
I N T E R S T A N D A R D

Unified System of Design Documentation
BASIC REQUIREMENTS FOR DRAWINGS**GOST**
2.109-73

Date of introduction 01.07.74

This Standard establishes the basic requirements for executing the components, assembly, outline and installation drawings at a stage of the working documentation development for all industries.

(Amended Wording, Amendment No. 8).

1. GENERAL REQUIREMENTS FOR WORKING DRAWINGS**1.1. General provisions**

1.1.1. The following shall be provided when developing the working drawings:

- a) Optimal application of standard and bought items, and also the items of commercial production, conforming to the modern technics level;
- b) Rationally bounded nomenclature of threads, slots and other design elements, their dimensions, coatings, etc.;
- c) Rationally bounded nomenclature of material grades and assortments, and also application of the cheapest and least scarce materials;
- d) The necessary degree of interchangeability, the most advantageous modes of the items production and repair, and also their maximal serviceability during the operation.

1.1.2. Interstate, state, national and branch standards and specifications may be referred to in the drawings, provided that they fully and uniquely specify the appropriate requirements.

When there are references to specifications in the drawings for items of serial and mass production, these specifications shall be registered in accordance with the established procedure (in the states where state registration of specifications is obligatory).

It is allowed to make references to technological instructions, provided that the requirements established in these instructions are unique and guarantee the required item quality; in this case the instructions shall be enclosed to the complete set of the item design documentation when transferring it to the other enterprise.

Plant (corporation) standards may be referred to in the drawings for auxiliary process items.

Separate clauses of standards, specifications and technological instructions may not be referred to. The whole document or its separate section may not be referred to in the drawing, if necessary.

The documents, specifying the shape and dimensions of the item design elements (facet, thread, etc.), may not be referred to, if there are no designations of these elements in appropriate standards. All the data for their production shall be specified in the drawings.

(Amended Wording, Amendments Nos. 4 and 10).

1.1.3. Technological instructions are not allowed in the working drawings.

By way of exception it is allowed:

- a) To specify the production and control modes if they are unique and guarantee the required item quality, for example, joint processing, joint bending or flaring, etc.;
- b) To give the instructions on the choice of technological billet type (cast, forged piece, etc.);
- c) To specify a certain technological technique ensuring the item separate technical requirements which cannot be expressed by objective parameters or values, for example, ageing process, vacuum impregnation, gluing procedure, inspection, pump element conjugation, etc.

1.1.4. Various instructions on items production techniques and inspection are allowed in the drawings designed for use at particular enterprise, for the items of basic individual* and auxiliary process.

1.1.5. Conventional designations (signs, lines, alphabetic and alphanumeric designations) established in state standards shall be applied in the drawings.

Conventional designations shall be applied without their explanation in the drawing and with no standard number indicated. The exception is for conventional designations in which the standard number shall be specified, for example center hole C12 GOST 14034.

Notes:

1. If there are no corresponding conventional designations in state standards, the conventional designations established in branch standards shall be applied with the obligatory references to them.
2. It is allowed to apply conventional designations, which are not specified in state and branch standards. In these cases the conventional designations shall be explained in the drawing field.

1.1.6. The conventional signs dimensions not specified in standards shall be determined taking into account the drawing visualization and clearness and be identical when multiply repeated.

1.1.7. The dimensions, maximum deviations, roughness of surfaces and other data, which the item shall conform to before assembly (see figure 1a), shall be specified in the item working drawing.

The exception is for the case specified in clause 1.1.8.

The item elements dimensions, maximum deviations and roughness of surfaces, obtained as a result of processing during assembly or after it, shall be specified in the assembly drawing (see figure 1 b).

(Amended Wording, Amendment No. 3).

1.1.8. An item, whose manufacturing provides for an allowance of subsequent machining of separate elements during assembly, shall be represented in the drawing with the dimensions, maximum deviations and other data, which it shall conform to after finishing. Such dimensions shall be parenthesized, and an inscription such as: "The parenthesized dimensions are applicable after assembly" (see figure 1 c) shall be made in the technical requirements.

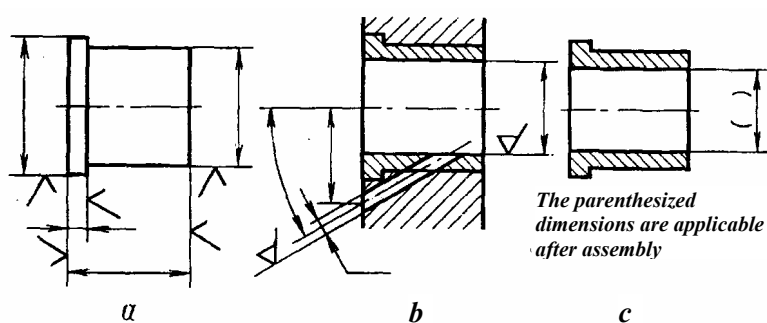


Fig. 1

1.1.9. For the items subjected to coating, the dimensions and roughness of surface before coating shall be specified in the working drawings. The dimensions and roughness of surface before and after coating may be specified simultaneously. In this case the dimension lines and surface roughness designations before coating and after coating shall be drawn as shown in figure 2.

If it is necessary to specify the dimensions and roughness of surface only after coating, the appropriate dimensions and surface roughness designations shall

* Rules for execution of drawings for items of individual production apply as well to auxiliary process.

be marked with the sign “*”, and an inscription such as: “*The dimensions and roughness of surface after coating” shall be made in the drawing technical requirements (see figure 3).

1.1.10. An individual drawing shall be executed for every item. An exception is made for a group of items, having common design features, for which a group drawing in accordance with GOST 2.113 shall be executed.

1.1.11. Every drawing shall have the main inscription and additional columns to it in accordance with the requirements of GOST 2.104.

1.1.12. The main inscription columns shall be filled in view of the following additional requirements:

In case the drawing is executed on several sheets, the same designation shall be specified on all the sheets of this drawing;

The item mass shall be specified in column 5 as follows: the estimated mass shall be specified in the drawings for pilot samples manufacture, and the actual mass shall be specified in the drawings starting from the letter O₁. In this case the actual mass shall be understood as the mass determined by measurement (weighing the item).

It is allowed to specify the estimated mass in the drawings of items for individual production, items with big mass, and also for large-dimensioned items whose mass determination by weighing causes difficulties. In this case in the drawings of items, developed by the order of the Ministry of Defense, the estimated mass indication is allowed only by agreement with the customer (or customer representative).

The item mass shall be specified in kilograms without measurement unit indication.

It is allowed to specify the mass in other measurement units with their indication, for example 0.25 t or 15 t.

The maximum deviations of item mass may be specified, if necessary, in technical requirements of the drawing.

The mass be not be specified on the outline and assembly drawings, and also in the drawings of components of pilot samples and individual manufacture.

(Amended Wording, Amendment No. 6).

1.1.13. The item name in the main drawing inscription shall correspond to the accepted terminology and shall be as brief as possible.

The item name shall be written in the singular Nominative case.

The data of the item purpose and location are not generally included into its name.

1.1.14. If the edge (rim) shall be executed sharp or rounded the appropriate indication shall be put onto the drawing. If there are no indications for the edge or rim shape in the drawing, they shall be dulled.

In this case the dulling (facet, radius) dimension may be specified if necessary. It shall be placed near to the sign “L”, for example as shown in figure 3a.

(Amended Wording, Amendment No. 9).

1.1.15. If the finished items shall have center holes executed in accordance with GOST 14034, they shall be indicated conventionally by the sign \angle , with designation indication in accordance with GOST 14034 in the leader-line. If there are two identical holes only one of them shall be indicated (see figure 4a).

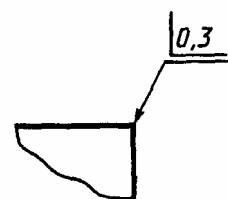


Fig 3a

If the center holes in the finished item are inadmissible the sign \angle shall be indicated (see figure 4b).

If the presence of center holes is structurally indifferent they shall not be indicated and shall not be placed in the technical requirements.

(Amended Wording, Amendment No. 7).

1.1.16. In justified cases (for example, when the dimensions in the drawing are changed during its development, when the drawing renewal is inexpedient, when the blank drawings* are used, etc.) is allowed to deviate from the image scale if it does not deform the image presentation and does not complicate the drawing reading during manufacture.

(Amended Wording, Amendments No. 2 and 8).

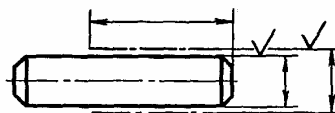


Fig 2

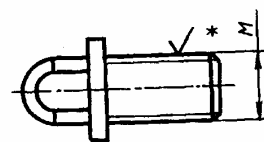


Fig 3

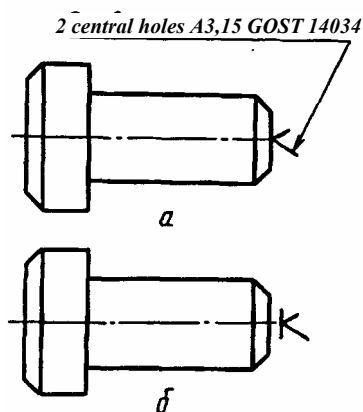


Fig 4

1.2. Drawings of commonly processed items

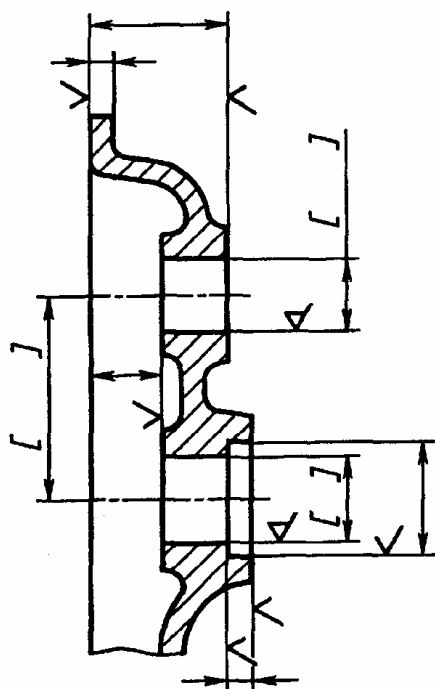
1.2.1. If individual item elements shall be processed before with another item assembly together (and for this purpose these elements, such as half-bodies, crankcase components, etc. are temporarily coupled and fastened), the individual drawings for both items shall be issued in general order. These drawings shall contain all the dimensions, maximum deviations, surface roughness and other necessary data.

The dimensions with maximum deviations for elements, processed together, shall be put into square brackets and the following note shall be included in technical requirements: "Processing by square-bracketed dimensions shall be executed together with ..." (figure 5).

1.2.2. In complex cases during indication of dimensions, connecting different surfaces of both items, the full or partial simplified image of another item, executed by continuous thin lines (figure 6), shall be placed close to the image of one of the items, reflecting the coprocessing conditions with maximum completeness. The issue of individual drawings for coprocessing is not allowed.

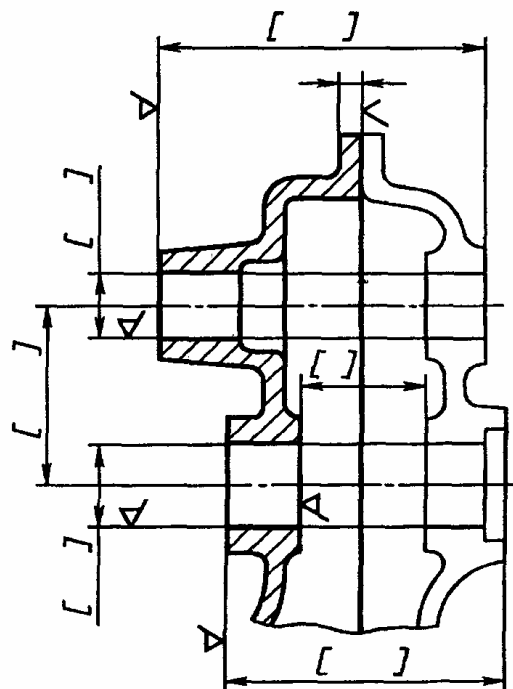
1.2.3. The technical requirements referring to the surfaces processed together shall be placed in the drawing where all the coprocessed items are shown. The indications for coprocessing shall be placed onto all the drawings of coprocessed items.

1.2.4. If individual item elements shall be processed by another item and (or) shall be fitted to it, the dimensions of such elements shall be marked near the image with sign "*" or with a letter symbol, and the appropriate indications shall be specified in the technical requirements of the drawing (figure 7).



