Standards compendium 2022

for engineering training and everyday use

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Note:
The Figures in this Standards Compendium illustrate the text. They do not represent examples of specific use. For this reason, the Figures are not completely dimensioned or toleranced. They illustrate only the relevant general principles. The Figures must not lead to any assumptions affecting any details, geometric elements or other notes, shown or not shown. In many Figures, drawing elements or other details have been removed, added or lengthened so that the representation supports the text.

FOREWORD

Since the publication of the fourth edition many standards have been revised to comply with the new state of the art and re-issued.
These changes to standards, as well as suggestions from the Swiss Mechanical, Electrical and Metal Industries trainers necessitated a further reworking of the book.

The focus of this issue is on the implementation of the ISO GPS standards. A list of the changes can be seen under http://www.snv.ch.

The revision of the Standards Compendium was made by the authors group of Swissmem and SNV.

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May 2022

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1.12.2 Comparison of the workpiece edges

a) With the ambiguous, indeterminate form according to ISO 13715 (Fig. 63/1)

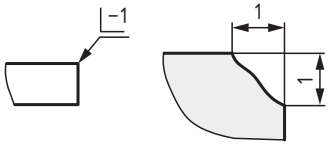
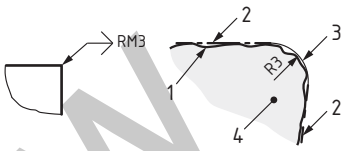


Fig. 63/1

b) With the unique GPS specification of the edge transition according to ISO 21204 (Fig. 63/2)

Note
The standard ISO 21204 is not applicable to corners connecting three or more integral surfaces (Fig. 63/3).



Key
1 Real workpiece/skin model
2 Adjacent reference sections
3 Restrictive minimum material boundary
4 Material side

Fig. 63/2

1.12.3 Symbols and meaning

The symbol consists of a reference line to the edge transition element with a dot (Fig. 63/3) or an arrow (Fig. 63/4) and a large 90° arrow at the right end of the reference line. The specification is made by letters and numbers; e.g. **C= chamfer, R = radius, E = ellipse, T = tolerance value, M = maximum material, P = profile defined by the CAD model,** etc. The nominal edge transition element shown alongside (Fig. 63/3 to Fig. 63/5)) contains a chamfer of 0,5 mm with an angle of 30° in a tolerance zone of 0,1 mm symmetrically around the nominal profile (Fig. 63/6).

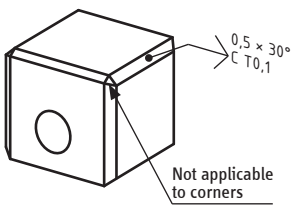


Fig. 63/3

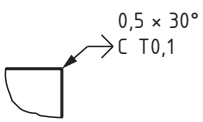
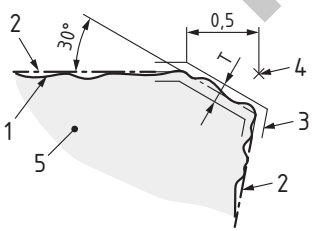


Fig. 63/4



Key
1 Real workpiece/skin model
2 Adjacent reference sections
3 Tolerance zone
4 Specification origin
5 Material side
T Tolerance value for the transition tolerance

Fig. 63/6

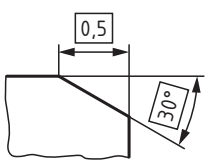
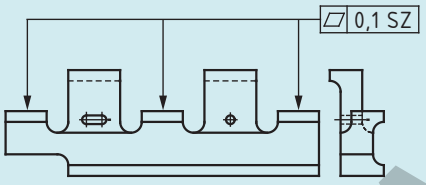
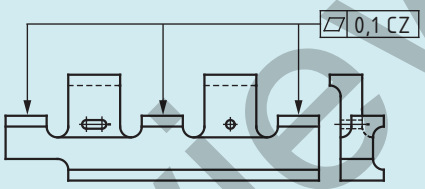
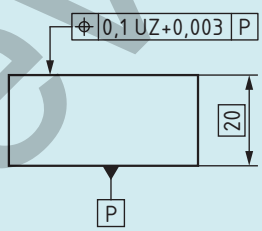
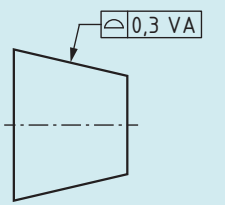


