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GEOMETRICAL INCONSISTENCIES IN EN 755 SERIES OF STANDARDS

The seven parts of standard EN 755 that defines geometrical requirements for aluminium extruded rods/bars, tubes and profiles that are used across a broad spectrum of industries were investigated. Particularly the parts 3 to 6 of EN 755 that are devoted to give tolerances on dimensions and form for round, square, rectangular and hexagonal bars; the parts 7 and 8 that give tolerances on dimensions and form for seamless and porthole tubes and the last part 9 devoted to tolerances on dimensions and form for profiles. Unfortunately, the interpretation of requirements outlined in the EN 755 series of standards often presents ambiguities. A comprehensive review of these standards with respect to geometrical requirements consistency has revealed several irregularities. Therefore, revisions are proposed to improve structural framework and the clarity of the terminology used in parts 3 to 9 of the standard EN 755 and to make them in line with terms and definitions given in the standards developed by Technical Committee ISO/TC 213 which is responsible for standardization in the dimensional and geometrical tolerancing.

1. INTRODUCTION

Aluminium is used across a wide range of industries with major applications in transportation (automotive & aerospace), electronic devices, construction and other. Due to its light weight, strength, durability and corrosion resistance along with electrical and thermal conductivity it offers evident advantages. Raw aluminium products are typically supplied in the form of rods, bars, tubes, and profiles. In many cases, the dimensional and geometrical specifications of these semi-finished products have a significant impact on their suitability for specific applications or subsequent machining operations. The guidelines of geometrical accuracy contained in the EN 755 series of standards cause a number of ambiguities in the interpretation of requirements. The primary objective of this paper is to critically examine and highlight ambiguities in the interpretation of requirements specified within the EN 755 series, which governs the tolerances and dimensional specifications for extruded aluminium

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products. These standards are widely adopted across the European manufacturing sector and play a crucial role in ensuring consistency, interoperability, and quality in the production of precision aluminium profiles. However, despite their broad application, some clauses and definitions within the EN 755 series of standards remain open to subjective interpretation, leading to potential discrepancies in the understanding and implementation of the geometrical requirements by designers, manufacturers, and quality assurance personnel.

To address the identified inconsistencies and improve the overall coherence of the EN 755 series of standards, this paper proposes a set of targeted revisions aimed at improving both the formal content structure and the clarity of terminology used in Parts 3 to 9 of the standard. These parts, which cover key aspects of dimensional tolerances and product specifications for the extruded aluminium profiles, currently show a lack of compliance with internationally recognized rules of geometrical tolerancing. This misalignment can lead to interpretation troubles across different industrial sectors, potentially affecting product quality, compliance, and interoperability.

The proposed revisions are designed to harmonize the terminology and conceptual structure of EN 755 series of standards with the definitions, principles, and rules established by ISO Technical Committee 213 (ISO/TC 213) [1], which is responsible for the global standardization of dimensional and geometrical tolerancing practices. By aligning EN 755 series of standards with the ISO GPS system terminology and concepts, the revised standard would facilitate clear communication between design, manufacturing, and inspection functions, reduce ambiguity in technical documentation, and support more consistent application of tolerancing principles across international supply chains.

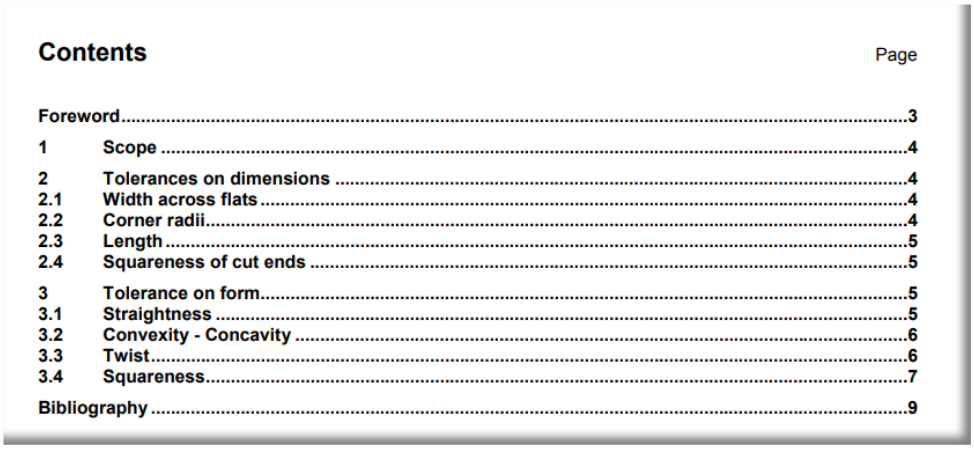
2. CONTENT STRUCTURE

At the beginning of each standard within the EN 755 series, there is a table of contents, as in every EN or ISO standard. At the first glance it seems that a clear and systematic pattern in the organization and presentation of the content can be observed in all EN 755 parts. The clause “Tolerances on dimensions” is always followed by the clause “Tolerance on form” (Fig. 1). Such structural uniformity is intended to facilitate navigation, increase the usability of the documents, and support effective cross-referencing across the series.