1. Processing by square-bracketed dimensions shall be executed together with component ...
2. The components shall be applied together.

Fig 5



1. Processing by square-bracketed dimensions shall be executed together with component ...
2. The components shall be applied together.

Fig 6

* **Blank-drawings** are the blanks of design documents which are used after the missing dimensions and other necessary data are inserted into them.

1.2.5. When processing of holes for set screws, rivets and pins shall be executed during the item assembly with other items without pre-processing the hole with smaller diameter, the hole components shall not be shown in the drawings and no indications shall be inserted in the technical requirements.

All necessary data for processing of such holes (such as the image, dimensions, surface roughness, arrangement coordinates and the number of holes) shall be placed in the assembly drawing of the item, which the given item is included in as a component (figure 8).

In case the taper pins are applied, the item assembly drawings shall only contain the data for hole surface roughness and also the number of holes specified under the leader-line with the pin position number.

1.2.6. The blank image shall not be placed in the drawing of item, received by blank cutting into the parts and interchangeable with any other item manufactured from other blanks by the same drawing (figure 9).

1.2.7. One drawing shall be developed for the item, received by blank cutting into the parts or consisting of two and more coprocessed parts used only together and not interchangeable with the same parts of another similar item (figure 10).

1.3. Drawings of items with additional processing or alteration

1.3.1. The drawings of items, manufactured with additional processing of other items, shall be executed considering the following requirements:

a) The blank-item shall be shown by continuous thin lines, and the surfaces received by additional processing, newly-introduced items and the items installed in place of present ones shall be shown by continuous base lines.

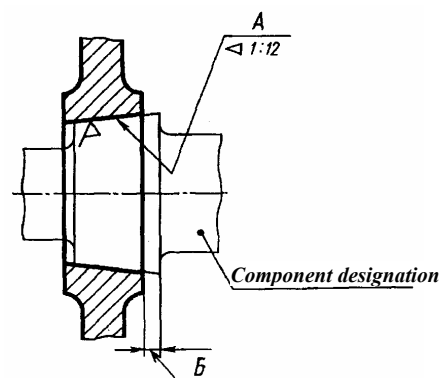
The components removed during alteration shall not be shown;

b) Those dimensions, maximum deviations and surface roughness designations, required for additional processing, shall be only specified (figure 11).

It is allowed to specify the reference, dimensional and connecting dimensions.

It is allowed to show only a part of a blank-item whose elements shall be additionally processed.

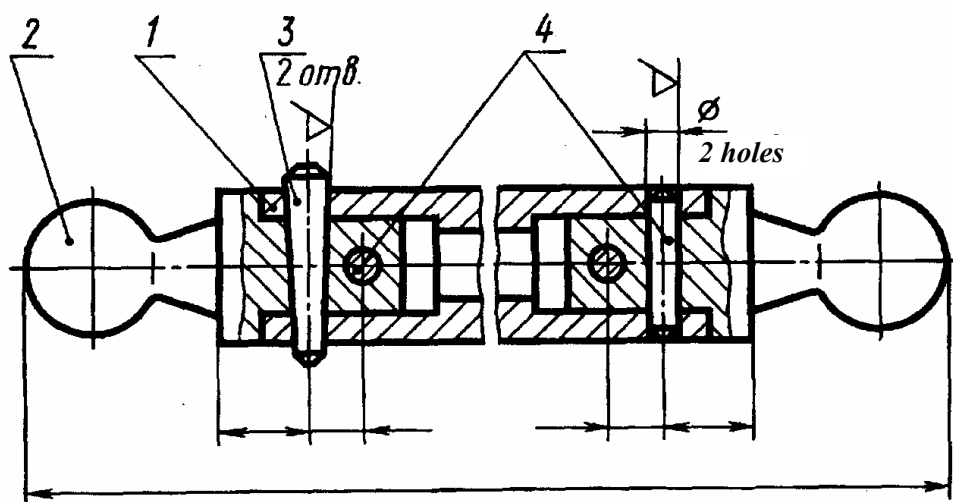
1.3.2. The text "Blank" and the blank-item designation shall be specified in column 3 of the basic inscription in the drawing of component manufactured by additional blank processing.



1. Surface A shall be processed by component..., providing the dimension B.
2. The components shall be applied together.

Fig 7

Assembly drawing



Drawings of components

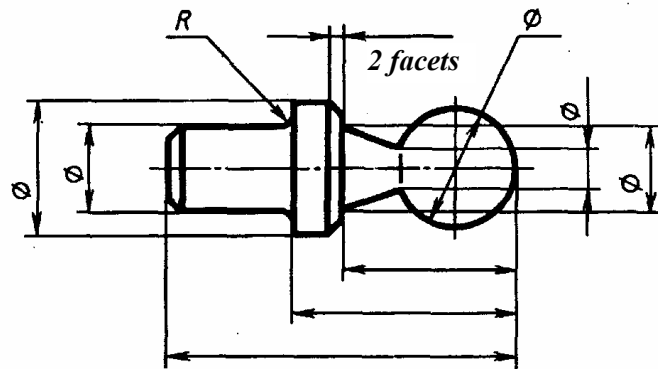
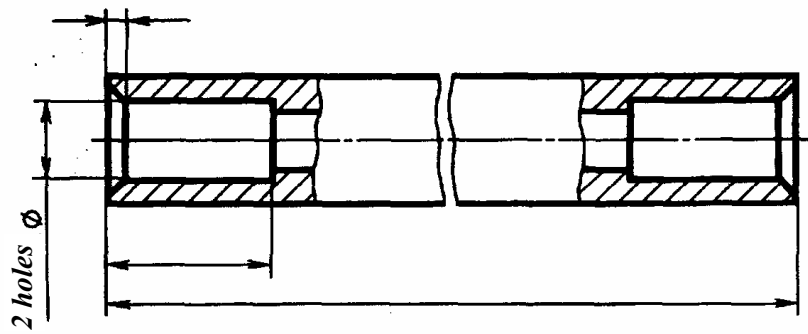


Fig 8

A-A

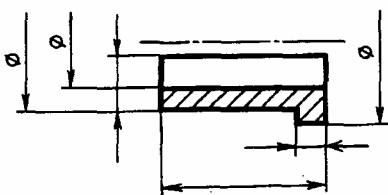


Fig 9

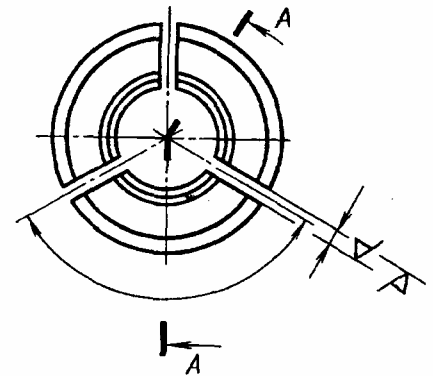
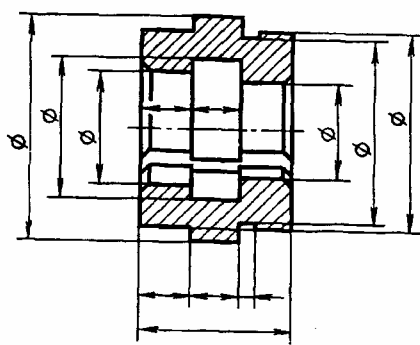


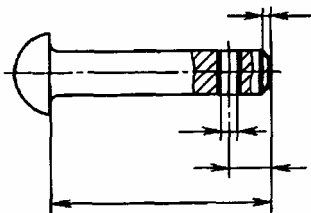
Fig 10

1.3.3. The blank-component shall be recorded in appropriate section of the item specification. In this case the column "Position" shall be dashed.

The text "Blank for... XXXXXX..." shall be specified in brackets in the column "Name" after the blank-item name.

(Amended Wording, Amendment No. 6).

1.3.4. If an assembly unit is used as the blank-item the drawing of item, manufactured from the blank, shall be executed as an assembly. The blank-item and other items installed during alteration shall be recorded in specification of this item. An individual designation shall be assigned to the altered item.



It is allowed to specify in the drawing technical requirements the assembly units and components which are replaced with newly-installed ones and those eliminated without replacement during alteration, for example: “Components 4 and 6 shall be installed in place of present bead and bush”, “Present bush shall be removed”, etc.

1.3.5. If the completion of item, being an assembly unit, consists in removal or replacement of its components, the assembly drawing for the modified item may not be issued. The specification for such an item shall be carried out in accordance with GOST 2.106 considering the following peculiarities:

the modified item shall be recorded in “Assembly units” section as the first position;

the components removed from the modified items shall be recorded after the position number by the modified item specification into appropriate sections under the “Removed components” heading;

the newly-installed components shall be recorded into appropriate sections under the “Newly-installed components” heading with indication of position numbers, which are the continuation of positions specified in the modified item.

Note. The specified method may not be applied for purchased item completion.

(Subsequently Inserted, Amendment No. 6).

1.4. Item drawings with inscriptions, signs and photographs

1.4.1. The inscriptions and signs, marked on the flat item surface, shall be generally shown on the appropriate view completely, irrespective of the marking technique. Their arrangement and typeface shall correspond to the requirements presented to the finished item. If these items in the drawing are shown with breaks it is allowed to draw the inscriptions and signs on the image incompletely and to specify them in the technical requirements of the drawing.

1.4.2. If the inscriptions and signs shall be put on cylindrical or tapered surface, the inscription image as a scanning shall be placed in the drawing.

On the view, where the inscriptions, figures and other data are projected with distortion, it is allowed to represent them without distortion. It is allowed to represent on such a view only a part of the drawn data, necessary for connection between the view and the scanning (figures 12 and 13).

1.4.3. In case of symmetric inscription arrangement relative to the component contour, the maximum arrangement deviations shall be generally specified in the technical requirements in place of the dimensions defining the inscription arrangement (figure 14).

(Amended Wording, Amendment No. 6).

1.4.4. The following data shall be specified in the drawing (figure 15):

- drawing method of inscriptions and signs (such as etching, stamping, coining, photographing, etc.),
- coating of all item surfaces,
- coating of the front face background,
- coating of the drawn inscriptions and signs.

1.4.5. If the drawing of inscriptions, signs or other images onto the item shall be carried out by photographing or contact printing directly from the original of the item working drawing, the drawing (figure 16) shall be executed with meeting the following requirements:

a) The item shall be drawn in full scale or in enlarged scale. The scale shall be chosen depending on the image drawing technique (for example, for contact printing the scale shall be equal to 1:1);

b) There shall be no construction lines on the item image. All necessary dimensions, and also dimensional and remote lines shall be located in the drawing area outside the image.

The dimensions of holes executed in the item may be specified in the technical requirements.

1.4.4 and 1.4.5. (Amended Wording, Amendment No. 5).