Fig. 63/5

2.8.2.2 Symbols for modifiers

Table 176/1 Symbols for modifiers

Description	Symbol	Examples	Remarks
Modifiers for combining tolerance zones			
Separate zones	SZ		Addition "SZ" is not necessary here, due to independence according to ISO 8015. See also Fig. 197/1.
Combined zone	CZ		
Modifiers for uneven tolerance zones			
Specified tolerance zone offset	UZ		The center of the tolerance zone is shifted out of the material from TED dimension 20 by 0,003 mm. The "-" sign indicates the shift into the material.
Modifiers for constraints			
Unspecified linear tolerance zone offset (offset zone)	OZ	For flat surfaces and lines, it is better to use parallelism.	
Unspecified angular tolerance zone offset (variable angle)	VA		If the angle is not tolerated, the shape of the cone can be defined by a tolerance zone. This comprises the area between two coaxial conical surfaces with the same, unspecified angle, at a distance of 0,3 mm.

3.6.2.2 Active and passive corrosion protection

A distinction is made between active and passive corrosion protection. In active protection, an attempt is made to optimize the reaction of the corrosion partners (component and external conditions). Whereas in passive corrosion protection an attempt is made to separate the corrosion partners from each other.

Table 264/1 Corrosion protection

Corrosion protection				
Passive corrosion protection				Active corrosion protection
Metallic coatings	Non-metallic coatings			
	Passive coatings	Organic coatings	Inorganic coatings	
Galvanizing Plating Hot dip galvanizing	Anodic oxidation Burnishing Phosphating	Plastic coatings Oil paints Lacquers	Enameling	Material selection, Alloy formation, Addition of inhibitors, Adjustment of pH value, Cathodic protection, Corrosion-compatible material design

Note
This table only shows some typical examples. It is not exhaustive.

3.6.2.3 Structural design

Structural design is the manner in which a structure is designed, considering corrosion protection according to a detailed design plan.

Corrosion protected shape design of structural parts (Fig. 264/1):
– Simplification of shapes
– Observance of the installation position of plates and profiles
– Avoidance of the possibility of moisture and dirt deposits
– Avoidance of abrupt changes in cross-sections
– Avoidance of internal and external stresses
– Structural avoidance of penetration of corrosion-promoting substances into the active medium