Unfortunately after detailed analysis, inconsistencies become apparent in both the classification of specified characteristics and the definitions of used terms, particularly when compared to the terms and concepts adopted in the ISO GPS system standards. The EN 755 series content is structured into two main categories: “tolerances on dimensions” and “tolerances on form”. However, upon closer inspection, the allocation of specific requirements within each category reveals inconsistencies and raises doubts about the accuracy of classification. Certain parameters are incorrectly placed or conceptually misaligned with the definitions established by the ISO GPS system standards, potentially leading to confusion in interpretation and application.

Setting aside terms-related considerations – which are addressed in detail in the paper subsequent sections – the clause titled “Tolerances on dimensions” is intended to define permissible variations in dimensional characteristics. This clause should comprehensively

address tolerances associated with linear and angular dimensions. The first notable inconsistency lies in the classification of the "squareness of cut ends" under the category dimensions (see EN 755-4 [2], EN 755-3 [3], EN 755-5 [4], standards related to bars).



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Fig. 1. Content page taken from EN 755-4 [2]

Apart from the strange term "squareness" which does not appear in the ISO GPS system standards (correct term is perpendicularity) this is technically inaccurate, as the defined requirement is by its nature a geometrical tolerance defined in the ISO GPS system. Misclassifying it as a linear dimension undermines the functional intent of tolerance specification and is prone to misinterpretation during design validation or quality control processes.

Similarly, in parts EN 755-7 [5] and EN 755-8 [6] (standards related to tubes), the clause titled "Tolerances on dimensions", includes a subclause addressing wall thickness variation attributed to eccentricity.

There are also terminology mistakes in some column headers of tables included in EN 755 standard. Notoriously the caption "Tolerances on …." is given in column header while numerical values given in particular columns are preceded by symbol ± which means that actually the values of maximum limit deviations are given in the tables.

The clause titled "Tolerances on form" is intended to address tolerances on geometrical form, such as straightness, roundness or flatness. However, upon closer examination, it becomes evident that used terminology does not comply with the ISO GPS system standards – this clause also includes descriptions of tolerances that should be properly classified as orientation controls, such as parallelism or perpendicularity. This misclassification with unclear descriptions of used terms can lead to ambiguity in interpretation and application, as form tolerances control intrinsic shape characteristics, whereas orientation tolerances define the spatial relationships of geometrical features relative to specified datum or datums. Correct categorization is essential to maintain design intent, and facilitate accurate inspection and verification processes.

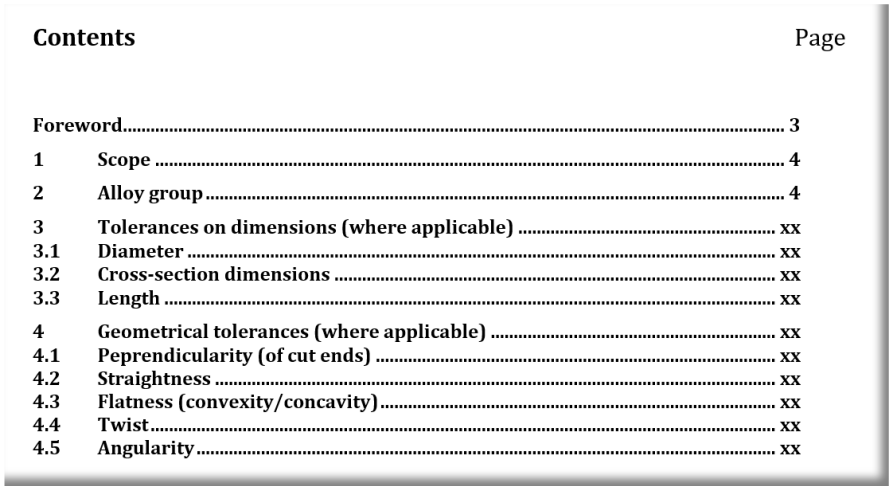
A corrective review of these classifications is recommended in order to ensure technical accuracy and harmonization with the ISO GPS system standards. The proposed solution includes a revised and harmonized content structure, designed to be applied uniformly across all documents within the EN 755 series. This updated standard will feature a curated selection

of basic terminology necessary to describe geometrical characteristics with greater clarity and eliminated ambiguity.

Nevertheless, if the EN 755 series of standards were consolidated into a single coherent document, or alternatively revised separately to improve internal consistency and alignment, it would be feasible to establish a common table of contents serving as a standardized template (Fig. 2). Such a template could enhance structural coherence, facilitate navigation, and promote uniform interpretation across the entire standard series. As the current arrangement is unclear and insufficiently structured, the key requirement is to maintain a clear distinction between clauses pertaining to dimensions and those pertaining to geometrical tolerances. It would be also beneficial to align the terminology with the ISO GPS system conventions; however, at present, the main obstacle is that certain terms have different meanings compared with their definitions in the ISO GPS system.

The detailed structure of the table of contents will depend on the specific types of profiles included. Extruded profile types can be classified into the following categories: non hollow non round profiles (such as square, rectangular, and hexagonal bars), non-hollow round profiles (rods), hollow round profiles (tubes), and custom designed shapes.

The clauses “Scope” and “Alloy group”, included in all EN 755 standards, shall remain as clauses one and two. The third clause shall specify the tolerances for dimensions relevant to the profile. Depending on the profile type, these will include diameter and corresponding cross-section dimensions: width, height, width across flats, and, where applicable, wall thickness. The fourth clause shall specify the applicable geometrical requirements for the particular profile type, including perpendicularity of cut ends, roundness with the stress on ovality, straightness, flatness (convexity/concavity), angularity, and twist. The term twist which is specific to profiles shall be defined much more rigorously then it is defined currently.