1.4.6. If it is expedient to draw the image onto the item by photographing from the original of any design document (for example, from the basic electric circuit), the drawing of such an item (figure 17) shall be executed with meeting the following requirements:

a) the drawn images shall not be traced;

b) The limits of image arrangement shall be indicated with continuous thin line inside the item contour;

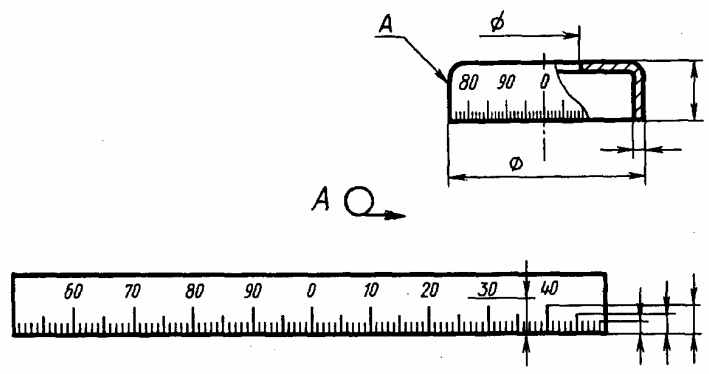


Fig. 12

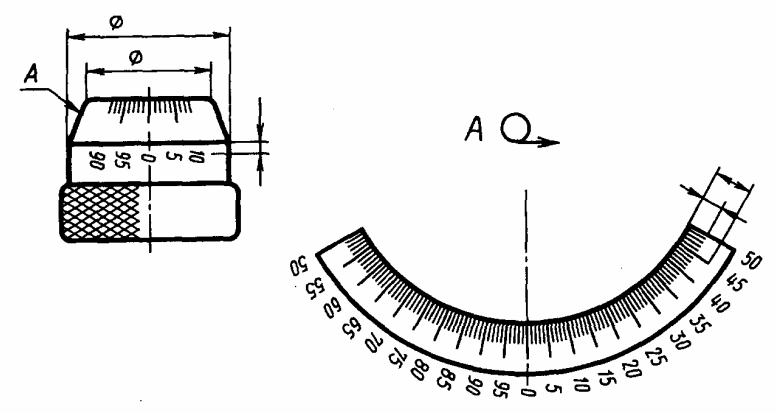
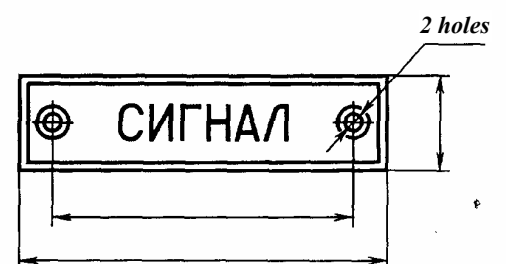
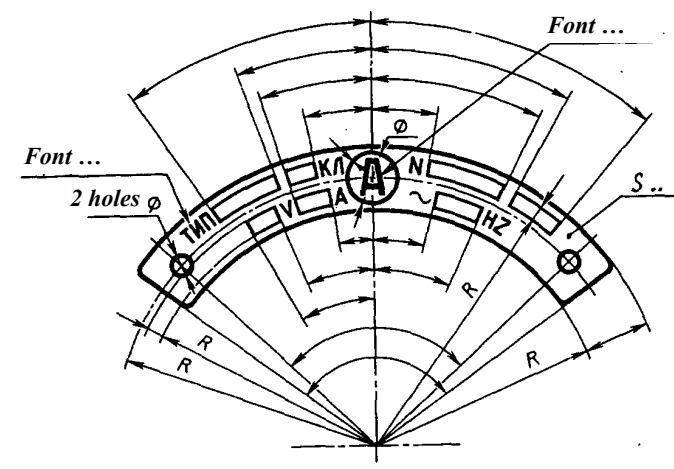


Fig. 13



Deviation from symmetric inscription arrangement of no more than 0.5 mm.

Fig 14



1. Photochemical flat etching:
 - a) Front face background shall have black color;
 - b) Inscriptions, letters, signs and platform shall have metal color.
2. The type shall be in accordance with specifications and technical documentation.

Fig 15

Name	Qty	Stock	Document number
Screw	8	3	
Screw	4	3	
Lamp БЖ7	4	6	
Short screwdriver A	1	5	
Cloth (white baize)	2	2	
Selcyn ИЛ-404П (2 cl.)	1	1	
Resistor ПЭ-50-350 $\Omega \pm 10\%$	4	8	
Glass ($\varnothing 1,00 \times 5$ mm)	2	9	
Electric motor АПП-363А	2	2	
Completed by	Quality Control Department		

160

120

*White background; black inscriptions and lines.
External contour line serves as the cut line*

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Изд. и дата

Fig 16

c) Designation of document, the photographing shall be made from, shall be specified in the drawing field or inside the item contour. The additional data for indication of the document part subject to photographing shall be also specified;

d) The inscriptions, signs and other data, subject to be added to the plotted image and missing in the document, shall be drawn within the item contour with indication of the necessary dimensions and coordinates.

1.5. Drawings of items manufactured in various technological versions

1.5.1. The drawings, admitting the item manufacture in two and more technological versions, shall be carried out in accordance with the rules established for the drawings of components and assembly drawings considering the additional requirements specified in Clauses 1.5.2 to 1.5.8.

Note. The technological versions are such versions of item execution which are stipulated in the drawings as applied to different certainly known industrial conditions or technological methods and manufacturing means.

The technological versions shall not break the item interchangeability, performance and operational qualities.

1.5.2. A separate drawing with an individual designation shall be issued for each component manufacture version, differing from other versions by manufacturing technique (such as casting, die forging, welding, pressing from press material, etc.).

1.5.3. An indication for permissible changes shall be put in the drawing of the component, which may be manufactured in different versions, varying by design elements or their shape (such as the flutes for tool output, the facets, the rolled or cut thread, etc.). An additional image with a "Version" inscription above it shall be put if necessary. In case of several versions the version number shall be specified in the inscription. The indications allowing the components manufacture in accordance with the represented version shall not be specified in the drawing (figure 18).

1.5.4. If the assembly drawing is provided with the versions of item components manufacture by individual drawings (for example, the components manufactured from metal casting or from stamping forging, or pressed from plastic), all the versions shall be recorded into the specification of this assembly unit in separate positions by individual designations.

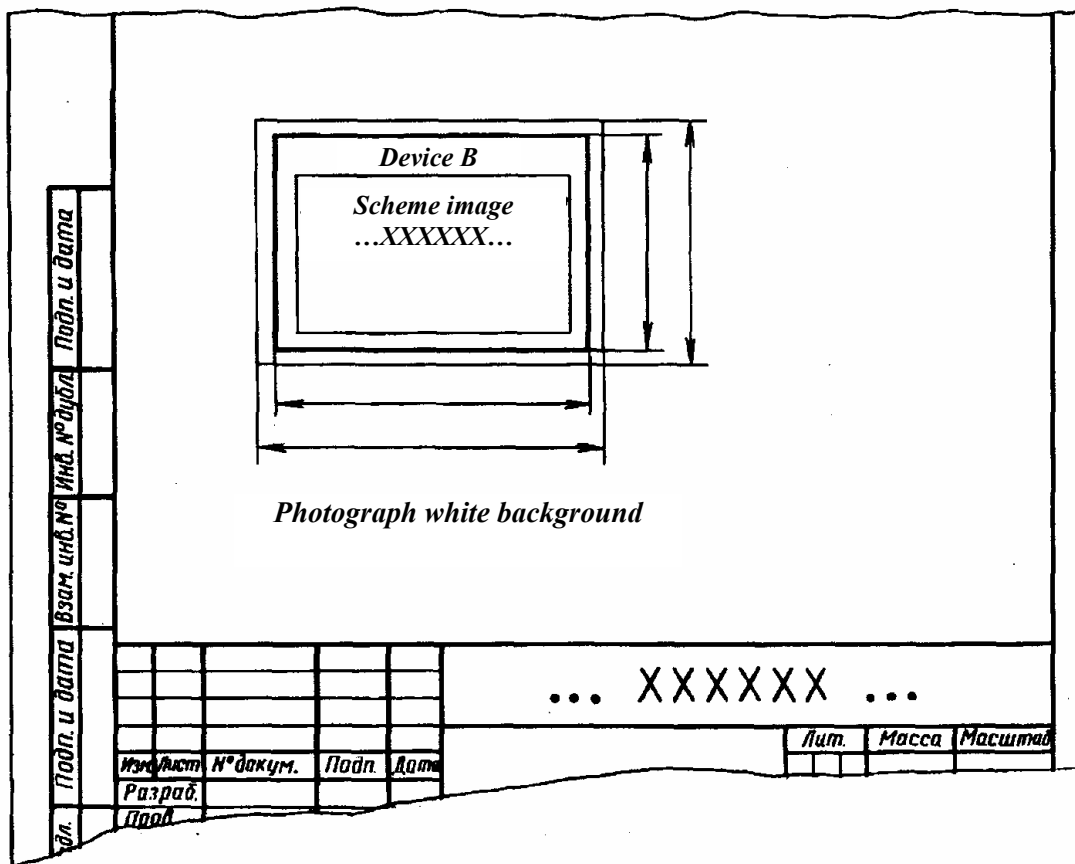


Fig 17

The number of components in the "Quantity" column shall not be indicated in specification, and the text "...pieces, tolerance, replacement with position..." shall be specified in the "Note" column. The position numbers for all the component versions shall be specified in the leader-line of the component image, for example: "6 or 11"

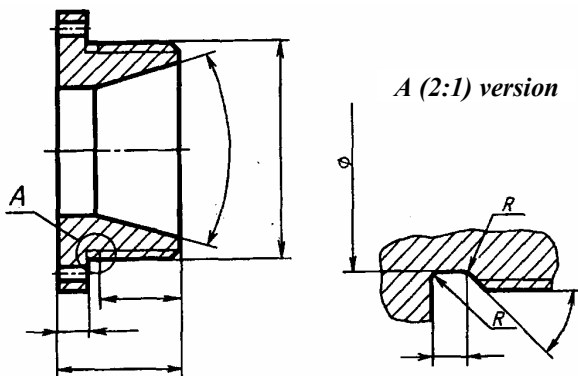


Fig 18

1.5.6. The assembly drawing of the item, which the component with various manufacturing versions (in accordance with Clauses 1.5.3 and 1.5.5.) is included in, shall be made out without extra indications.

1.5.7. If the item manufacturing versions imply that its components, remaining equivalent, differ by any design elements which are expedient to be shown in the assembly drawing, the appropriate additional images shall be specified.

An inscription explaining that the additional image refers to the manufacturing version shall be specified above this image.

In case of several versions the version number shall be specified in the inscription.

The positions of components, included in the versions, shall be specified in appropriate additional images (figure 19).

1.5.8. If the components manufacturing version is a split connection, consisting of several components, the assembly drawing for such a version shall not be developed.

The components making a version shall be recorded in the item specification by separate positions.

The "Quantity" column of specification shall not be filled, and the following text shall be recorded into the "Note" column:

for the basic component: "pieces, tolerance, replacement with positions...". In this case the positional numbers of all the components making the version shall be specified, as well as the number of every component;

for the components of the version (split connection): "...pieces, application with positions ... in place of positions..." (figure 20).

2. DRAWINGS OF COMPONENTS

2.1. The working drawings shall be generally developed for all the components included into the item.

It is allowed not to issue the drawings for the following components:

a) components manufactured from shaped or graded material by right-angle cutting, from sheet material by circular cutting, including cutting of a concentric hole or along the rectangular perimeter without subsequent processing;

b) one of the item components in cases specified in Clauses 3.3.5 and 3.3.6;

c) item components with one-piece connections (such as welded, soldered, riveted, pasted, knocked with nails connections, etc.), being the components of individual-produced items, if the design of such component is so simple, that three-four dimensions in the assembly drawing or one image of such component in the free drawing field is enough for its manufacture;

d) components of individual-produced items whose shape and dimensions (such as length, bending radius, etc.) are established at the place, for example, separate parts of railing and flooring, separate sheets of carcase and bulkhead plating, strips, angle bars, boards and bars, pipes, etc.;

e) purchased components subjected to anticorrosive or decorative coating, not changing the mode of interfacing with adjacent components.

The necessary data for manufacture and control of components, for which there are no drawings under issue, shall be specified in assembly drawings and in the specification.

(Amended Wording, Amendment No. 8).

2.2. The material conventional designations in the drawings of components and in the specification shall correspond to the designations established by the standards for material. If there is no standard for the material it shall be designated by specifications.