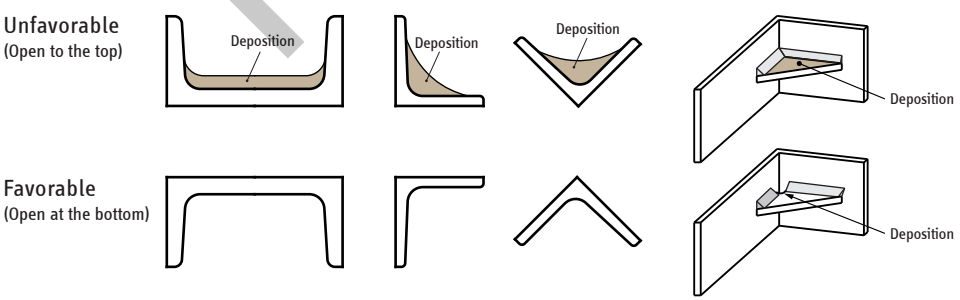


Fig. 264/1

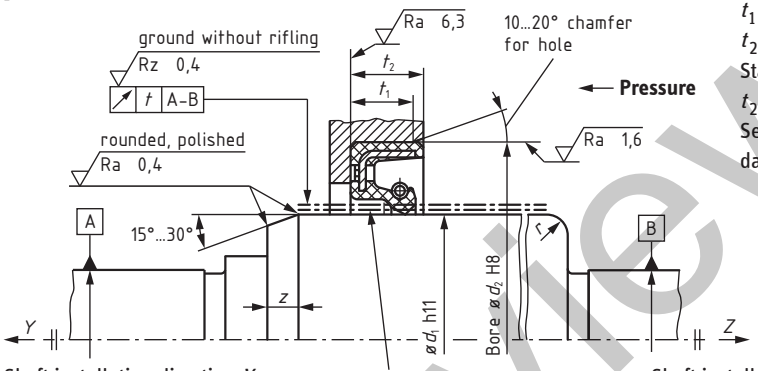
4.16.2.3.1 Guidance for assembly

The seal lip must always be pointed to the pressure side. The mating surface for the seal lip must be smooth and may not be damaged in any way.

Edges rounded and polished. In the area where the seal is slid along, there may not be any holes or grooves. Care should be taken when installing the seal that it is concentric and vertical to the shaft axis.

Surface hardness of the shaft, min. 450 HV 30. It should be > 600 HV 30

the hardening depth min. 0,3 mm, where the rotational speed is over 4 m/s (For heat treatment processes, see 5.1.5).



t_1 = 0,85 × b (min.)
t_2 = b + 0,3 (min.)
Standard dimensions t_1 and t_2 according to DIN 3760. See also manufacturer's data.

Shaft installation direction *Y*: **chamfer** on shaft

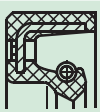
Shaft installation direction *Z*: **radius** or **chamfer** on shaft

Fig. 334/1

Table 334/1 Usual length *z* for chamfer Dimensions in mm

d_1	*z* (min.) at 15° [1]
≤ 20	2,5
22 ... 50	3,5
55 ... 80	4,5
90 ... 100	5,5

Table 334/2 Usual radius *r* Dimensions in mm

For type A	For type AS (with protective lip)
≥ 0,6 	≥ 1 

4.16.2.3.2 Run-out

Shaft run-out must be kept within narrow limits.

It is useful to locate the shaft seal ring close to the bearing and to keep bearing play as small as possible. The adjacent Fig. 249/2 shows shaft run-out tolerances for the noted seal ring materials.

Shaft run-out *t*

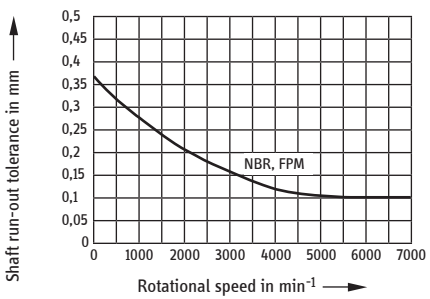


Fig. 334/2

1) Where the dimension *z* is less, both edges of the chamfer *z* must be rounded and polished.

Table 352/1 Format of steel names for steels in category 1

Principal symbol: Letter	Principal symbol: Mechanical properties	Additional symbols for steel: Group 1	Additional symbols for steel: Group 2 [1]	for steel products
S Structural steel [2]	Min. yield strength (R^e) in N/mm² for the smallest thickness range	Impact energy in joules: 27 J: JR; 40 J: KR; 60 J: LR — Test temperature °C: + 20; J 0: K 0: L 0: 0; J 2: K 2: L 2: − 20; J 4: K 4: L 4: − 40 **G** = Other characteristics followed, where necessary, by 1 or 2 digits, e.g. G1 rimming steel	**C** = Special cold forming **H** = Hollow section **W** = Weather resistant	Table 351/1
E Engineering steels [2]		**G** = Other characteristics followed, where necessary, by 1 or 2 digits, or where impact properties are specified, as in the above Table.	**C** = suitable for cold drawing	
P Steels for pressure purposes [2]		**N** = Normalised or normalised rolled **G** = Other characteristics followed, where necessary, by 1 or 2 digits	**H** = High temperature **R** = Room temperature **L** = Low temperature	
D Flat products for cold forming	**C** = cold rolled **D** = hot rolled **X** = where rolled condition not specified (followed by 2 symbols)	**H** = hollow section **T** = tube	No additional symbol	