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Fig. 2. Proposal of a new Content page

3. TERMS & DEFINITIONS

The terminology used in the EN 755 series of standards, with particular focus on their compliance and consistency with the ISO GPS system is analysed in this section. It also

includes a critical review of the EN 755 definitions to assess their alignment with the conceptual and semantic framework established in the ISO GPS system standards.

The objective of this comparative analysis is to identify potential discrepancies and opportunities for harmonising the terms used in the EN 755 series of standards with those adopted in the ISO GPS system. This paper will contribute to improve clarity, interoperability, and standardization in technical documentation of the extruded aluminium product specification practices.

3.1. SQUARENESS OF CUT ENDS AND ANGULARITY

The term squareness of cut ends is not explicitly defined but it is consistently referred to in all standards within the EN 755 series. Measurement of the squareness deviation of cut ends appears to be problematic. The corresponding clause in the standard EN 755-5 provides only a single prescriptive statement: “The squareness of cut ends shall be within half of the fixed-length tolerance range specified in Table 5 for both fixed and random lengths”. This definition is totally imprecise and is ambiguous. Three possible ways for evaluation the deviation of the squareness of cut ends are shown in Figure 3. In the first method (Fig. 3a) the flat edge square of selected arm length is used as the measuring equipment. Its base arm shall be placed tangent to a tube edge and the distance between the measuring arm and tube end is measured. In order to assess squareness of cut end deviation measurements should be taken in at least four longitudinal sections of a tube (spaced at 90-degree intervals). In the second method (Fig. 3b) the length of base arm is equal to the tube length. In practice, this approach may be used for tubes that are not too long. In the third method (Fig. 3c) the squareness of cut ends deviation is assesses as the distance between the plane that is perpendicular to the axis of the cylinder inscribed into the tube hole. Of course, looking at methods (a) and (b), the question of the length of the inscribed cylinder immediately arises. The term squareness defined within the EN 755 series of standards, most closely corresponds to the definition of perpendicularity in the ISO GPS system.

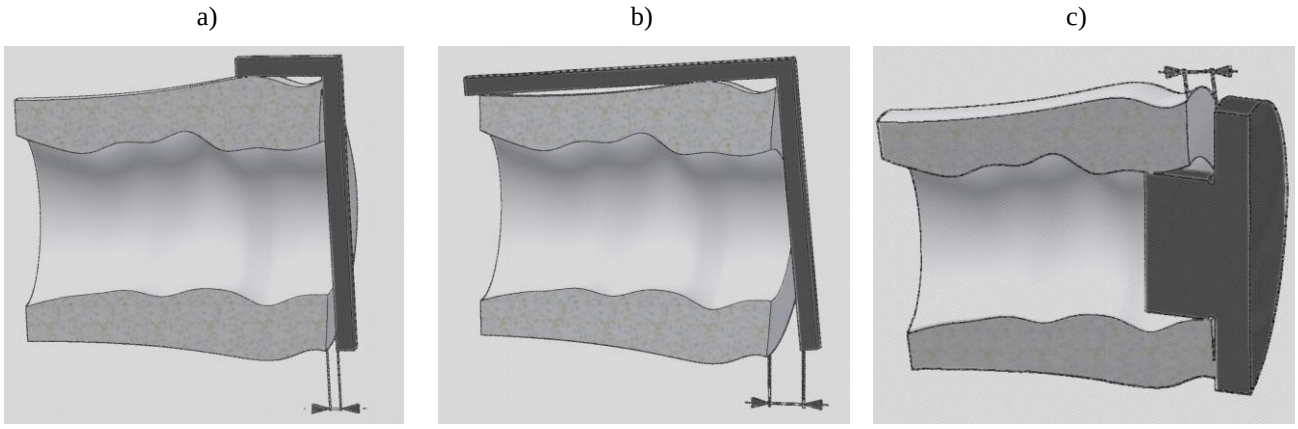


Fig. 3. Due to the lack of the precise definition of the term “squareness of cut ends” various results of its assessment may be reported as it is shown by the dimension lines; (examples given do not exhaust all possible measurement concepts)

So the unclear description of the squareness requirement given in EN 755 series of standards shall be substituted by perpendicularity tolerance requirement (Fig. 4). According to the functional requirements at least three options for perpendicularity specification may be considered.