2.3. The component material designation in accordance with the standard for assortment shall be recorded in the drawing only when the component, depending on operational and requirements presented for it, shall be manufactured from a graded material having a certain structure and dimensions, for example:

Circle $\frac{40 \text{ GOST 1133-71}}{Y10 \text{ GOST 1435-90}}$

Strip $\frac{5 \times 50 \text{ GOST 103-76}}{CT3 \text{ GOST 535-88}}$

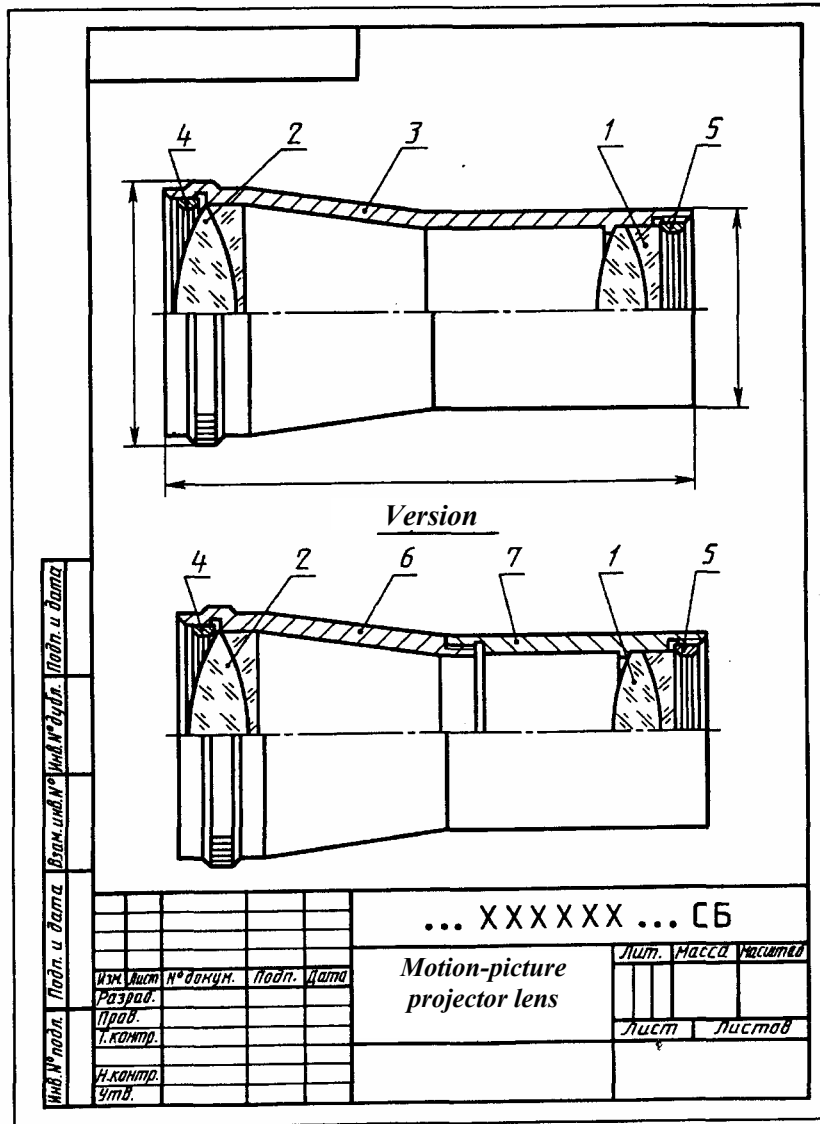


Fig 19

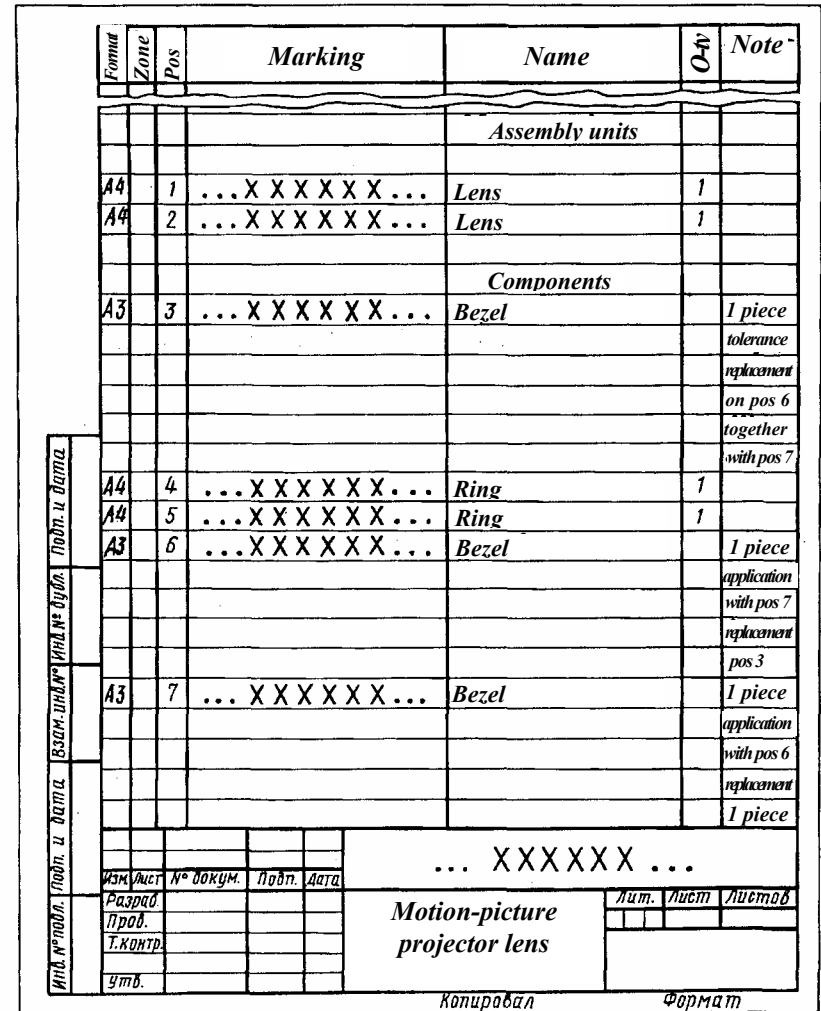


Fig 20

It is allowed not to specify in the material conventional designation the accuracy group, planeness, stretching, edge shearing, sheet length and width, tape width and other parameters if they do not effect the item (component) operational qualities. In this case the general sequence of the data recording, established by standards or specifications on materials, shall be kept.

(Amended Wording, Amendment Nos. 8 and 10).

2.4. In the basic inscription of the drawing of a component specify no more than one type of a material. If for manufacturing a component use of substitutes of a material them specify in technical requirements of the drawing or specifications a item is provided.

2.5. If the shape and the dimensions of all elements are determined in the drawing of a finished component, scanning (the image, length of scanning) do not result.

When the image of the component made flexible, does not give representation about the valid form and the dimensions of its separate elements, in the drawing of a component place partial or its full scanning. On the image of scanning render only those dimensions which cannot be specified on the image of a finished component.

Above the image of scanning place conditional graphic designation \mathcal{Q} (fig. 21).

2.6. Scanning represent continuous basic lines which thickness shall be equal to thickness of lines of a visible contour on the image of a component.

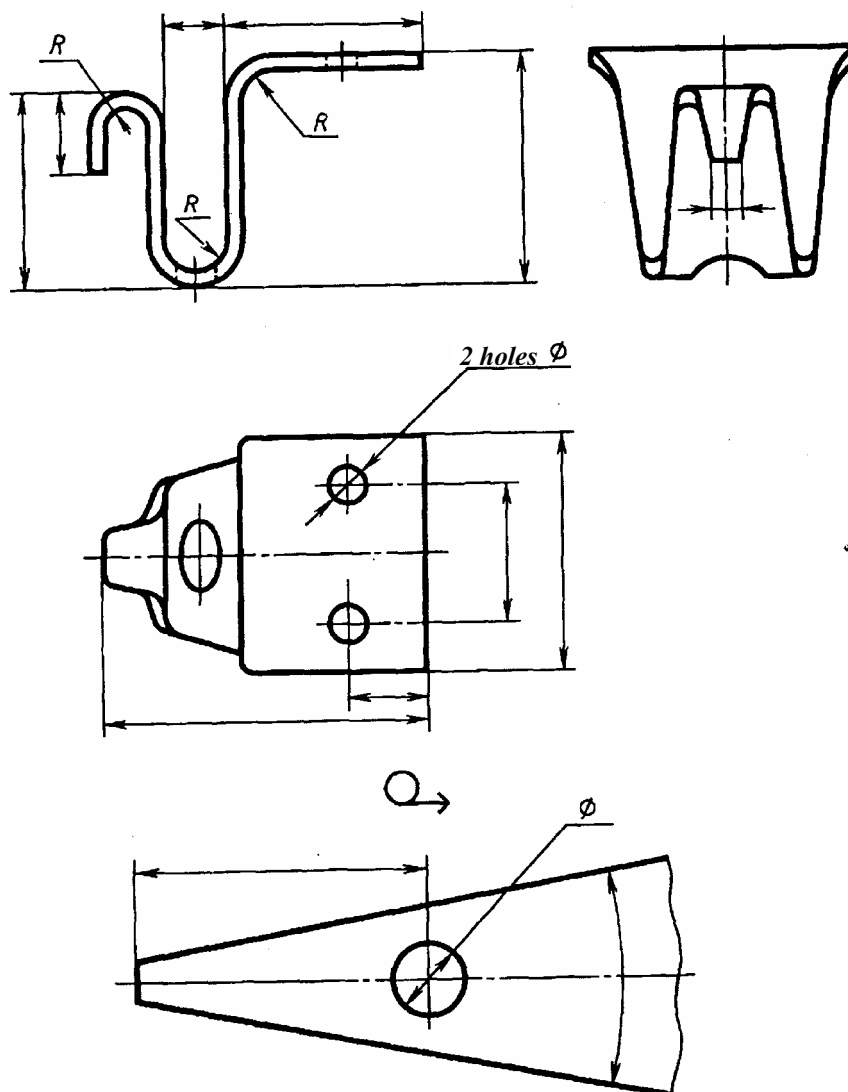


Fig 21

If necessary, on the image of scanning render the lines of bends which are carried out by a stroke - dotted thin line with two points, with the indication in the leader-line "Bending line".

2.7. It is allowed, not breaking clearness of the drawing to combine the image of a part of scanning with a type of a component. In this case scanning represent dash-and-dot thin lines with two points and conditional graphic designation $\ominus \rightarrow$ do not place (fig. 22).

2.8. Components, for which the separate elements shall be measured after change (within the limits of elastic deformations) the initial form corresponding to a free condition of a component, represent continuous basic lines in a free condition and stroke - dotted thin lines with two points - after change of the initial form of a component. The dimensions of elements which shall be measured after change of the initial form of a component, render on the image executed by thin dash-and-dot lines with two points (fig. 23).

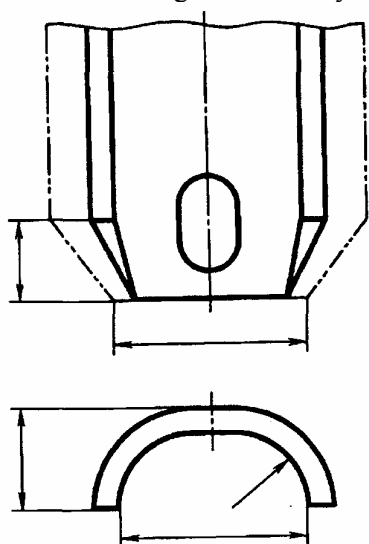


Fig 22

If the component deformable elements in free condition can have arbitrary form, then the component shall be depicted in the drawing in condition of its measurement with appropriate specifying in the drawing field (fig. 24).

2.6 to 2.8. (**Amended Wording, Amendment No. 3**).

2.9. If the component shall be made of the material having a certain direction of fibres, a basis, etc. (metal tape, fabrics, paper, tree) in the drawing it is if necessary allowed to specify a direction of fibres (fig. 25).

Indications on an arrangement of layers of a material of the component made of textolite, fiber, hardened paper or other layered material, shall be placed in technical requirements if necessary (fig. 26).

2.10. On drawings of the components manufactured from materials, having obverse and turnaround sides (leather, some types of fabrics, films, etc.), the face sheet shall be specified in the leader-line if necessary (fig. 27). Such indications are allowed to be placed and on assembly drawings of items which structure includes the components having obverse and a back (fig. 28).

2.11. Components from transparent materials represent as opaque. Put on a component from the reverse side from the observer of an inscription, figure, signs and other similar data which at a finished component shall be visible from a face sheet, represent in the drawing as visible and place the corresponding indication in technical requirements (fig. 29).

