

## Laboratory-Grown Diamonds

### HPHT Diamonds

HPHT laboratory-grown diamonds are grown in laboratories at high pressures and high temperatures. A diamond seed is used and growth from a flux material (molten metal alloy) takes place over a period of several weeks.



### CVD Diamonds

CVD diamonds are grown at high temperatures and very low pressures in a vacuum chamber. Tabular laboratory-grown diamond crystals up to several carats are formed on flat diamond seed plates during growth periods of one week or more.



## Natural Diamonds

### Natural Diamonds

Natural diamonds occur only when the right combination of atomic elements meets at high pressures and temperatures about 100 miles below the earth's surface. The crystal that grows under these conditions has a unique structure we associate with natural diamonds.



## About GIA

Established in 1931, GIA has studied the scientific properties of gems, developing new methods of identifying natural, laboratory-grown and treated gemstones. This research serves to protect all who buy and sell gems by ensuring accurate and unbiased standards for determining and describing gem quality. GIA research findings are incorporated into its educational programs, published in professional journals, used for developing practical instruments and tools, and applied in grading and identification services every day.

To learn more about diamond identification and GIA laboratory services, and to view past issues of *Gems & Gemology*, GIA's quarterly scientific journal, visit [GIA.edu](http://GIA.edu)



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The World's Foremost Authority in Gemology™

## Laboratory-Grown Diamonds and the GIA Laboratory-Grown Diamond Reports



**GIA**<sup>®</sup>

Gemological Institute of America®

## Overview

Natural diamonds have long fascinated mankind with their unique physical and visual properties. Features such as exceptional hardness, durability, light reflectivity (brilliance) and dispersion (fire) distinguish them from other gems. The beauty and universal appeal of natural diamonds come at a price, as the recovery and fashioning of such rare gems are challenging.

For decades, researchers have sought to create diamonds in laboratories. Research began in the early 1900s, but success in synthesizing diamonds did not occur until the mid-1950s. Gem-quality laboratory-grown diamonds, also known as man-made diamonds, took another couple of decades to perfect, however the growth rate was slow and the cost was high.

*A rapid increase in laboratory-grown diamond growth technology over the past decade has added to their availability in the jewelry market as an alternative to natural diamonds.*

GIA has followed the developments of laboratory-grown diamonds for 60 years. This continuum — combined with fundamental research on tens of millions of natural diamonds — enables GIA to accurately identify laboratory-grown diamonds and offer reports that fit the needs for describing these stones.

## Laboratory-Grown Diamonds

Unlike natural diamonds, laboratory-grown diamonds are grown over a very short period of time — typically two to three weeks or less. A longer growth period results in larger crystals, however, steady heat and pressure must be maintained to ensure the formation of high-quality gem crystals. While laboratory-grown diamonds in melee sizes are most often encountered in the industry, larger stones are available and their marketing can benefit from an association with a GIA Laboratory-Grown Diamond Report.



Laboratory-grown rough diamond crystals created by the HPHT process display a distinctly different shape than natural rough diamonds.

*Courtesy: New Diamond Technology*

Two crystal growth methods are used to create laboratory-grown diamonds: HPHT and CVD. HPHT (high pressure, high temperature) synthesis, developed in the 1950s, uses high temperatures and pressures from a molten metal and a diamond seed to initiate crystal formation. The HPHT process more closely mirrors the conditions of natural diamond formation than CVD.

The chemical vapor deposition (CVD) method produces diamonds through the use of low pressures and high temperatures in a vacuum chamber. While originally developed in the 1950s, progress on the technology for single crystal growth has been rapid during the past decade.

## GIA Laboratory-Grown Diamond Report

GIA offers a Laboratory-Grown Diamond Report that includes the same information as the GIA Diamond Report for natural D-to-Z diamonds.

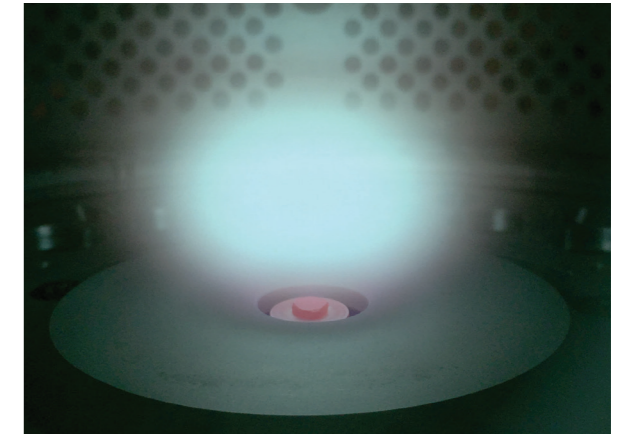
The information presented in the report is important in the marketing of laboratory-grown diamonds and, being from GIA, a respected, independent third-party, can add value. Like the GIA Diamond Grading Report for natural diamonds, the GIA Laboratory-Grown Diamond Report includes the critical information related to the diamond's cut such as polish, symmetry and, for round brilliants, a GIA cut grade. These are all factors used to understand the interplay of light patterns that affect the perceived sparkle and beauty of the diamond. Weight and measurements, as well as a GIA plotting diagram, accurately capture characteristics of the stone to aid in its re-identification.