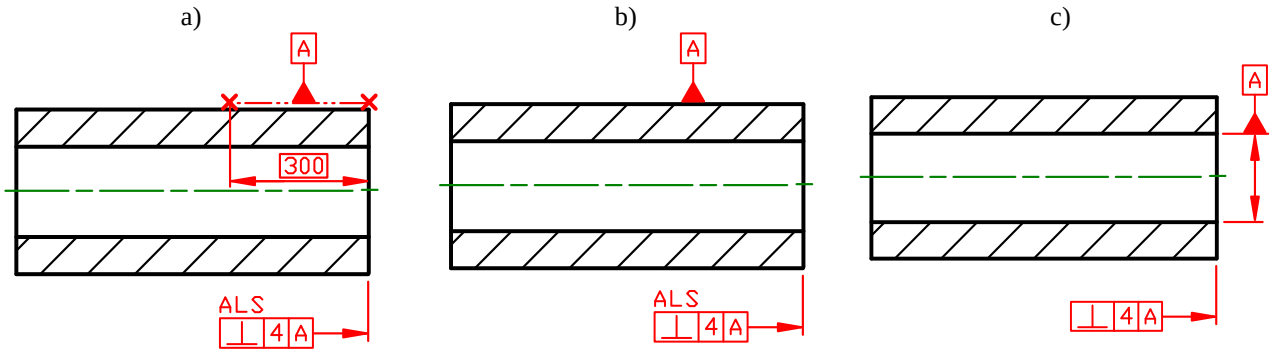


Fig. 4. Specifications of the perpendicularity of tube end that uniquely determine verification according to Figs. 4 a, b, c respectively. ALS modifier indicates that the tolerance is specified for Any Longitudinal Section. The tolerance 4 mm is for the tubes of outside diameter over 200 mm up to and including 450 mm with length up to and including 2000 mm

Despite above, the same term “squareness” is used also in the context of deviation from square in subclauses of EN-755 series and is related to the cross-sectional geometry of rectangular profiles (Fig. 5a). When the figure is viewed for the first time, the reader may initially interpret it as representing the relative situation of an upper point (or line) with respect to a lower point (or line). Within the standard, this illustration is explicitly captioned as the “measurement of deviation from square”, and it is accompanied by a table titled “Squareness tolerances for square and rectangular tubes”, which specifies the permissible deviations from an ideal square geometry in millimetres. However the EN 755 standard does not define the unique verification method. The proposed unique specification for the cross-section of the rectangular tube is shown in Fig. 5b. The geometry of the cross-section is defined with theoretically exact dimensions and the line profile tolerance limits geometrical deviations in cross-section of the rectangular tube. Because the “all around” symbol (small circle placed on the intersection of the leader line and the reference line of the tolerance indicator) and the UF (united feature) modifier are used, the specification applies to a united feature. This tolerance UF is built from the features that make up the periphery of the workpiece determined in a cutting plane in each cross-section as the plane containing the circle of the lowest possible circumscribed diameter. The tolerance zone is limited by two equidistant lines enveloping circles with a diameter equal to the tolerance value T_1, the centres of which are situated on the theoretically exact feature (TEF) defined by the theoretically exact dimensions X and Y specified in the rectangular frames and default four theoretically exact angles 90° between sides of the rectangular tube. The geometry variation is refined by the OZ (offset zone) modifier (ISO 1660 [7]). The second tolerance zone is defined by an unspecified, but constant, offset from TEF defined by the theoretically exact dimensions X and Y. This way the offset tolerance zone with the width T_2 controls the form of each toleranced feature within the larger, tolerance zone of the width T_1 that controls dimensions and relative locations of the geometrical features that establish the periphery of the cross section of the extruded profile.

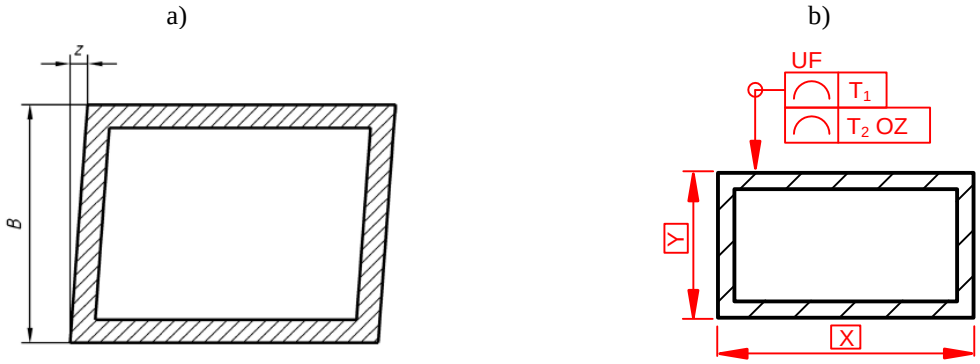


Fig. 5. a) Measurement of deviation z from square (figure and caption from [4] – Fig. 6) – the illustration does not define the unique verification method. b) Extruded rectangular tube with restricted dimensions, form, orientation and location by tolerance T_1 and further restricted form and orientation by tolerance T_2

In industrial practice, measurements in line with the specification given in Figure 5a are typically performed using an optical projector or CMM, based on a cross-sectional slice of the evaluated profile with a thickness of a few millimetres. This operation is not complex, for most of aluminium extrusion manufacturers, it is a routine activity defined by an established control plan that takes into account, for example, batch volume. The objective is to maintain a reasonable balance between measurement cost and the functional requirements of the specific aluminium profile (bar) application.

Furthermore, similar illustration is included in the subclause 5.5 of [5] titled "Angularity", with first short sentence "The deviation from square for square and rectangular tubes shall be measured as shown in Figure 6" (Fig. 5a in paper). Such description is not very informative and is extremally fuzzy. This contextual placement makes it evident that the illustration is not intended to describe situation relationships along the length of the profile, but rather to depict the measurement concept used to quantify angular deviations within the profile's cross-section. Usage of the same term "squareness", in two different meanings in a single standard demonstrates its authors' lack of diligence.