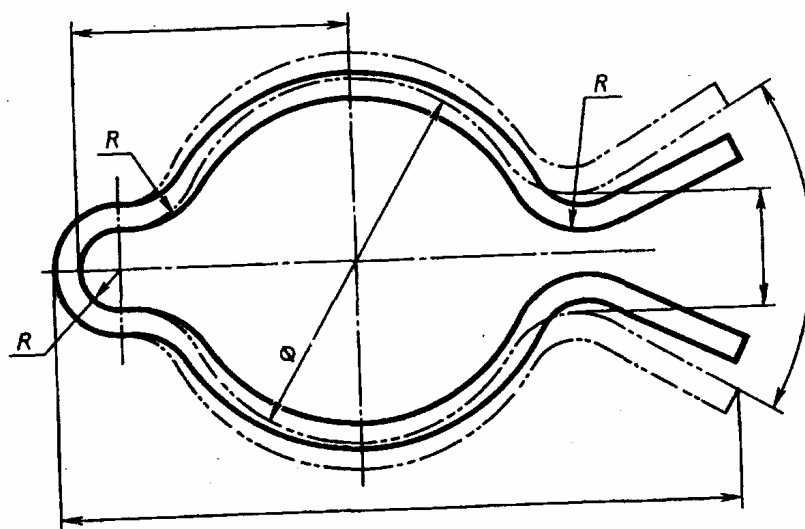


Fig 23

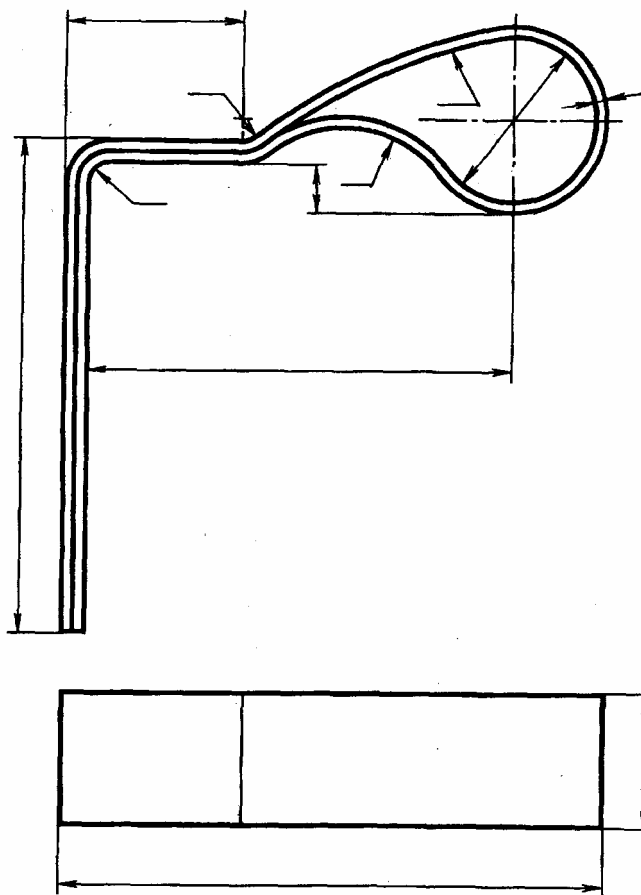
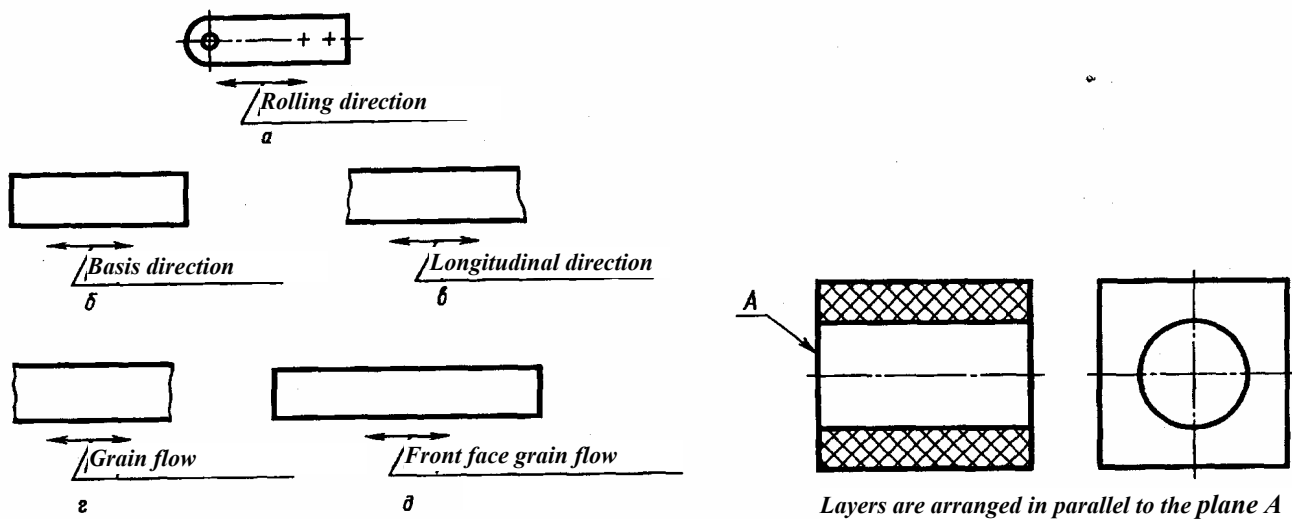


Fig 24



Layers are arranged in parallel to the plane A

a is for metal; *b* is for fabrics; *z* is for wood; *d* is for plywood.

Fig 26

Fig 25

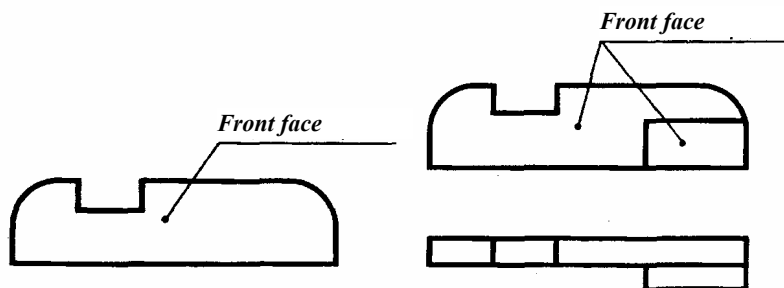
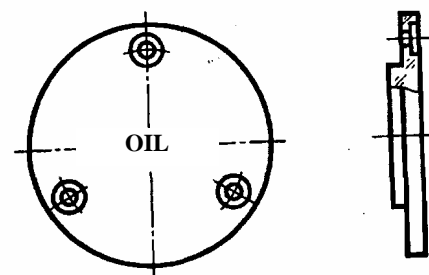


Fig. 27

Fig. 28



The inscription shall be engraved on the reverse side

Fig. 29

3. ASSEMBLY DRAWINGS

3.1. The contents, images and dimensioning

3.1.1. The number of assembly drawings shall be minimal, but sufficient for the rational organization of manufacture (assembly and control) of items. If necessary the data for item operation and about interaction of its parts shall be specified in the assembly drawings.

3.1.2. The assembly drawing shall contain:

a) The image of assembly unit giving representation about an arrangement and mutual communication(connection) of components, connected under the given drawing, and providing an opportunity of realization of assembly and the control of assembly unit.

It is allowed to place additional schematic images of connection and an arrangement of components of a item on assembly drawings;

b) The dimensions, maximum deviations both other parameters and requirements which shall be executed or controlled on the given assembly drawing.

It is allowed to specify as help the dimensions of components determining character interfaces;

c) Indications on character of interface and methods of its realization if accuracy of interface is provided with not set maximum deviations of the dimensions, and selection adjustment, etc., and also indications for execution of one-piece connections (welded, soldered, etc.);

d) Numbers of positions of the components which are included in a item;

e) Overall item dimensions;

f) Adjusting, connecting and other necessary reference dimensions;

g) Item characteristics (if necessary);

h) Gravity center coordinates (if necessary).

Notes :

1. The data specified in transfer ∂ , it is allowed not to specify in the drawings of assembly units, not being a subject of individual delivery.

2. The data specified in subclauses μ and ε of the this clause, do not place on an assembly drawing if they are specified in the other design document on the given item, for example, in the outline drawing.

(Amended Wording, Amendment No. 8).

3.1.3. During indication of the adjusting and connecting dimensions the following data shall be put: coordinates of an arrangement, the dimensions with maximum deviations of the elements serving for connection with сопрягаемыми as items;

other parameters, for example, for the cogwheels serving as elements of external connection, the module, number and direction of teeth.

3.1.4. On the assembly drawing it is allowed to represent the item movable parts in extreme or intermediate position with appropriate dimensions. If the drawing reading while representing the movable parts makes difficulties, these parts may be represented in additional views with appropriate inscriptions, for example: "Extreme position of bogie of position 5".

3.1.5. In the item assembly drawing it is allowed to place the image of boundary (neighboring) items (so-called "environment") and the dimensions defining their relative arrangement (fig. 30).

The item components located outside the environment shall be represented as visible ones. It is allowed to represent them as invisible ones if necessary.

The "environmental" subjects shall be executed simplified, and the necessary data for determination of installation place, methods of item fastening and connection shall be specified. In the cuts and sections the "environment" may not be hatched.

3.1.6. If it is necessary to specify in assembly drawing the names or designations of items making the "environment", or their elements, these indications shall be placed directly in the "environment" image or in the shelf of the leader-line led from the appropriate image, for example: "Automatic pressure device (designation)"; "Oil cooler pipe (designation)", etc.

3.1.7. In the assembly drawing of auxiliary-process item (for example, stamp, conductor, etc.) the operational sketch may be placed in the right top corner.

3.1.8. The assembly drawings shall be generally executed with simplifications corresponding to the requirements of standards of Unified System of Design Documentation and also to the requirements of this Standard.

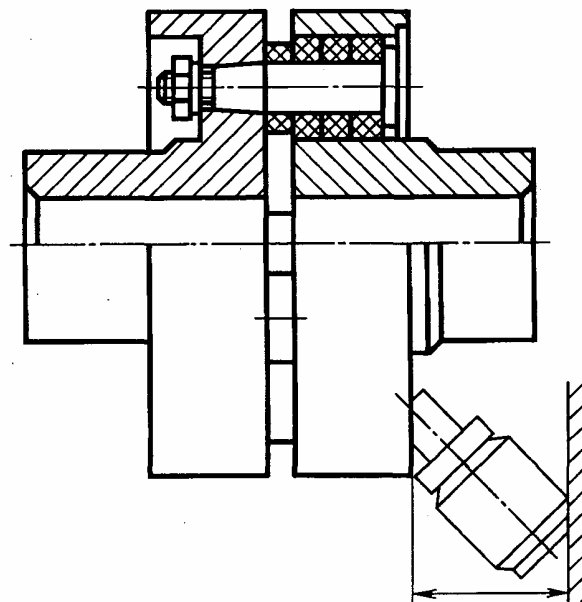


Fig. 30

The following components may not be shown in assembly drawings:

- a) Facets, roundings, turnings, deepenings, bulges, knurlings, notches, braids and other fine elements;
- b) Clearances between the core and the hole;
- c) Covers, boards, casings, baffles, etc. if it is necessary to show the item components closed by them. In this case the appropriate* inscription shall be executed above the image, for example: "Cover of position 3 is not shown";
- d) Visible item components or their elements, located behind the grid and also partly closed by the components located ahead;
- e) Inscriptions on the plates, name bars, scales and other similar components, representing only their contour.

3.1.9. The items made from transparent material shall be represented as opaque ones.

In assembly drawings the item components and elements, located behind the transparent objects, may be represented as visible ones, for example: scales, pointers of devices, lamp interior arrangement, etc.

3.1.10. The items located behind the screw spring, represented by coil sections only, shall be represented up to the zone, closing conditionally these items and determined by the axial lines of coil sections (figure 31).

3.1.11. The following methods for simplified representation of item components shall be applied in assembly drawings:

- a) The nonsected components, for which the individual assembly drawings are issued, shall be shown in the sections. It is allowed to execute the drawings as shown in figure 32;
- b) Typical, purchased and other widely used items shall be represented by external outline (figure 33).

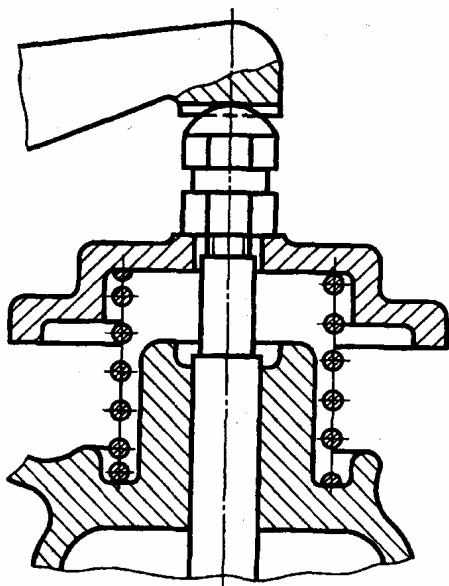


Fig. 31

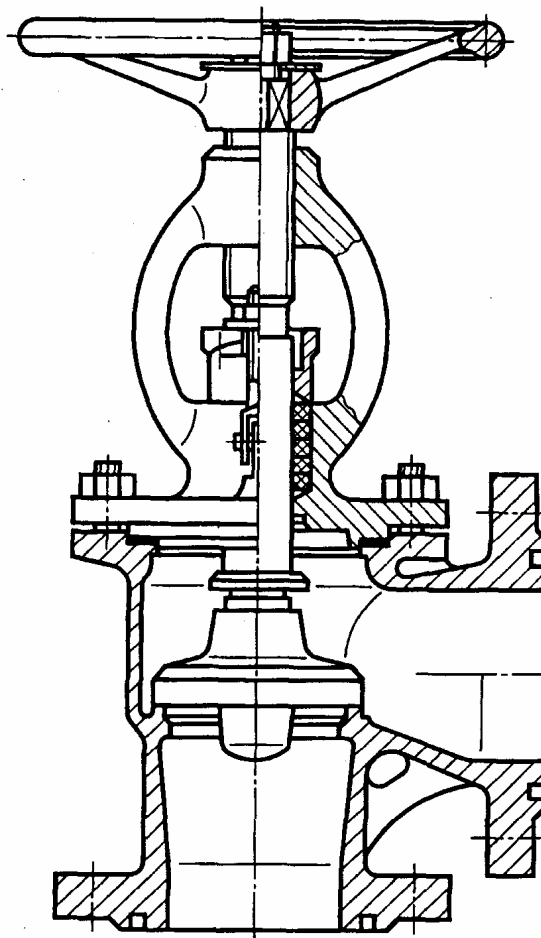
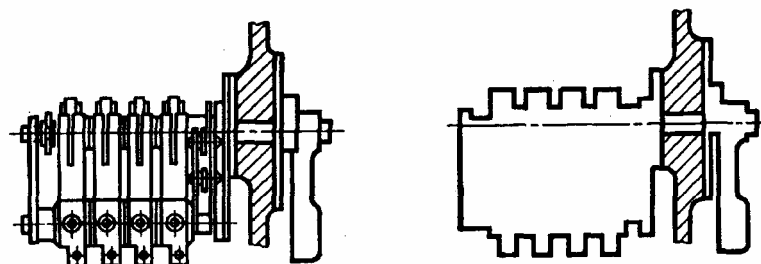


Fig. 32

3.1.12. The item external outline shall be generally simplified, not representing the fine bulges, hollows, etc. (figures 33 and 34(a and b)).

