

FINAL DRAFT – PUBLIC DOMAIN
Industry information pack

Guide to dual certified carbon steel tubes



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Typically asked questions with answers

Q1: *What is a dual certified tube?*

A1: A dual certified tube is a product that has been manufactured and documented in accordance with more than one technical tube standard.

Q2: *Why would you do this?*

A2: Some building services pipework applications require the tube to be supplied in accordance with both the Construction Products Regulations (CPR) and the Pressure Equipment Directive (PED). There isn't a single tube standard that covers both, so referring to more than one standard is required.

Q3: *Does this make a difference to the tube?*

A3: Yes, as there will need to be a tighter control of the steel chemistry, mechanical properties and additional product testing undertaken by the tube manufacturer to comply with the multiple specifications.

Q4: *What are the tube standards that are typically used?*

A4: Dual standard products are typically to BS EN10255 (for the CPR and CE marking) and EN10217 (for the PED). EN10217 shows that the tube has also been made by a Welded production route. (Seamless tubes to BS EN10216 are rarely supplied in this size range).

Q5: *Are there different Parts to BS EN10217?*

A5: Yes, and this is very important to understand, BS EN10217 is typically supplied as either Part 1 or Part 2. The Part 1 offering is technically only suitable for ambient temperature use (max 50 degC), whereas Part 2 is suitable for high temperatures (max design temperature = 400 degC) – you should always check with the tube manufacturer's data for confirmation as other additional tests may have been undertaken to enhance capability. The tubes actual characteristics can also be shown by **Technical Quality Designations**.

Q6: *What are Technical Quality Designations?*

A6: Within BS EN 10217 Part 1 and Part 2, there exists Technical Quality Designations to be used alongside the steel grade; for BS EN10217 Part 1 these are **TR1** and **TR2**, for Part 2 it's **GH**. These define the tube characteristics and can also confirm the production route and the application suitability. For example:

- BS EN10217 Part 1, Grade P195TR1 = this shows that the tube is P = Pressure, the min yield of the tube = 195MPa, and the **TR1** designation = typically a **cold-formed tube**, supplied as welded, with a max operating temp of 50 degC (ambient). TR1 grades are not suitable for applications under the PED.
- BS EN10217 Part 1, Grade P195TR2 = this shows that the tube is also P = Pressure, and the min yield of the tube is also = 195MPa, but the **TR2** designation = an as welded tube with some additional heat treatment, can be classified as a **warm-formed tube** (see **Note 1**) but still with a max operating temp of 50 degC (but see **Note 2**). Not all TR2 products are suitable for applications under the PED (**Note 3**).
- BS EN10217 Part 2 Grade P195GH = this shows that the tube is again P = Pressure, and the min yield of the tube again = 195MPa, but the **GH** designation = a **hot-finished tube** which has been heat treated at a sufficiently high temperature to relieve internal stresses and fully remove the weld Heat Affected Zone (HAZ). BS EN10217 Part 2 is intended for both ambient and elevated temperature applications, and defines additional testing protocols to demonstrate tube suitability. All GH products are suitable for applications under the PED.

Note 1: BS EN ISO 4885 defines 780 degC as the minimum temperature for hot forming – hence below this is **warm-forming**. The minimum temperature for full hot 'normalising' is 850 degC. Therefore, TR2 is referred to as **warm-formed** as technically it can be supplied in this condition.

Note 2: Other temperatures and pressures may be possible if additional testing / product guarantees are given by the tube manufacturer - see Table 1 for additional details.

Note 3: Weld Line Normalised or Annealed (WLA) TR2 tubes made from hot rolled coil **ARE NOT COVERED UNDER THE PED**.