More over, it is surprising that subclauses 5.5 in [5] and 3.5 in [6] are titled "Angularity" but the term "angularity" is not used in either of these standards; instead, the term squareness tolerance is unexpectedly used. It is necessary to stress once more that ignoring the term issue the crucial problem is that the figure in [4] does not secure unique verification of the deviation from square (Fig. 6). It shall be noted that more options of the placement of the flat edge square with respect to measured rectangular tube are possible than two shown in Figure 6. More over for the case shown in Fig. 6a the deviation is assessed as the distance between end point of the flat edge square arm, while for the case shown in Fig. 6b such distance is equal to zero. On the other hand the significant distance can be observed in Fig. 6b at the corner of the flat edge square. The standard does not indicate which distance shall be reported as the deviation.

The specific case of angularity is addressed in the EN 755-9 [8]. In this standard, which primarily concerns hollow extruded profiles with circumscribing circle not greater than 800 mm, the subclause on "Angularity" provides an additional method for characterising the inclination of profile walls. In contrast to the earlier discussion on squareness requirement in [5, 6], this provision does not classify the requirement as a "squareness" condition.

a) b)

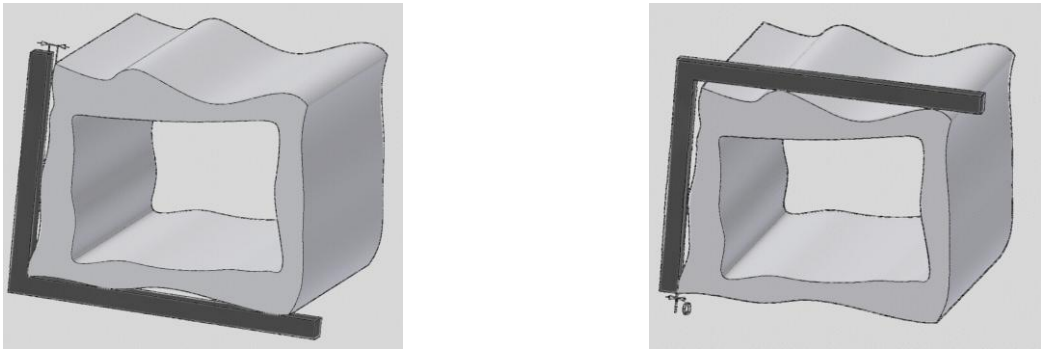


Fig. 6 The illustration given in [4] does not define a unique verification of the deviation from square. a), b) Two possible results of the deviation from square assessment using the flat edge square based on the assumption specified in [4], that the tolerance shall apply to the shorter side of a rectangular profile are indicated by the dimension lines

Notably, the standard permits the specification of such deviations using two independent, different methods: linear, expressed directly in millimetres along the profile length, and angular, expressed in degrees, however there's no correlation between tolerance values given for both methods.

To sum up – for a proper definition of perpendicularity requirement, regardless of the terminology used, at least one datum reference must be established. A datum system provides the necessary functional intent to control orientation between features, ensuring consistency and repeatability in inspection processes. However, the EN 755 series does not explicitly specify the establishment of such a datum system within its requirements. This omission introduces potential ambiguity in interpretation and may lead to variations in quality control practices, particularly in applications where narrow geometrical tolerances are critical for functional performance.

3.2. OVALITY

Standards [3, 5, 6] give dimensional tolerances for the diameter of aluminium alloy extruded products, [3] applies to rods, while [5] and [6] apply to tubes. The concept of ovality is addressed exclusively in [3] in subclause 4.1 as the diameter difference between the maximum and minimum diameters measured in one cross-section (Fig. 7a). The term ovality is mentioned in [5] in subclause 4.2 and in [6] in subclause 3.2 where it is stated that required diameter tolerances include of any ovality. Figure 7a was developed based on the description provided in the standard [3], as the standard itself does not include an illustration. Figure 7b was developed based on the definition of tolerance zone for roundness and the default method of roundness deviation evaluation (minimax – Chebyshev) given in the ISO GPS standard ISO 1101 [9]. Ovality is the case of two lobes roundness deviation. The crucial problem is that the value of the ovality deviation reported in line with the well-known [9] definition will be two times smaller than the value obtained using the definition given in [3]. The tube will pass inspection according to the definition given in [9] definition but must be rejected in accordance with the definition given in [3].

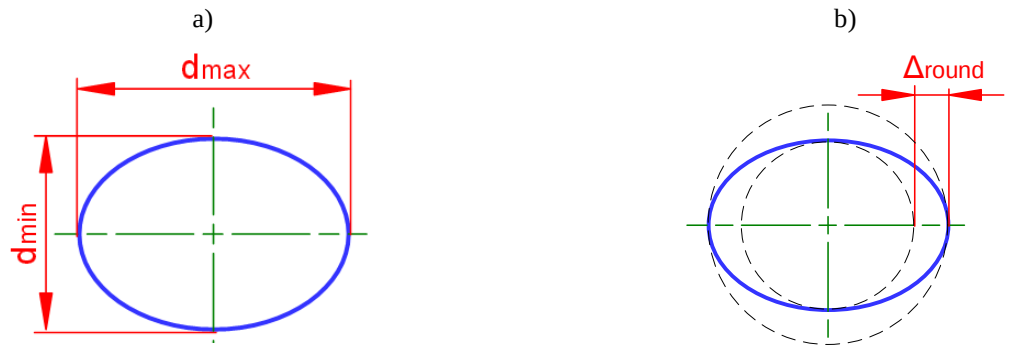


Fig. 7. a) Illustration of the ovality definition according to [3] where ovality is defined as difference between the maximum and minimum diameters measured in one cross-section. b) Illustration of the roundness deviation according to [9] where roundness deviation is defined as equal to difference in radii of two concentric circles