3.1.11 and 3.1.12. (Amended Wording, Amendment No. 5).



Complete image.

Simplified image.

Fig. 33

3.1.13a. In assembly drawings it is allowed to represent the sealants conventionally, as shown in figure 34 (e, z and d), indicating the sealant effect direction by a pointer.

(Subsequently Inserted, Amendment No. 5).

3.1.13. In assembly drawings including the images of several identical components (such as the wheels, basic rolls, etc.) it is allowed to execute the complete image of one component, and the image of other parts may be executed simplified as the external outline.

3.1.14. Welded, soldered, glued and similar item made from a homogeneous material in assembly with other items in the cuts and sections shall be hatched in one direction, representing the boundaries between the item components by continuous basic lines (figure 35). It is allowed not to show the boundaries between the components, i.e. to represent the structure as a monolithic body.

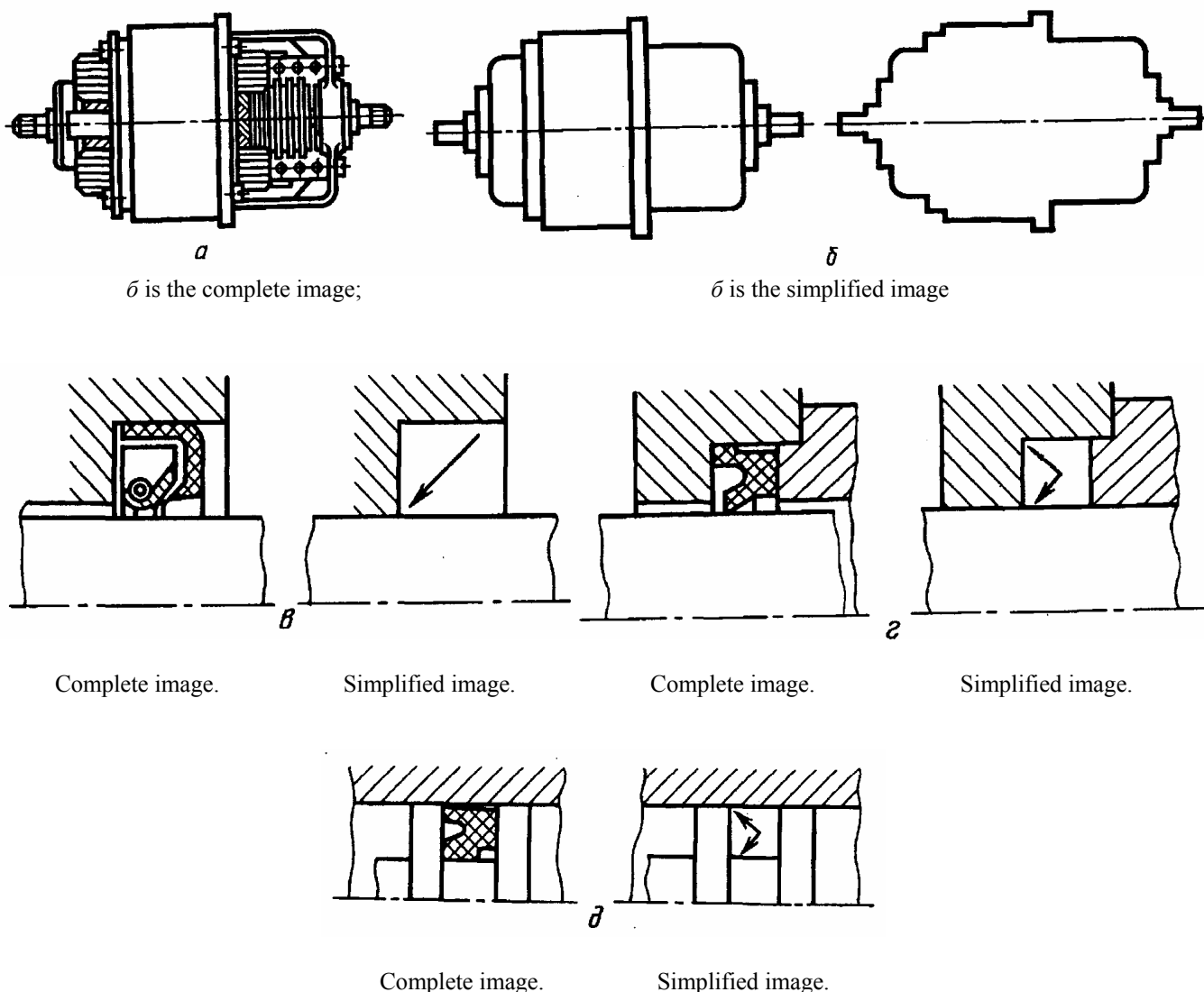


Fig. 34

3.1.15. If it is necessary to indicate the position of an item's gravity center, the appropriate dimensions shall be specified in the drawing, and a "G.C." inscription shall be placed in the leader-line.

The lines of gravity centers of the item components shall be put as the dash-and-dot line, and a "G.C. line" inscription shall be placed in the leader-line.

3.2. Position numbers

3.2.1. In assembly drawing all the assembly unit components shall be numbered in accordance with the position numbers specified in the specification of this assembly unit. The position numbers shall be placed in the leader-lines, drawn from the component images.

3.2.2. The position numbers shall be specified in those images where the appropriate components are projected as visible ones, generally, in the basic views and in the cross-sections replacing them.

3.2.3. The position number shall be placed in parallel to the drawing basic inscription outside the image contour and shall be grouped in a column or in a row in one line if possible.

3.2.4. The position numbers shall be generally indicated only once in the drawing. Repeated indication of position numbers is allowed for identical components.

3.2.5. The position number typesize shall exceed for one or two numbers the typesize accepted for dimensional numbers in the same drawing.

3.2.6. It is allowed to make the common leader-line with a vertical arrangement of position numbers:

a) for a group of fixing components referring to the same fastening place (figure 36). If there are two and more fixing components and the different components are fastened by identical fixing components, then it is allowed to specify their quantity in brackets after the appropriate position number and to specify only for one unit of a fixed component, irrespective of the number of these components in the item;

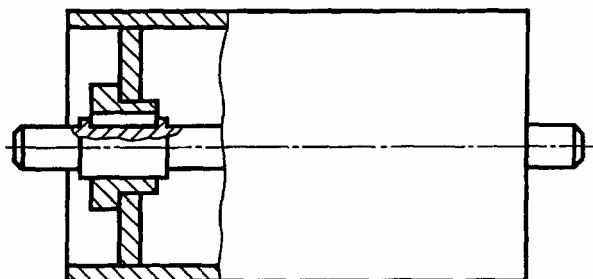


Fig. 35

b) for a group of components with distinctly expressed interrelation, eliminating various understanding, if it is impossible to bring the leader-line to each component (figure 37).

In these cases the leader-line shall be allocated from the fixed component;

c) For individual item components, if their graphical representation makes difficulties. In this case these components may not be shown in the drawing, and their location may be determined by means of a leader-line from the visible component and in the drawing field, and an appropriate indication shall be placed in the technical requirements, for example: "Braids of position 12 under brackets shall be wrapped with presspahn of position 22".

(Amended Wording, Amendment No. 10).

3.3. Execution of separate types of assembly drawings

3.3.1. In the assembly drawing of the item, including the components for which the working drawings are not issued, in the image and (or) in the technical requirements the data, necessary for components manufacture (such as surface roughness, shape deviations, etc.) shall be specified in addition to the data indicated in the specification.

In the assembly drawings of individual-produced items it is allowed to specify the data about the edge preparation for one-piece connections (such as welding, soldering, etc.) directly in the image or as a remote element (figure 38), if these data are not specified in the components drawings.

3.3.2. Depending on the manufacture mode the item components, for which the drawings may not be issued, may be taken into account by two following methods: as the components with assignment of name or designation to them or as the material without assignment of designation and name to them and with quantity indication in the units of length or mass or in other units (figures 39 to 42).

(Amended Wording, Amendment No. 5).

3.3.3. When a certain graded material is established for manufacture by the assembly drawing of a component with simple configuration (without issuing an individual drawing for it), the appropriate component dimensions shall be specified in the specification.

If there is no necessity to establish a certain graded material for the component, all the dimensions in the assembly drawing shall be placed in the image of this component, and the material grade shall be only specified in the specification.

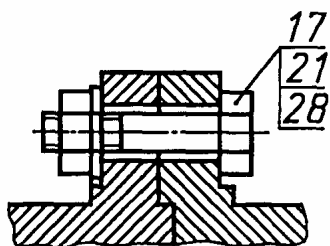


Fig. 36

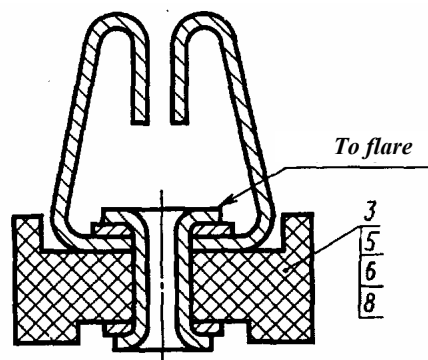


Fig. 37

3.3.4. The separate images of several components, for which the working drawings may not be issued, may be placed in the assembly drawing field provided that the drawing clearness is conserved.

If the image scale differs from that specified in the basic drawing inscription, an inscription containing the position number and the image scale shall be put above the component image.

3.3.5. If the component with large dimensions and complex configuration is connected with a less complex and smaller-sized component by pressing-in, soldering, welding, riveting or other similar techniques, all the dimensions and other data necessary for manufacture and control of the basic component may be specified in the item assembly drawings and the drawings for less complex components may be only issued, under the condition the drawing clearness and manufacture possibilities are conserved.

(Amended Wording, Amendment No. 8).

3.3.6. If an assembly unit is manufactured by surfacing onto a metal or alloy component, flooding the component surfaces or elements with metal, alloy, plastic, rubber and other materials, the drawing for such components may not be issued. The dimensions of surfaces or elements for surfacing, flooding, etc., the dimensions of finally finished assembly unit and other data necessary for manufacture and control shall be specified in the drawings of these assembly units.

3.3.7. The surfaced metal, alloy, plastic, rubber and other materials, with which the reinforcing components are flooded, shall be recorded in assembly unit specification into the "Materials" section.

3.3.8. The examples of execution of drawings for assembly units manufactured by surfacing and flooding the components with alloy or rubber are specified in figures 43 to 45.

(Amended Wording, Amendment No. 5).

3.3.9. If the components are selected during the item assembly for its adjustment, tuning or equalization, they shall be represented in the assembly drawing in one of the possible application versions.

3.3.10. Recording of "selected" components into the specification and indication of position numbers in the leader-lines shall be executed depending on the components application method:

a) If the selection is executed by identical items (for example, the required spring load is reached by installation of identical washers under it), the most probable number of items during installation shall be specified in the "Quantity" column of specification, and the text "Maximum quantity" shall be recorded into the "Note" column.

