

STATE STANDARDS, FORMATS, SCALES, AND FONTS IN COMPUTER GRAPHICS

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Abstract: State standards play a critical role in ensuring uniformity, clarity, and accuracy in computer graphics, particularly in technical and engineering documentation. This article explores the significance of these standards, focusing on the regulation of formats, scales, fonts, and other graphic elements to maintain consistency across various industries and regions. By adhering to internationally recognized guidelines such as ISO, GOST, and ANSI, professionals can ensure interoperability, reduce errors, and improve communication in design and manufacturing processes. The article also highlights how modern software tools integrate these standards to streamline the creation of compliant technical drawings.

Keywords: State Standards, computer graphics, technical drawings, formats, scales, fonts, ISO Standards, GOST Standards, Engineering documentation, CAD Software

INTRODUCTION

Computer graphics play a crucial role in various fields, including engineering, architecture, design, and media. To ensure consistency, quality, and clarity in visual communication, many countries have established state standards that define how graphic elements should be created, formatted, and presented. These standards regulate aspects such as formats, scales, and fonts—each playing a vital role in professional and technical drawings. This article explores the importance and function of these components in computer graphics.

State Standards in Computer Graphics

Computer graphics have become a cornerstone of modern communication in fields such as engineering, architecture, design, and manufacturing. With the increasing reliance on digital tools to create technical drawings and visual representations, it is crucial that these graphics maintain a consistent structure and quality. State standards play a vital role in ensuring that computer-generated images, diagrams, and designs meet uniform technical and professional requirements.

State standards are formalized regulations or guidelines developed by governmental or authorized organizations to ensure uniformity, quality, and safety across various industries. In computer graphics, these standards regulate the creation and formatting of technical documentation and visual data.

Examples include:

- ISO (International Organization for Standardization)
- ANSI (American National Standards Institute)
- GOST (Russian national standards)

- DIN (German Institute for Standardization)

These bodies publish technical documents that define rules for how graphics should be prepared, formatted, and interpreted.

Importance of State Standards in Graphics

State standards ensure that technical documents and graphical elements:

- Maintain clarity and readability
- Comply with legal and industrial requirements
- Are interpretable across departments, companies, and even countries
- Prevent errors in construction, manufacturing, or interpretation

For example, a technical drawing of a machine part must follow specific standards for scale, dimensioning, text font, and line weight so that any professional—regardless of location—can understand it.

Common Areas Governed by Standards

1. Drawing Formats
 - Paper sizes (A0 to A4 as per ISO 216)
 - Border and title block layout
 - Orientation and margins
2. Line Types and Thickness
 - Defined line styles for contours, hidden edges, and centerlines
 - Specific thickness ratios to differentiate elements
3. Scales
 - Standard scales (e.g., 1:1, 1:10, 10:1) defined by ISO 5455 or GOST 2.302
 - Proper scale notation for reduced or enlarged views
4. Fonts and Lettering
 - Font type, height, and spacing (e.g., ISO 3098 or GOST 2.304)
 - Capital lettering for better visibility
 - Monospaced fonts often preferred for clarity
5. Dimensioning and Tolerancing
 - Units of measurement
 - Tolerance symbols and placement
 - Geometrical dimensioning rules

Benefits of Using Standards

- Interoperability: Designs created in one system or country can be read and used by others.
- Quality Control: Ensures a consistent and high-quality output.
- Efficiency: Reduces confusion and speeds up the design and approval process.
- Error Reduction: Minimizes misunderstandings that could lead to costly production mistakes.

Application in Modern Software

Popular CAD (Computer-Aided Design) and graphic software, such as AutoCAD, SolidWorks, and Adobe Illustrator, often include built-in templates and tools that comply with international or local standards. This helps professionals automatically align with regulatory requirements during the design process.