The following terms: ovality, wall thickness variation (linked with term eccentricity in [5], which is incorrect – Figure 8), and dent depth around the tube circumference collectively describe the geometrical requirements for the extruded products. The term dent depth is not defined in EN 755 series of standards. In ISO 8785 [10] dent is defined very generally as hollow with no raised portion, often caused by plastic deformation resulting from an impression or blow. It seems that that dent depth pertains to the permissible description of surface damage, emphasizing that such surface conditions are to be classified strictly as allowable imperfections and, therefore, shall not be interpreted or assessed as dimensional or geometrical deviations.

For ovality [3] gives its value as a maximum of 50% of the specified diameter tolerance range. For example, if the diameter limit deviations are ±0.22 mm, the permissible ovality is 0.22 mm. Of course, in cases where overall diameter accuracy is not critical, but ovality is functionally important, the designer can individually specify the required characteristic.

To ensure technical precision and terminological consistency, this parameter should be redefined in alignment with best practices from the ISO GPS standards, where roundness is the correct corresponding characteristic (Fig. 7b).

3.3. WALL THICKNESS VARIATION (ECCENTRICITY)

The term “eccentricity” used in [5] in the context of wall thickness variation is technically incorrect. Firstly, this term is not standardized within the ISO GPS system, where no formal definition exists for eccentricity as applied to wall thickness. The closest related standardized concept is concentricity, but addresses the position relation between geometrical features not the material thickness distribution. The term “eccentricity” is used in [5] seven times and what is astonishing the term “concentricity” is also used in this standard in the same context but it occurs only once. The question is whether it is only editorial negligence of the standard’s developers?

Figure 8a illustrates a scenario in which the wall thickness variation arises solely as a consequence of the mutual two-axis displacement of the features. Figure 8a was developed based on figure A.1 in [5] and the equation from this standard to show that wall thickness

variation is related to concentricity, the only in specific case and, in general no such relation can be observed (Fig. 8b).

The determination of wall thickness variation and the assessment of eccentricity are based on fundamentally different measurement methods. Wall thickness variation may be evaluated through direct thickness measurements, for example micrometer with a spherical anvil and flat measuring face of a spindle. Concentricity (eccentricity) requires geometrical referencing to defined axis as a datum or datum system. These characteristics should not be used interchangeably.

The term eccentricity should not be used in [5] at mentioned context as it only describes a special case of wall-thickness variation and it has no formal definition within the ISO GPS system. Wall-thickness variation is a direct material-thickness characteristic, whereas eccentricity is a concept that belongs to tolerances of location group requiring datum and centre point alignment. Consequently, these terms refer to fundamentally different types of specifications and must not be mixed in technical documentation.

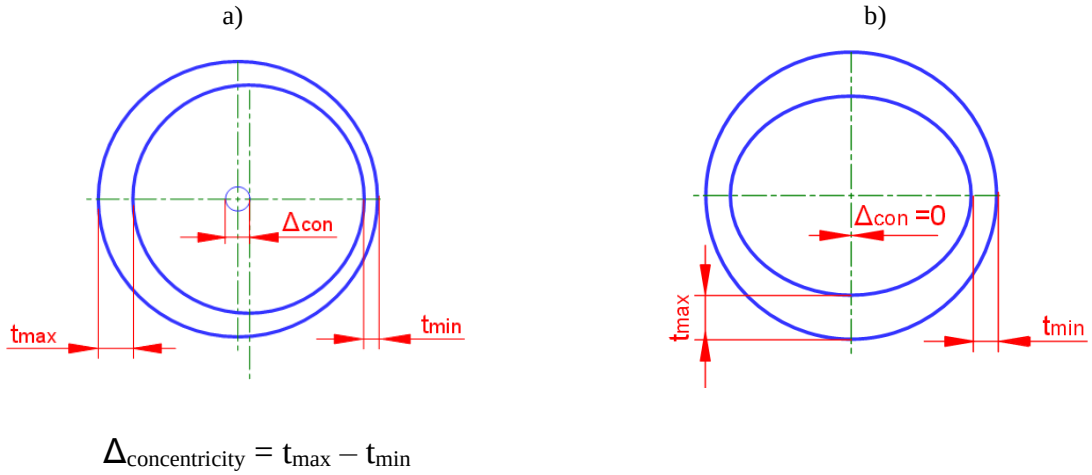


Fig. 8. a) The variation in wall thickness results from a deviation in concentricity although no ovality deviation is present. b) The observed wall-thickness variation is attributed to roundness (ovality) deviation, with no concentricity deviation detected

3.4. TWIST

It is mentioned in [11] that sketch provided in [8] showing measurement of twist for open profile gives obscure measurement set-up on majority of the actual parts. The [8] specifies tolerances for aluminium extruded profiles of any geometry that can be circumscribed in the circle of diameter not larger than 800 mm and it is pretty hard to define twist for any geometry of hollow and solid profiles with edges of different heights. Therefore the application of the surface profile tolerance to limit geometrical deviations for such profiles is strongly recommended in [1]. Application of the surface profile gives a unique specification, however it is not functionally obvious for tubes of rectangular cross-section. Although the term twist was analysed in [1] with reference to the more complex cross-section specified in [8], it is worth to extend the discussion by examining the case described in [4] (rectangular bars) – Fig. 9.