Designation examples

Structural steel: **S235JRC+C**

S235 (principal symbol)
S = **steels for structures**
235 = **minimum yield strength in N/mm²**
JR = **notched bar impact energy 27 J bei 20 °C** (additional symbol group 1)
C = **special cold workability** (additional symbol group 2)
+C = **cold work hardened** (treatment condition see Table 351/1)

Fine grain steel suitable for welding, Normalized for low temperatures (EN 10025-3): **S355NL**

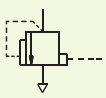
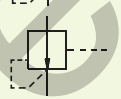
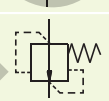
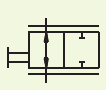
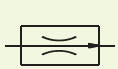
S355 (principal symbol)
S = **steels for structures**
355 = **minimum yield strength in N/mm²**
N = **normalized** (additional symbol group 1)
L = **for low temperatures** (additional symbol group 2)

Steel for general engineering uses (SN EN 10293): **GE200**

GE200 (principal symbol)
G = **Letter for cast steel**
E = **Steel type: Engineering steel**
200 = **Minimum yield strength in N/mm²**

1) Additional symbols in Group 2 shall only be used in conjunction with symbol of Group 1.
2) For steel castings the name is preceded by the letter G.

Table 417/2 Control valves (continued)

Name and explanation	Symbol
3.4.2 Pressure limiting valve (safety valve): Inlet pressure works against a counter force (e.g. a spring) to open the exit to a vessel or to the atmosphere.	
– With pilot control Inlet pressure is limited (as above or with pilot control).	
3.4.3 Differential pressure valve: The inlet pressure is limited by a differential pressure pilot (table 420/1, par. 5.2.4).	
3.4.4 Follower valve: When the inlet pressure is higher than the counter force from the spring, the valve opens and allows flow to the outlet port.	
3.4.5 Pressure control valve or pressure reduction valve (pressure reducer) Unit with variable inlet pressure which delivers an essentially constant outlet pressure, provided the inlet pressure is higher than the required outlet pressure.	
– Without relief opening	
– Without relief opening, with remote operation As above but the outlet pressure depends on the pilot pressure.	
3.4.6 Pressure difference regulating valve: The outlet pressure is reduced by a set value which depends on the inlet pressure.	
3.5 Flow control valves	
Unit which ensures control of flow; positions and methods of representation as in section 3.4	
3.5.1 Throttle valve: Simplified symbol (without information about type of actuation or state of the valve).	
– With manual actuation Full symbol (with information about type of actuation or state of the valve)	
3.5.2 Flow regulator: (simplified representation) Changes in inlet pressure have no influence on the flow rate.	
– With constant outlet flow	

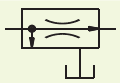
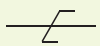
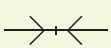
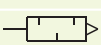
Name and explanation	Symbol
– With constant outlet flow and relief opening to vessel As above, but with the excess flow led away	
– With variable outlet flow As above, but with arrow according to 1.2.3 added to the throttle symbol.	
3.6 Shut-off valve	
(Simplified symbol)	

Table 419/1 Energy transfer and processing

4.1 Sources of energy	
Name and explanation	Symbol
4.1.1 Source of pressure – Pneumatic source of energy	
– Hydraulic source of energy	
4.2 Flow lines and connections	
4.2.1 Lines: – Supply line, return line	
– Pilot (control) line, drain or leak line	
– Flexible connecting line Flexible hose, usually for connecting moving parts	
– Electrical line	
4.2.2 Piping connection	
4.2.3 Crossing piping, not connected	
4.2.4 Deaeration	
4.2.5 Outlet opening: – Without connection arrangements	
– With thread for connection	
4.2.6 Energy connections: On equipment or piping for energy removal or measuring	
– With plug	
4.2.7 Quick action couplings: Connected, without mechanically opening non-return valve	
4.2.8 Silencer	