Table 1: Guide to dual certified welded carbon steel building services products			
Standard	BS EN10255 / 10217-1:2019 TR1 Part 1-TR1	BS EN10255 / 10217-1:2019 TR2 Part 1-TR2	BS EN10255 / 10217-2:2019 GH Part 2-GH
Technical Delivery Condition	COLD-FORMED	WARM-FORMED	HOT-FINISHED
Min temp range (degC)	5	5	-10
Max temp range (degC)	50	50	400
Temp classification	Ambient (A)	Ambient (A)	High Temp (HT)
Max pressure	70 bar	70 bar	70 bar
PED compliance	No	Yes – but see note below **	Yes
CPR CE compliance	Yes – if supplied with CAT3&4 DOP	Yes – if supplied with CAT3&4 DOP	Yes – if supplied with CAT3&4 DOP

Table 2: Manufacturers Specifications (See Note 1)	
Own brand – BS EN10255 / 10217-1:2019 TR2-MODIFIED (see Note 1)	Own brand – BS EN10255 / 10217-2:2019 GH-MODIFIED (see Note 1)
WARM-FORMED with ADDITIONAL MANUFACTURERS TESTING *	HOT-FINISHED with ADDITIONAL MANUFACTURERS TESTING *
-10	-20
Up to 100	400
Low Temp (LT)	High Temp (HT)
70 bar	Greater than 70 bar
Yes – but see note below **	Yes
Yes – if supplied with CAT3&4 DOP	Yes – if supplied with CAT3&4 DOP

Note 1: Table 2 shows examples of products which have been modified in accordance with a Manufacturers Specification (changes highlighted in yellow). Whilst such products may have additional guarantees, they may still be outside the scope of the primary product standard; this may cause compliance issues if the primary standard does not satisfy the application or legislative regulatory requirements in full – see Question 13.

* Needs to be fully supported with appropriate Technical Statements/Reports from the manufacturers – ideally independently verified.

** Weld Line Annealed (WLA) TR2 tubes must be produced from normalised-rolled strip. TR2 tubes made from hot rolled coil ARE **NOT COVERED UNDER THE PED** - Refer to **Annex A** for additional details regarding the PED.

Q7: From Table 1, why are TR1 products not suitable for applications under the PED?

A7: On the 20th April 2021, the old version of BS EN10217 Part 1:2002 was officially withdrawn and the new Part 1:2019 version became the only current Part 1 standard for the industry to use. Within this new version, it clearly states that cold-formed TR1 products are no longer suitable for use under the PED. This is because TR1 grades do not automatically meet the essential requirements of the PED in respect of ageing (determined by the chemical composition) or ductility/toughness (specified as minimum Charpy impact requirements).

Q8: Are BS EN10217-1:2002 TR1 tubes made before 20th April still suitable under the PED?

A8: Yes, when standards get updated or are changed there is a Transitional Period and Coexistence Period. The new BS EN10217 standards were launched in 2019, but the older 2002 version did not become officially withdrawn until the 20th April 2021 – this is known as the Transitional Period. Any material already manufactured, or that is currently within the supply chain, or has been placed on the market, or that is about to be used or has been used still complies with the PED through being produced to the 2002 version of the standard; this is the Coexistence Period.

Q9: So, are BS EN10217-1:2002 TR1 tubes in old projects that are being used in current projects still ok under the PED?

A9: Yes, material previously installed is still covered. Material made pre-20th April 2021 is still covered. Any material placed on the market or within the supply chain is still covered. Only, new material produced to BS EN10217:2019 TR1 after 20 April is no longer covered, but the industry will see older material eventually being used up and new material take its place within the supply chain. However, it is important to note that Part 1 tubes are only intended for ambient temperature use, so, depending on the application temperature, a Part 2 tube may have been required.

Q10: Why can TR2 and GH tubes be used under the PED?

A10: These tubes have different coil type, steel chemistry, manufacturing and testing requirements. Therefore, they do meet the essential requirements of the PED in respect of ageing (determined by the chemical composition) or ductility/toughness (specified as minimum Charpy Impact requirements). Also, due to additional testing requirements Part 2 (GH) grades are suitable for low, ambient, high as well as elevated temperature use, whereas technically a Part 1 TR2 tube is only suitable for ambient (50 degC max) temperatures.

Q11: Are all TR2 tubes suitable for applications under the PED?

A11: No, only TR2 tubes that are normalised-rolled, full body normalised or made from normalised-rolled strip that is Weld Line Normalised or Annealed (WLA) are covered. TR2 tubes produced from hot-rolled coil that is then Weld Line Normalised or Annealed (WLA) are not covered as they are seen as not meeting the essential requirements of the PED. So not all TR2 tubes are the same.

Q12: Can a TR1 tube be retested or recertified as a TR2 or GH tube?