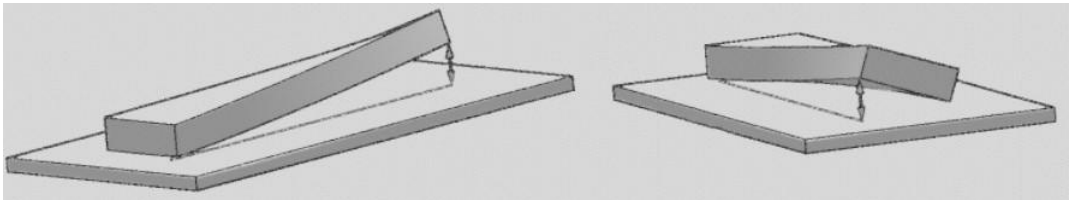


Fig. 9. Twist deviation – illustration showing actual part developed based on Figure 4 given in [4]. Two views are used to provide the clear presentation of the twist deviation marked by the dimension lines

The [4], together with its counterpart [2] (square bars), provides no definition of the term "twist" nor any technical description of the associated requirement, offering only a simplified illustrative drawing and a table of permissible deviation values. The figure included in the standard illustrates only the general concept of the method for evaluating twist, in which the profile is placed on a flat reference plate and the twist magnitude is defined as the vertical displacement measured at one end relative to the base surface.

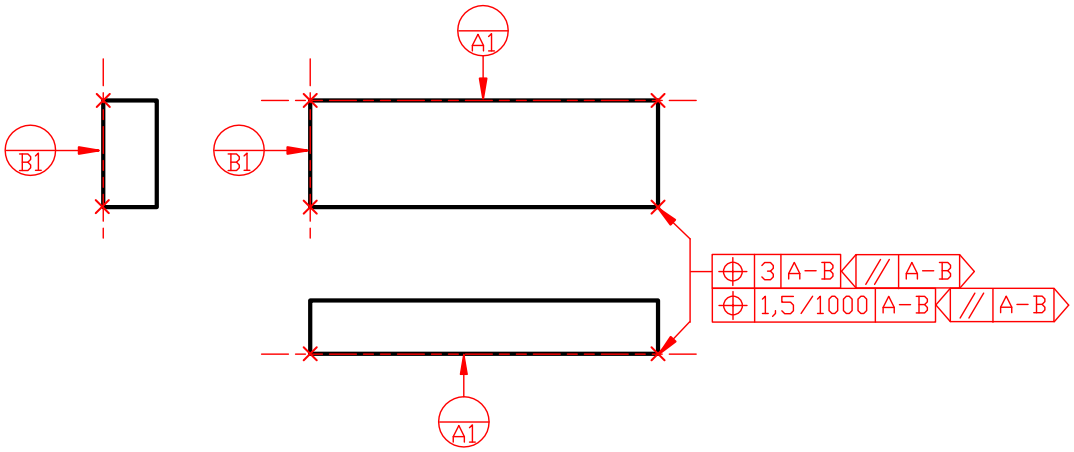


Fig. 10. Unique specification of tolerance that limits twist deviation – the twist is clearly defined as the bar corner "vertical displacement"

The unique specification of tolerance that limits twist deviation is shown in Figure 10. The first single line datum target feature A1 is established by the indicated edge of the rectangular bar. The second single line datum target feature B1 is established by the indicated edge of the bar left face. The common datum A-B is specified in the third compartment of the tolerance indicator. It means that the pair of mutually perpendicular straight lines is used to establish the common datum A-B which is a plane. The corner (bar endpoint) is indicated as the toleranced feature. The orientation plane indicator placed to the right of the tolerance indicator carries information that the toleranced corner shall be contained between two parallel planes that are parallel to the common datum plane A-B. Although the double indication for the toleranced feature is not advised, the specification for toleranced point includes two views to provide greater clarity and ensure that the intended interpretation of the requirement is fully understood.

This is an example of an unambiguous specification that can only be verified using coordinate metrology. However, as with any verification process, simplified methods may also be applied. A CMM-based approach is proposed because the current description in the EN 755 series of standards does not allow even unique simplified methods to be followed.

4. CONCLUSIONS

Through the detailed and systematic review of the EN 755 series of standards, with particular emphasis on geometrical consistency and compliance with modern tolerancing principles, this study has identified several irregularities and inconsistencies that adversely affect the clarity and reliability of technical documentation. These irregularities include unclear definitions, insufficient distinction between form and orientation tolerances, and a lack of integration with the ISO Geometrical Product Specifications (GPS) system. Such issues can result in miscommunication between stakeholders, and challenges in achieving repeatable verification.