This standard is applicable to any organization, regardless of size, type and nature, and applies to the environmental aspects of its activities, products and services that the organization determines it can either control or influence considering a life cycle perspective. It does not state specific environmental performance criteria.
This standard can be used in whole or in part to systematically improve environmental management. Claims of conformity to this standard, however, are not acceptable unless all its requirements are incorporated into an organization's environmental management system and fulfilled without exclusion.
This can be achieved by using the PDCA model. The model can be used partially or as a whole.

Relationship between "PDCA" (plan, do, check, act) and the framework of ISO 14001.

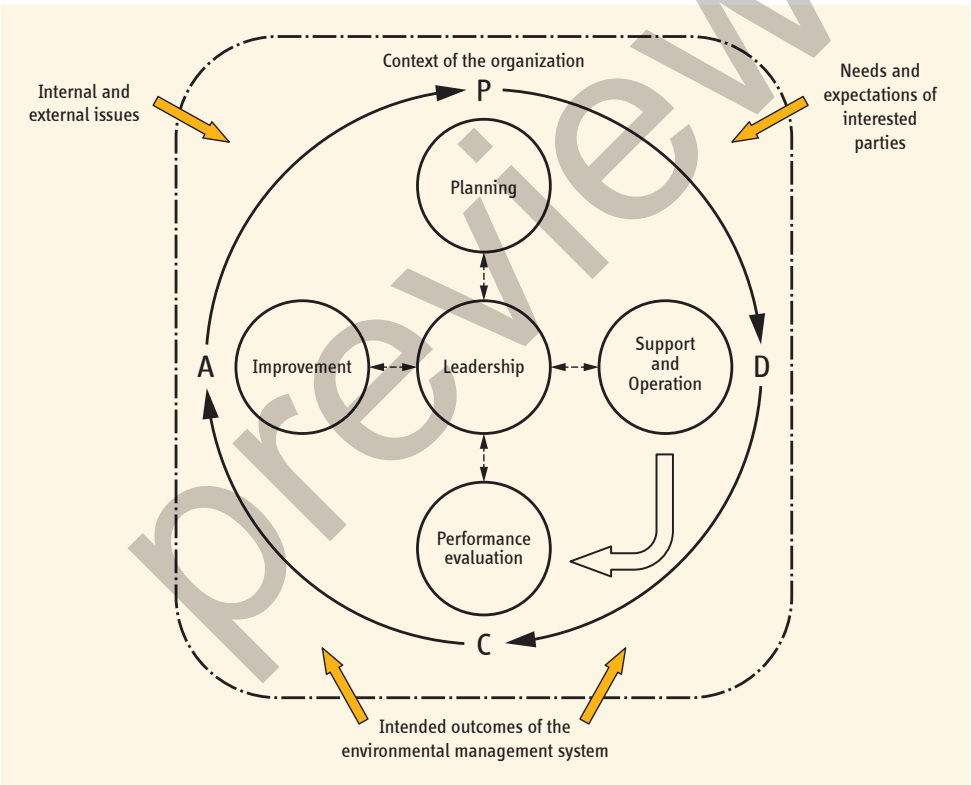


Fig. 477/1

"Planning" (P) includes deciding on objectives and processes with the organization's management. "Doing" (D) is carrying out the planned processes. "Checking" consists of the comparison of the actual and planned results of the processes. "Acting" means carrying out appropriate actions to correct deviations from planned results and to produce continual improvement.