The necessary indications for installation of such "selected" parts shall be specified in the technical requirements of assembly drawing, for example: "The spring load shall be provided by installing the necessary number of components of position...";

b) If the selection is executed by installation of one of the items having different dimensions and individual designations (for example, the clearance value shall be provided by installation of only one adjustment ring), every "selected" part shall be recorded into the specification under different position numbers. The text "1" shall be specified in the "Quantity" column for every part and the text "Selection" shall be specified in the "Note" column. A record of the following character shall be placed into the technical requirements: "Dimension (clearance, travel, etc.) *A* shall be provided by installing one of the components of position...";

c) If the selection may be executed by installation of several items with different dimensions, designations and in different quantities, all the items shall be recorded into the specification. The appropriate position number and designation shall be assigned to every "selected" part. In this case the most probable quantity during installation shall be specified in the "Quantity" column for every "selected" part and the text "Maximum quantity" shall be specified in the "Note" column.

The positions numbers of all "selected" parts shall be specified in the leader-lines. The following indication shall be respectively specified in the technical requirements: "Dimension (clearance, travel, etc.) *B* shall be provided by installing the component of position...".

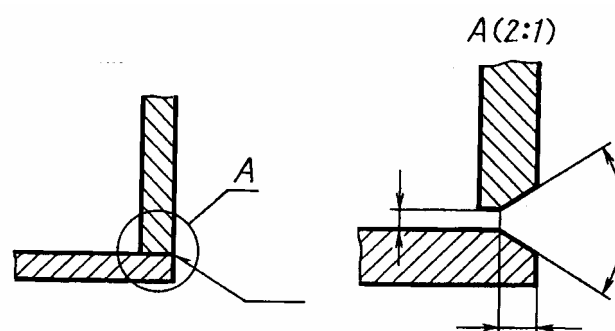


Fig. 38

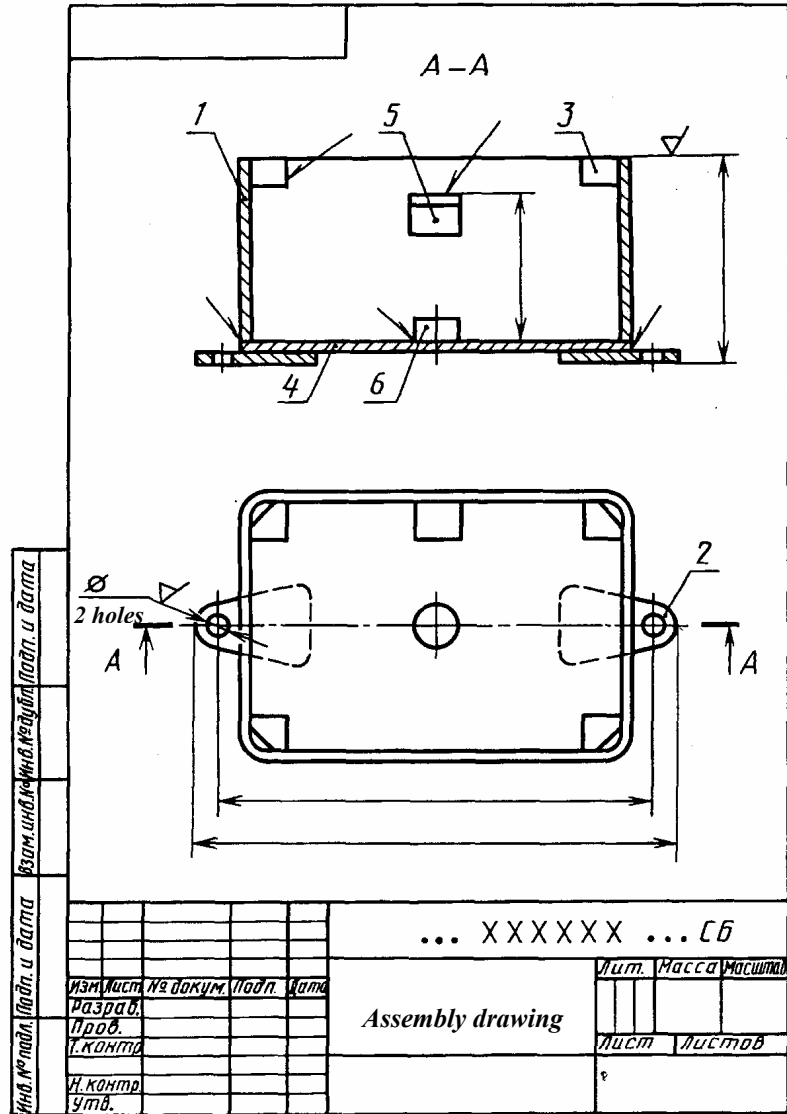


Fig. 39

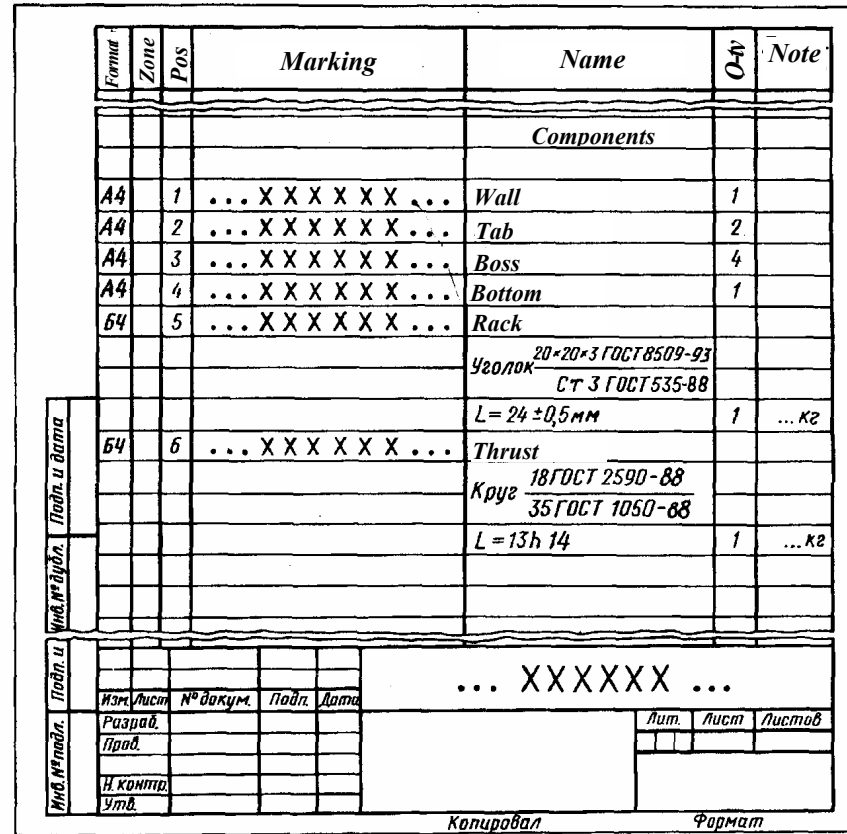


Fig. 40

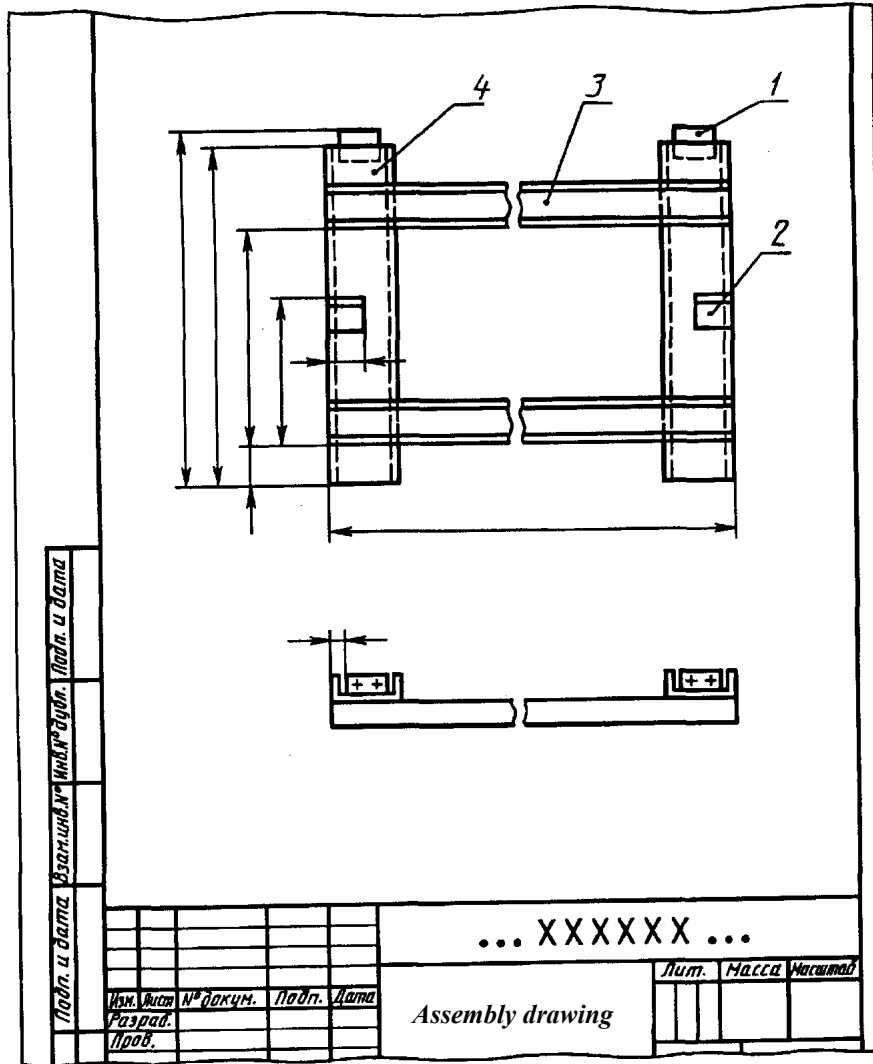


Fig. 41

Forma	Zone	Pos	Marking	Name	Qty	Note
<i>Components</i>						
A4	1	...	XXXXXX	Corbel	2	
<i>Materials</i>						
	2			Уголок 75*50*5 ГОСТ 8510-86 Ст 3 ГОСТ 535-88	...	M
	3			Швеллеры ГОСТ 8240-89 Ст 3 ГОСТ 535-88	...	M
	4			Channel bar 10	...	M
				Channel bar 16	...	M
... XXXXXX ...						
			Изм.	Лист	№ докум.	Подп.
			Дата			
			Лит.	Лист	Листов	
				Копировал	Формат	

Fig. 42

It is allowed, if necessary, to give the references to the clause of technical requirements containing the indications for selection, for example: "See Clause..." These references shall be placed in the "Note" column of specification for "selected" parts.

3.3.11. When it is necessary to install the temporary protective components (such as the cover, plug, etc.), for the period of item transportation and (or) storage after its assembly, these components shall be represented in the assembly drawing so as they shall be installed during transportation and storage.

3.3.12. If the temporary protective components for the period of transportation and storage shall be installed in place of any devices or mechanisms, removed from the item, the appropriate indications about it shall be specified in the technical requirements of the assembly drawing, for example: "Pump of pos. and regulator of pos. before packing shall be removed and the covers of pos. shall be installed at their place, tightening them densely with bolts of pos. ...", etc.

The image of a machine part with installed temporary protective component may be shown in the assembly drawing. This image shall explain the component position.

3.3.13. Assignment of names and designations to the temporary protective components, their image in the assembly drawing and recording into the specification shall be executed in accordance with general rules.

3.3.14. When the separate parts of purchased item are installed into different item assembly units (for example, tapered roller bearings), the purchased item shall be recorded into the specification of the assembly unit in which it is included in assembled state. The assembly units, which the separate parts of purchased item are included in, shall be specified in the technical requirements of assembly drawing of the developed item. The designation of the specification, which the purchased item in assembled state is included in, shall be specified in the specifications of these assembly units in the "Note" column. In this case the name of purchased item component shall be specified in the "Name" column, and the "Quantity" column shall not be filled.

(Subsequently Inserted, Amendment No. 8).

4. OUTLINE DRAWINGS

4.1. Outline drawings are not designed for item manufacture by them and shall not contain the data for manufacture and assembly.

4.2. The item image in the outline drawing shall be executed with maximum simplification. The item shall be shown so that the extreme positions of movable, put forward or hinged parts, levers, bogies, hinged covers, etc. are visible.

The elements bulging outside the basic contour insignificantly relative to the item dimensions may not be shown.