It is important to highlight that the EN 755 series of standards, along with several other related series, does not include any references to dimensional or geometrical tolerancing standards within its normative or informative bibliography. This omission raises concerns regarding the conceptual clarity and technical rigour of the standard, particularly in relation to the interpretation of fundamental terms such as “dimension” and “tolerance”.

The absence of explicit references to the ISO GPS system terms and definitions is incomprehensible. Many terms used EN 755 series of standards are neither formally defined nor contextually explained within this series of standards. Consequently, the lack of standardized definitions introduces ambiguity and increases the risk of inconsistent interpretation and application across industrial sectors.

The authors consider [5] and [6] to be a strong candidates for consolidation, as it exemplifies an unnecessary division of closely related content into separate standard parts. Both standards specify dimensional tolerances for extruded rods, bars, and tubes, differing only in the manufacturing method: seamless extrusion [5] and porthole extrusion [6]. Despite these distinct manufacturing processes, the resulting standards differ only in a single table defining wall-thickness tolerances – and the differences between listed values are relatively minor. This raises the question of whether the creation of two standalone parts is justified when the substantive difference occupies less than half a page. Also [2] and [4] are obvious candidates for merging.

A potential next step would be to consolidate all EN 755 series of standards into a single, unified document. The total volume of EN 755 series of standards currently approaches 100 pages; however, a significant portion of the content – such as general information, definitions, and repeated descriptions – appears redundantly across multiple clauses. By removing duplicative text and harmonising requirements, the provisions of the standards could be effectively integrated into one comprehensive, user-friendly, document with an estimated length of approximately half its current total.

To ensure technical coherence and interoperability, it is recommended that future revisions of the EN 755 series incorporate references to internationally recognised dimensional and tolerancing standards developed by ISO/TC 213, and provide clear definitions aligned with the ISO GPS system terms, definitions, rules and principles [12]. This would enhance the precision, usability, and global applicability of the standard.

The rationale behind the standard developers decision to simplify some terms and methodologies remains unclear. It is uncertain whether the intent was to increase accessibility for a broader audience; however, such simplifications do not resolve technical complexities.

Instead, they tend to introduce additional ambiguities and inconsistencies. A more robust approach is to ensure that users possess the necessary competence [13–16] in the fundamental principles of tolerancing and metrology, rather than relying on overly simplistic shortcuts. The growing industrial demands for improved dimensional accuracy in aluminium profiles are discussed in [17], but the work does not critically examine the inconsistencies found in the geometric accuracy specifications defined in the EN 755 series of standards.

REFERENCES

[1] Welcome to ISO/TC 213 https://committee.iso.org/home/tc213

[2] EN 755-4:2008, Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 4: Square bars, tolerances on dimensions and form

[3] EN 755-3:2008, Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 3: Round bars, tolerances on dimensions and form

[4] EN 755-5:2008, Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 5: Rectangular bars, tolerances on dimensions and form

[5] EN 755-7:2016, Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 7: Seamless tubes, tolerances on dimensions and form

[6] EN 755-8:2016, Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 8: Porthole tubes, tolerances on dimensions and form

[7] ISO 1660:2017, Geometrical product specifications (GPS) - Geometrical tolerancing - Profile tolerancing.

[8] EN 755-9:2016, Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 9: Profiles, tolerances on dimensions and form

[9] ISO 1101:2017, Geometrical product specifications (GPS) - Geometrical tolerancing - Tolerances of form, orientation, location and run-out

[10] ISO 8785:1998, Geometrical product specifications (GPS) - Surface imperfections - Terms, definitions and parameters

[11] HUMIENNY Z., BŁASZCZYK M., 2021, *Tolerances for Aluminium Alloy-Extruded Profiles According to EN 755-9 And EN 12020-2 Versus Definitions of Tolerances According to the ISO GPS System*, Journal of Machine Engineering, 21/1, 121–132, https://doi.org./10.36897/jme/133728

[12] HUMIENNY Z., BŁASZCZYK M., 2026, *Concepts, Principles and Rules in the ISO GPS System - Relations, Coherences and Incoherences*, Acta Technica Napocensis (in press)

[13] HUMIENNY Z., BŁASZCZYK M., 2023, *Assessment of the Candidate Suppliers' Fluency in ISO GPS Standards Essential Principles*, Rules and Indications, Journal of Machine Engineering, 23/3, 179–192 https://doi.org./10.36897/jme/168074

[14] SCHULDT J., GRÖGER, S., 2022, *The Assessment of the ISO GPS System Implementation with GPS Maturity Model*, Procedia CIRP, 114, 197–202, https://doi.org/10.1016/j.procir.2022.10.027

[15] KONG C., LI T., ZHANG Z., XU Y., LUO J., FU H., ZHU Y., MING C., YU J., 2022, *The Status of Delivery of ISO GPS in China: a Survey*, Procedia CIRP, 114, 100–105, https://doi.org/0.1016/j.procir.2022.10.014

[16] FOLEA M., 2025, *ISO GPS Changes – Challenges for Manufacturing Industry*, RECENT J. (2025), 77, 348-353, https://doi.org/10.31926/RECENT.2025.77.348

[17] AHMED F., 2025, *Study of Dimensional Variability and the Effect of Extrusion Parameters in Extruded Multi-Chambered Aluminum Profiles*, Polytechnic University of Turin, https://webthesis.biblio.polito.it/37063/