A12: No, a TR1 tube can never be recertified as a TR2 or GH tube, as TR1 tubes are **cold-formed** and supplied “as welded”; TR2 tubes undergo some stress relief and can be considered **warm-formed**. GH tubes are **hot-finished**. They are all different in their performance and suitability for use due to their different manufacturing, testing and validation processes.

Q13: From Table 2, what is MODIFIED or Outside Scope of Product Standard?

A13: Some manufacturers may do additional testing on their products and state that they are suitable for use at higher temperatures or pressures. Typically, this is to address issues or challenges with the products conforming to the correct standard in full. This is why such products should be identified as being to a **Manufactures Specification**, as they may be outside the scope of the primary product standard. Customers and end-users need to be made fully aware of this, as it may cause compliance or acceptance issues if the primary standard that the testing is modifying does not satisfy the application or legislative regulatory requirements in full. In such cases please consult the manufacturer for further clarification.

Q14: Are hot-finished tubes different to hot-formed ones?

A14: No, they can be considered to be the same – technically, it's down to the actual hot production route used – in all cases the Heat Affected Zone (HAZ) / weld seam is fully removed.

Q15: *When does the PED apply?*

A15: Unfortunately, the PED can be a complicated and confusing document, however, any pressure or pipework application using BS EN10217 tube which is above 0.5bar operating pressure may come under the PED requirements, although these may also be size and pressure dependant. There are some application exceptions set out in the UK Pressure Equipment (Safety) Regulations Guidelines (2021), but because building services can include a wide range of different applications, temperatures and pressures, for safety and compliance reasons, and as a result of the Grenfell disaster, and the anticipated forthcoming tightening up of UK product regulations and compliance, it is now advisable to treat all building services applications as potentially falling under the PED. However, please see **Annex A** of this pack for additional information.

Q16: *What happens when multiple sizes of tubes are used in a pipework system?*

A16: Annex A shows that some smaller sizes of tubes at varying pressures may not fall within the PED. However, if these sizes are used in combination with larger sizes that do fall under the PED, as the end-user will probably look to CE mark the system in its entirety, then it is likely that these smaller sizes will also need to comply with the essential requirements of the PED.

Q17: *What happens if I use a non-PED tube within a PED application?*

A17: There is a possible compliance issue, which could prevent the CE marking of the system and/or sign-off of the project and which could lead to consequential issues if there was a safety or performance issue identified. It may also lead to incorrect tube having to be removed from projects or having to be covered under additional supplier guarantees. However, if there is no associated product harmonised standard then SEP (Sound Engineering Practice) may be used by the manufacturer to demonstrate that their tube is suitable for the intended pressure and temperature application.

Q18: Why within pipework systems can fittings that are not covered under the PED still be used with the tubes?

A18: There are now some harmonised standards for threaded malleable iron fittings under the PED (Note: **there are only certain grades permitted**). Most other types of fittings are not currently covered. However, it is stressed within UK Regulations that all materials that are used must meet the essential safety requirements for the pressure and temperatures involved. Therefore, it is down to the manufacturers to consistently demonstrate product suitability, this can be done through SEP.

Q19: Are tubes and fittings produced to PED harmonised standards CE marked ?

A19: No, tubes supplied to BS EN10217, and any PED fittings are considered a component of the piping system, so can't be CE marked under the PED. However, confirming that the tubes and fittings are compliant under the PED may be a requirement by the end-user to assist them in CE marking the finished and complete system. The product manufacturer will also have to undergo a Specific Materials Assessment to demonstrate that they can produce material suitable for PED use. This typically involves a regular third-party audit.

Q20: Why do I see CE Marks on such tubes and fittings then?

A20: These tubes are dual certified with BS EN10255, and this standard is harmonised with the CPR (Construction Products Regulations). Under the CPR, the tube or fittings is classified as a product, not a component and must therefore be CE Marked. It is important to understand that the CE Mark is to the CPR and not the PED.

Q21: What is the difference between the BS EN10255 CE Conformity System Marks - CAT 3 and CAT 4?

A21: CAT 3 covers tube suitability for Water, Fuel, Air and Gas and must be independently validated through testing by an official type approval body on behalf of the tube manufacturer. CAT 4 covers suitability only for water and can be self-certified by the tube manufacturer. In both cases, however, a DOP (Declaration of Performance) shall be readily available to confirm what the tube is CE Marked to, by showing the intended use, CAT type and approval details. In addition, the CE Mark should be clearly shown on the tube or accompanying documentation.