4.3. The number of views in the outline drawing shall be minimum but sufficient to give an exhaustive representation about the item outline, the position of its bulging parts (such as the levers, flywheels, handles, buttons, etc.), about the elements, which shall be constantly in sight (such as the scales), about the arrangement of elements of item connection with other items.

4.4. The item image in the outline drawing shall be carried out by continuous basic lines, and the outline of movable parts in extreme positions shall be executed by dash-and-dot thin lines with two points.

The extreme positions of movable parts may be represented in individual views.

(Amended Wording, Amendment No. 3).

4.5. The components and assembly units not included into the item may be represented in the outline drawing by continuous thin lines.

4.6. The overall item dimensions, the connecting and installation dimensions and, if necessary, the dimensions determining the bulging parts position shall be shown in the outline drawing.

The connecting and installation dimensions necessary for coordination with other items shall be specified with maximum deviations. The gravity center coordinates may be specified. It is not necessary to indicate in the outline drawing that all the dimensions specified in it are the reference ones.

(Amended Wording, Amendment No. 8).

4.7. The conditions of item application, storage, transportation and operation may be specified in the outline drawing in case these data are not specified in the technical manual, specifications or in other design document for the item.

4.8. An example of outline drawing completion is specified in figure 46.

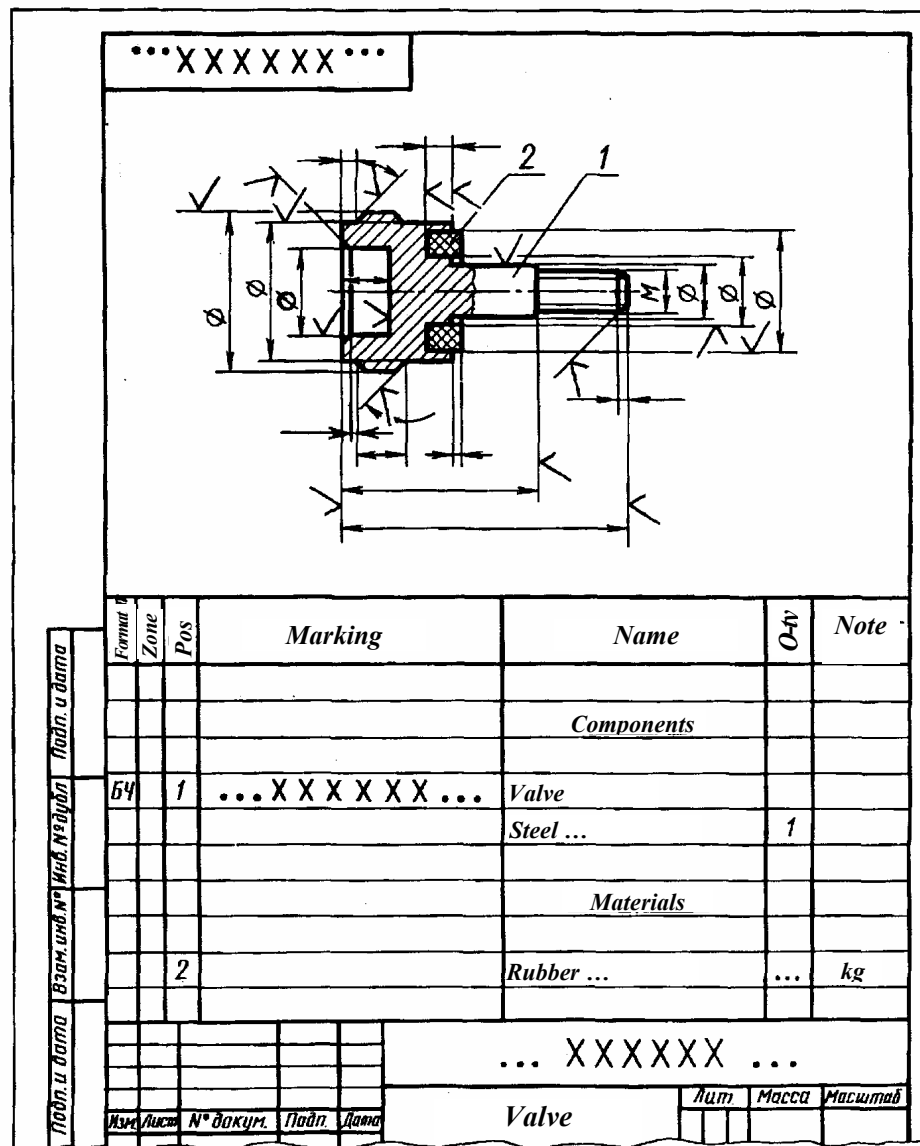


Fig. 45

5. ASSEMBLY DRAWINGS

5.1. The assembly drawing shall contain:

the image of the mounted item;

the images of items used during installation, and also complete or partial image of the device (design or base), the item is fastened to;

installation and connecting dimensions with maximum deviations;

the list of components necessary for installation;

technical requirements for item installation.

5.2. Assembly drawings shall be issued for:

items mounted at one certain place (device, object or base);

items mounted at several various places (devices or objects). The assembly drawing shall be also issued when it is necessary to show the complex components connection with each other at the operation place.

5.3. The assembly drawing shall be carried out in accordance with the rules established for assembly drawings, with an account for the rules specified in this section.

5.4. The mounted item shall be represented in the drawing simplified by showing its external outline. The design elements necessary for correct item installation shall be shown in detail.

The device (object or base), the mounted item is fastened to, shall be represented simplified by showing only those parts which are necessary for correct determination of the place and method of item fastening.

The image of the mounted item and the items, included in the complete set of assembly parts, shall be carried out by continuous basic lines, and the device the item is fastened to shall be shown by continuous thin lines.

During execution of base drawings the base shall be represented by continuous basic lines, and the mounted item shall be represented by continuous thin lines.

5.5. The connecting, mounting dimensions and other dimensions necessary for installation shall be specified in the assembly drawing.

In the assembly drawing designed for item installation at various places it is also necessary to specify the dimensions determining the specific requirements for item arrangement (for example, the minimal distance up to a room wall, etc.).

In the assembly drawing of a complex it is necessary to specify the dimensions determining the relative arrangement of components directly included into the complex.

5.6. The list of components necessary for installation may be executed in accordance with Form 1 of GOST 2.106, except for the "Format" and "Zone" columns. This list shall be placed at the first sheet of the drawing.

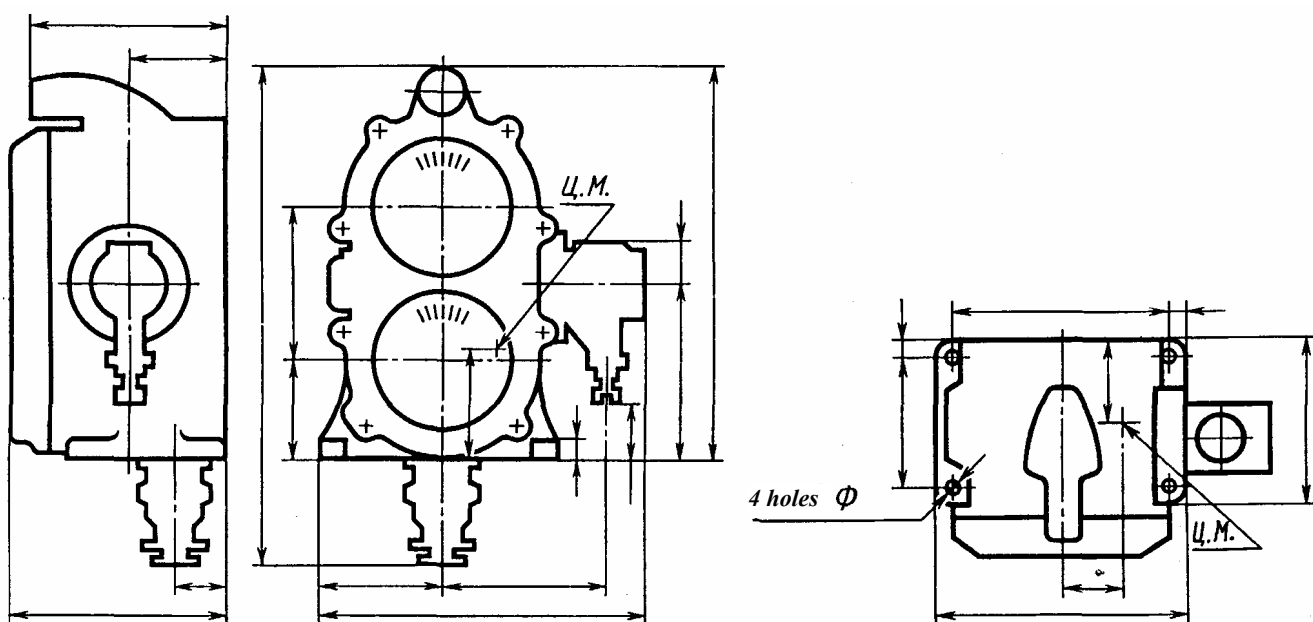


Fig. 46

The mounted item and also the assembly units, components and materials necessary for installation shall be recorded into the list.

It is allowed to specify the designations of these components in the leader-lines in place of the list.

5.7. The items and materials necessary for installation, delivered by the enterprise manufacturing the mounted item, shall be recorded into the specification of the assembly parts complete set in accordance with GOST 2.106.

5.8. The items necessary for installation and the materials, not delivered with the mounted item, shall be recorded into the list in the assembly drawing, and the appropriate indication shall be placed in the "Note" column or in the technical requirements, for example: "Positions 7 and 9 are not delivered with the item", etc.

If it is impossible to specify the exact designations and names of non-delivered items, their tentative names shall be specified in the list, and, if necessary, the dimensions and other data providing correct selection of items necessary for installation shall be specified in the drawing.

5.9. The name and (or) designation of the device (object) or the part of device, the mounted item is fastened to, shall be specified in the assembly drawing at the leader-line or directly at the image.

DETAILS

1. DEVELOPED AND SUBMITTED by the State Committee for Standards under the USSR Council of Ministers

2. APPROVED AND INTRODUCED by Decree No.1843, dated 27.07.73 of the State Committee for Standards under the USSR Council of Ministers

Amendment No. 9 accepted by Interstate Council for Standardization, Metrology and Certification (protocol No. 13, dated 28.05.98)

Registered by Technical Secretariat of Interstate Council No. 2907

Votes in favor:

State	National standards body
Republic of Belarus	Belstandart
Republic of Kazakhstan	Gosstandart of the Republic of Kazakhstan
Republic of Kirghizia	Kirghizstandart
Republic of Moldova	Moldovstandart
Russian Federation	Gosstandart of Russia
Republic of Tadjikistan	Tadjikgosstandart
Turkmenistan	Head State Inspectorate of Turkmenistan
Republic Uzbekistan	Uzgosstandart
Ukraine	Gosstandart of Ukraine

Amendment No. 10 is accepted by Interstate Council for Standardization, Metrology and Certification (protocol No. 17, dated 22.06.00)

Registered by Technical Secretariat of Interstate Council No. 3526

Votes in favor:

State	National standards body
Republic of Azerbaijan	Azgosstandart
Republic of Belarus	Belstandart
Republic of Georgia	Gruzstandart
Republic of Kazakhstan	Gosstandart of the Republic of Kazakhstan
Republic of Kirghizia	Kirghizstandart
Republic of Moldova	Moldovstandart
Russian Federation	Gosstandart of Russia
Republic of Tadjikistan	Tadjikgosstandart
Turkmenistan	Head State Inspectorate of Turkmenistan

3. IN PLACE OF GOST 2.107-68, GOST 2.109-68 and GOST 5292-60 regarding Section VIII

4. REFERENCE DOCUMENTATION

Number of reference document referred to	Clause	Number of reference document referred to	Clause
GOST 2.104-68	1.1.11	GOST 1133-71	2.3
GOST 2.106-96	1.3.5, 5.6 and 5.7	GOST 1435-90	2.3
GOST 2.113-75	1.1.10	GOST 2590-88	3.3.2
GOST 103-76	2.3	GOST 8240-89	3.3.2
GOST 535-88	2.3 and 3.3.2	GOST 8509-93	3.3.2
GOST 1050-88	3.3.2	GOST 8510-86	3.3.2
		GOST 14034-74	1.1.5 and 1.1.15

5. EDITION (March, 2001) with Amendments Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10, approved in February 1980, November 1981, May 1984, December 1984, March 1985, September 1985, March 1986, September 1987, February 1999 and December 2000 (IUS {Standards Information Catalog} No. 4-80, 4-82, 8-84, 3-85, 5-85, 12-85, 6-86,12-87, 5-99 and 3-2001)