State standards are official regulations or guidelines issued by national or international organizations (such as ISO, ANSI, GOST, or regional bodies) to unify technical documentation. In computer graphics, especially in engineering and design, state standards ensure:

- Uniformity and clarity in documentation
- Interoperability between different software and industries
- Accuracy in communication of design concepts
- Legal compliance in technical production

For instance, the Russian GOST or the ISO 128 standards guide the design of technical drawings across industries, providing specifications on layout, dimensions, text usage, and more.

Formats in Computer Graphics

Formats refer to the standard sizes and layouts used in technical and graphic documents. These include paper sizes (e.g., A0, A1, A2, A3, A4) and digital file types (e.g., .DWG, .DXF, .SVG, .PDF).

Paper Formats:

- Defined by ISO 216 (e.g., the A-series paper sizes)
- Common in architectural and engineering drawings
- Chosen based on the complexity and scale of the design

File Formats:

- Vector formats (.DWG, .SVG) are used for scalable and editable designs
- Raster formats (.PNG, .JPG) are used for images and renderings
- PDF is commonly used for sharing finalized graphics

Standardization of formats ensures that documents can be shared, printed, and archived without loss of quality or misinterpretation.

Scales in Technical Graphics

Scale is the ratio between the real-world size of an object and its representation in a graphic. Since many objects (like buildings or machinery) are too large or small to be drawn at their actual size, scales are used to represent them accurately on a manageable format.

Common Engineering Scales:

- Enlarged: 2:1, 5:1, 10:1
- Reduced: 1:2, 1:5, 1:10, 1:100, 1:500
- Full scale: 1:1

Standards such as ISO 5455 or GOST 2.302 define how to apply and label scales in drawings. The correct use of scale ensures precise communication and eliminates errors in construction or manufacturing.

Fonts in Computer Graphics

Fonts (or typefaces) are standardized in technical drawings to maintain legibility and professionalism. State standards typically specify:

- Font type (often sans-serif or monospaced)
- Font height (e.g., 2.5mm, 3.5mm, 5mm)
- Line thickness
- Spacing between characters and lines

In engineering drawings, fonts must be clear, unambiguous, and easy to read even when printed in small sizes. Standards like ISO 3098 define font styles and sizes for technical lettering.

Why Fonts Matter:

- Ensure consistency across documents
- Enhance readability, especially in blueprints or complex diagrams
- Prevent misinterpretation of critical information (e.g., dimensions, part numbers)

CONCLUSION

Standards for formats, scales, and fonts in computer graphics are more than just formal requirements—they are essential tools for clear and accurate communication in technical and creative disciplines. Adhering to state standards helps professionals across industries to collaborate effectively, avoid costly mistakes, and produce high-quality, universally understandable graphics.

As digital tools evolve, the importance of maintaining these standards continues to grow, ensuring that technology enhances—not complicates—the clarity and precision of visual information.

State standards in computer graphics are not just bureaucratic rules—they are essential guidelines that enhance the effectiveness and accuracy of visual communication. Whether drafting a blueprint for a building or designing a component for an engine, adhering to these standards ensures that the work is understood, accepted, and properly implemented across various platforms and professional fields.

References

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- International standard that defines general rules for the layout, symbols, and lettering of technical drawings.
- ISO 128 Overview
- 2. ISO 5455 – Technical Drawings — Scales
 - Specifies standard scale ratios used in technical drawings.
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 - Defines the standard paper sizes used internationally (A4, A3, etc.).
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- 4. ISO 3098 – Technical Product Documentation — Lettering
 - Establishes standardized lettering styles and sizes used in engineering drawings.
 - ISO 3098 Reference
- 5. GOST 2.301–68 – Unified System for Design Documentation (ESKD): Formats
 - Russian national standard for drawing formats within engineering and construction documents.
- 6. GOST 2.304–81 – Unified System for Design Documentation: Fonts
 - Specifies lettering requirements for engineering graphics in Russia and CIS countries.
- 7. ANSI Y14.5 – Dimensioning and Tolerancing
 - U.S. standard defining how dimensions and tolerances are represented on technical drawings.
 - ANSI Y14.5 Overview
- 8. DIN Standards (Germany) – Especially DIN 6771 and related to technical drawing documentation.