ANNEX A – When the PED applies (note: project specifications/different application/client requirements may apply)

T6: GROUP 1 GASES & VAPOUR: PED applies to all pipes \geq DN25 and pressures \geq 0.5 bar.

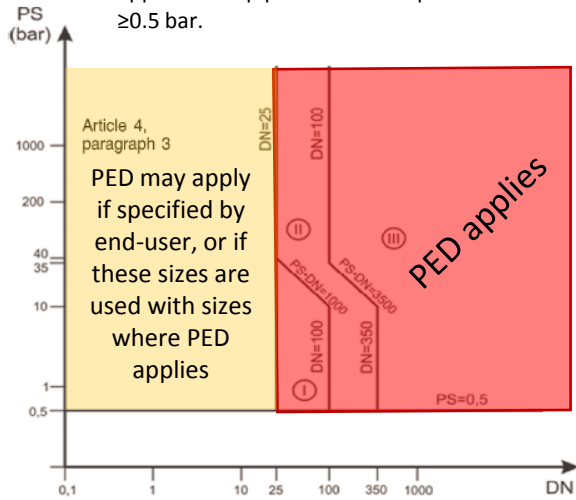


Table 6

Piping referred to in Article 4(1)(c)(i), first indent

T7: GROUP 2 GASES & VAPOUR: PED applies to all pipes \geq DN32 and pressures \geq 31.25 bar. Below this pressure, PED applies when $PS \times DN \geq 1000$

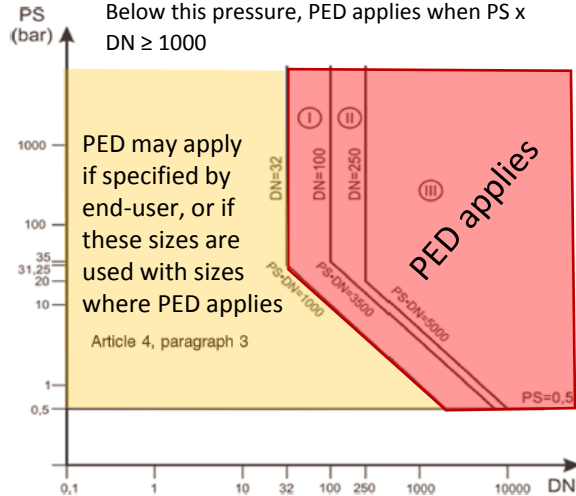


Table 7

Piping referred to in Article 4(1)(c)(i), second indent

T8: GROUP 1 LIQUIDS: PED applies to all pipes \geq DN25 and pressures \geq 80 bar. Below this pressure, PED applies when $PS \times DN \geq 2000$

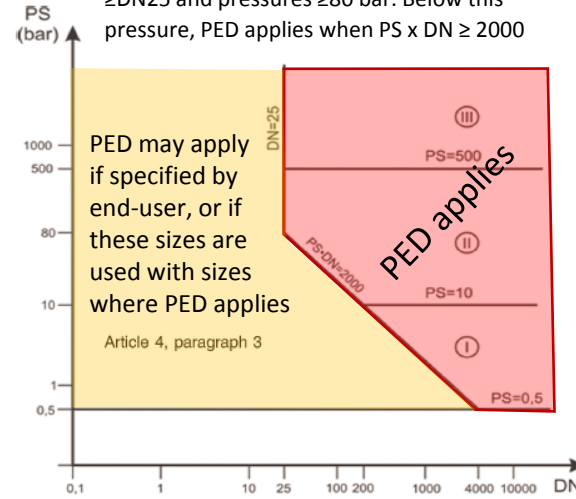


Table 8

Piping referred to in Article 4(1)(c)(ii), first indent

T9: GROUP 2 LIQUIDS: PED applies to all pipes \geq DN200 and pressures \geq 25 bar. Below this pressure, PED applies when $PS \times DN \geq 5000$