8.2.14.2 Swivel lever housing machined (explanations on page 518)

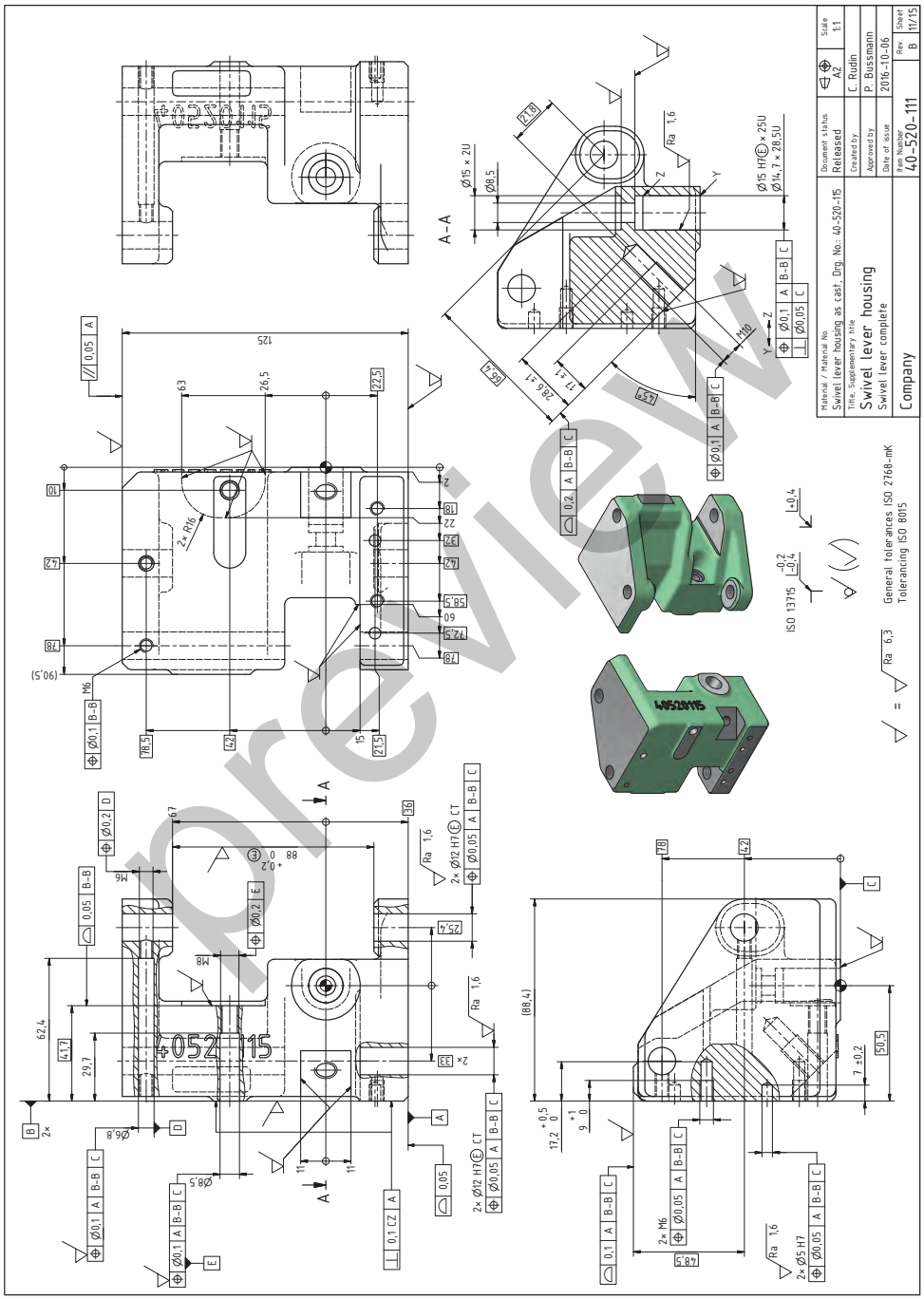


Table 574/1 Swiss standards (continued)

Number	Year	Page(s)
SN EN 1301-2	2008	391
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