GIA laboratory-grown diamond reports include 4Cs color and clarity specifications for laboratory-grown diamonds on the same scales as GIA's grading reports for natural diamonds. The specifications do not correlate to nature's continuum of rarity. The digital-only reports for

laboratory-grown diamonds have a distinct format to fully different from reports for natural diamonds. The laboratory-grown diamond's girdle is laser inscribed with "Laboratory-Grown" and the GIA report number.

## Identification

Identifying laboratory-grown diamonds is complex because their optical and physical properties are nearly identical to those of natural diamonds. However, because of their artificial growth environments, laboratory-grown diamonds exhibit several diagnostic features that allow GIA to readily identify them.

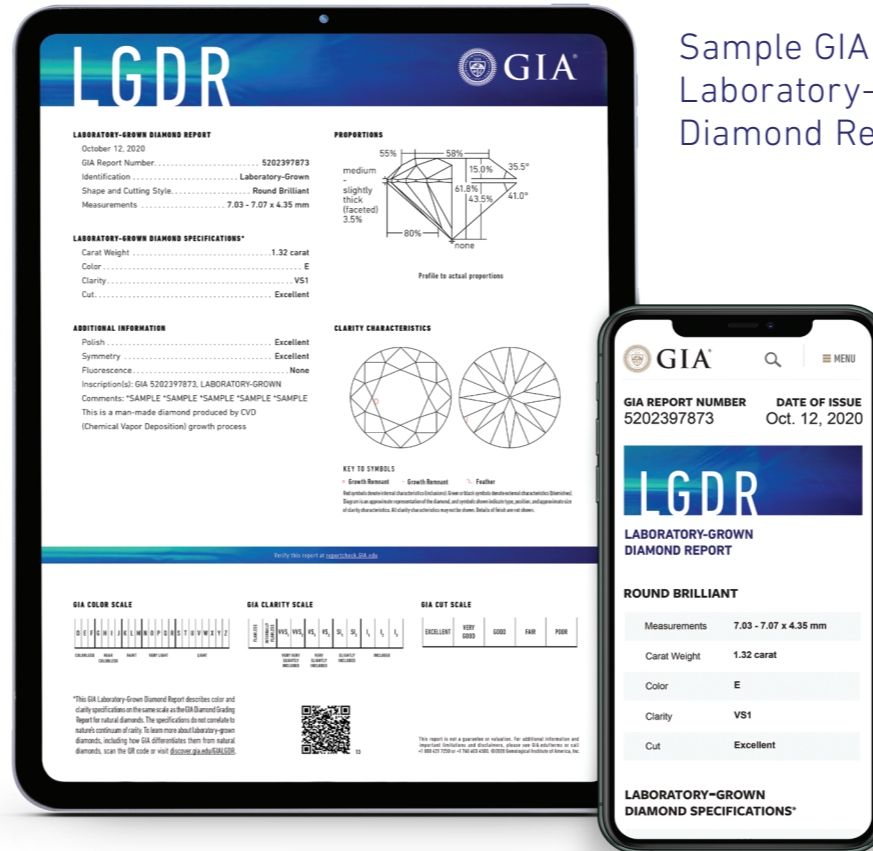


CVD diamond being formed in a CVD vacuum chamber.

## GIA's Commitment to Industry Assurance

Decades of research enable GIA to accurately identify laboratory-grown diamonds. Advancements in laboratory-grown diamond growth technology will continue to present challenges. GIA operates to ensure the public trust in gems and jewelry and will continue to make significant investments into research to understand the coming challenges and improve and expand upon its identification capabilities.

Whether a diamond is natural or laboratory-grown, it is important that it is accurately represented and the information surrounding it is not false, inaccurate or misleading. GIA's Laboratory-Grown Diamond Reports can provide this assurance to consumers and the trade.



## Sample GIA Laboratory-Grown Diamond Report

**LABORATORY-GROWN DIAMOND REPORT**  
 October 12, 2020  
 GIA Report Number ..... 5202397873  
 Identification ..... Laboratory-Grown  
 Shape and Cutting Style ..... Round Brilliant  
 Measurements ..... 7.03 - 7.07 x 4.35 mm

**LABORATORY-GROWN DIAMOND SPECIFICATIONS\***  
 Carat Weight ..... 1.32 carat  
 Color ..... E  
 Clarity ..... VS1  
 Cut ..... Excellent

**ADDITIONAL INFORMATION**  
 Polish ..... Excellent  
 Symmetry ..... Excellent  
 Fluorescence ..... None  
 Inscriptional: GIA 5202397873, LABORATORY-GROWN  
 Comments: \*SAMPLE \*SAMPLE \*SAMPLE \*SAMPLE  
 This is a man-made diamond produced by CVD (Chemical Vapor Deposition) growth process

**PROPORTIONS**  
 medium  
 slightly thick (faceted)  
 3.5%

**CLARITY CHARACTERISTICS**

**KEY TO SYMBOLS**  
 Growth Remnant Growth Remnant Feather  
 \*Remnants shown in red (characterized by a red dot) or in pink (characterized by a pink line). Report to be interpreted as presented. The diamond, cut and polish are described as natural diamonds. Clarity characteristics are shown in red. Details of inclusions are not shown.

**GIA COLOR SCALE**

**GIA CLARITY SCALE**

**GIA CUT SCALE**

**LABORATORY-GROWN DIAMOND SPECIFICATIONS\***

**ROUND BRILLIANT**

Measurements 7.03 - 7.07 x 4.35 mm

Carat Weight 1.32 carat

Color E

Clarity VS1

Cut Excellent