellent average particle size control
- Alumina, silica, titania, zirconia, zeolites and mixed oxides.

## CASE STUDY

Saint-Gobain NorPro's innovative manufacturing process allows for excellent control over average particle size. When compared to UniSpheres®, the company's traditional mono-sized spherical catalyst carrier, the increased homogeneity of Accu Spheres is evident. The particle size distribution has an average absolute error of just 1.5%, with a span of less than 15% between D10 and D90.

UniSpheres are available in a range of sizes, from 1.6 mm to 8 mm. A unique forming mechanism is used to produce highly mono-sized particles, but when size



Figure 1 Accu Spheres with a target median diameter of 1.6 mm and 3.2 mm  
Source: Saint-Gobain NorPro

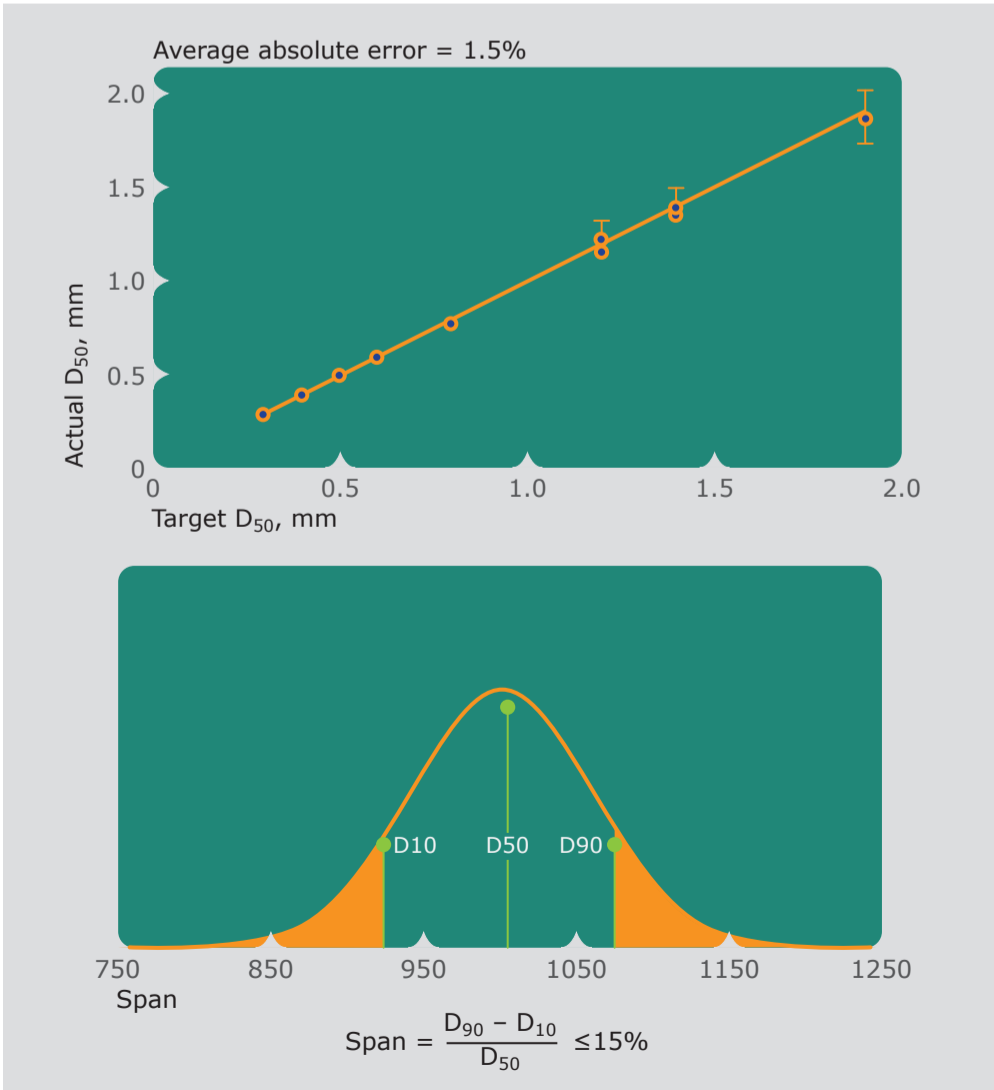


Figure 2 Average absolute error and typical size distribution  
Source: Saint-Gobain NorPro

Sample number	1	2	3	4	5
Technology	UniSpheres	UniSpheres	Accu Spheres	Accu Spheres	Accu Spheres
Target median diameter (mm)	1.6	1.6	1.6	2.2	2.1
N, BET surface area (m <sup>2</sup> /g)	248	237	279	214	204
Hg intrusion volume (cm <sup>3</sup> /g)	0.89	0.79	0.82	0.95	0.79
Average pore diameter (a)	94	87	93	120	106
F.P.C.S. (lb)	3.5	4.3	3.7	4.1	6.2
PSD CAMSizer, D <sub>10</sub> (μm)	1152	1380	1479	2071	2007
PSD CAMSizer, D <sub>50</sub> (μm)	1493	1631	1587	2208	2133
PSD CAMSizer, D <sub>90</sub> (μm)	1700	1825	1705	2345	2265
Deviation from target D <sub>50</sub> (%)	6.7	1.9	0.8	0.4	1.6
Span (D <sub>90</sub> -D <sub>10</sub> )/D <sub>50</sub> (%)	36.7	27.3	14.2	12.4	12.1

Accu Spheres are better at hitting target diameter and narrower particle size distribution

Figure 3 Improved size uniformity of Accu Spheres in comparison to UniSpheres  
Source: Saint-Gobain NorPro

uniformity is paramount Accu Spheres deliver a size range that is unprecedented.

Accu Spheres address the need for a tightly controlled target diameter. With a target median diameter of 1.6 mm, the mean diameter is within 0.8% versus up to 6.7% for UniSpheres.

## CATALYST CARRIER CUSTOMISATION

Few vendors make comparable-sized spheres in large quantities, and those that do are typically limited in size or by material composition. Accu Spheres are developed and prototyped for the intended application.

Their unique customer-driven capability is supported by a 50-100 t/y development plant. Here we can tailor porosity and produce a range of sphere sizes in large quantities, in multiple compositions and with varying properties.

Refractory metal oxides commonly used as catalyst carriers include alumina, silica, rare earth metal oxides, zirconia and titania. Saint-Gobain NorPro has extensive experience in material science and raw material characterisation. We can work with customers to optimise the finished carrier chemistry and physical properties for their catalyst system.

We tailor a solution from tightly controlled alumina catalyst carriers, most

commonly used in refinery applications, to proprietary material compositions. We can even produce a gradient of chemistries within each particle.

Saint-Gobain NorPro is one of the largest suppliers of catalyst carriers, and co-development has been a key to success. In fact, nearly 90% of sales are related

DID YOU KNOW  
90% OF SAINT-GOBAIN NORPRO'S  
CATALYST CARRIERS  
ARE CO-DEVELOPED  
WITH CUSTOMERS?

to custom proprietary catalyst carrier projects, with custom samples available upon request.

To learn more about our new micro-sized catalyst carrier spheres, contact Saint-Gobain NorPro and find out how we can develop a proprietary solution that meets your exact requirements. ■

Contact: [www.norpro.saint-gobain.com](http://www.norpro.saint-gobain.com)



Figure 4 Accu Sphere catalyst carriers are available in a multitude of uniform sizes  
Source: Saint-Gobain NorPro