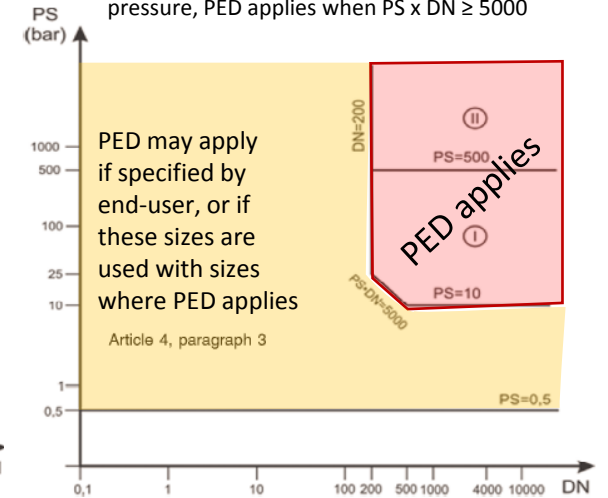
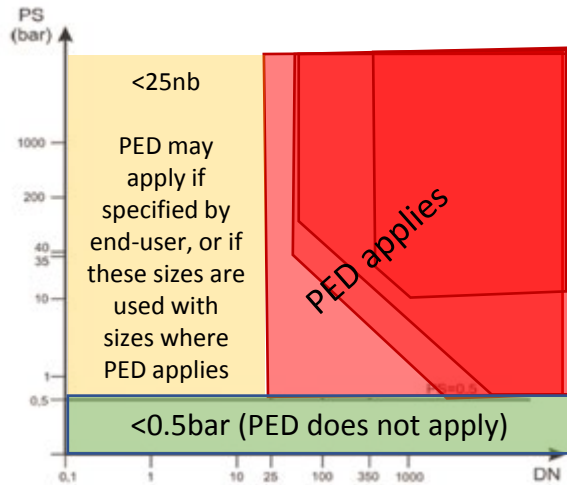


Table 9

Piping referred to in Article 4(1)(c)(ii), second indent



PED applicable zones layered on top of each other for reference



- Irrespective of the PED guidance on tube dimensions, suitable standards appropriate to the application operating temperature (and pressure) must be employed.
- From the UK PED guidance documents it appears that only tubes smaller than 25nb and applications below 0.5 bar fall outside the general PED requirements for gas and liquids. Other sizes may also fall outside, unless specified by an end-user, or if these sizes are used with sizes where PED applies.
- However, there remains the need to demonstrate that such products are still suitable for use at the pressure / temperature within their intended application.
- For all other sizes, and because we can't always fully understand where or how such tubes will be used, the safest option is always to consider the PED as applying. Unless you know the final intended application/product statements or tube markings etc are supplied for a particular end use only.

ANNEX B – PED fluid categories from Annex A

Group 1 – Dangerous Fluids (can be gas, vapour or liquid):

Flammable, highly flammable, toxic, very toxic, corrosive, oxidizing, explosive

- Gas or Vapour Refer to T6 (Annex A)
- Liquid Refer to T8 (Annex A)

Group 2 – Inert Fluids (can be gas, vapour or liquid):

All fluids not included in Group 1 above

- Inert Gas or Vapour Refer to T7 (Annex A)
- Non-Dangerous Liquid Refer to T9 (Annex A)

NOTE: Although steam is classified as a Category 2 vapour, additional requirements also apply to steam generating systems.

NOTE: Appropriate standards must be employed for elevated and low temperature applications.

NOTE: Customer specifications may be “catch all” and include compliance requirements for sizes not strictly within PED requirements.

NOTE: Please remember that requirements under the PED will also apply to other metals such as cast iron, stainless and copper.

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Suitability of dual-certified carbon steel tubes under UK/European legislation:

From the 20th April 2021, unlike BS EN10217-1 TR2 Grades and BS EN10217-2 GH Grades, all BS EN10217-1 TR1 Grades are no longer acceptable for use in applications under the Pressure Equipment Directive (PED -2014/68/EU) (“the Directive”), which was implemented into UK law by the Pressure Equipment (Safety) Regulations 2016.

This is because TR1 grades do not meet the essential requirements of that Directive in respect of ageing (determined by the chemical composition) or ductility (specified as minimum Charpy impact requirements). Therefore, when purchasing pipework, it is important to understand the technical differences between products and the applicable standards, legislation, or regulations being applied. This will help to ensure that steel tubes of appropriate type, grade and technical delivery conditions and standards are specified or selected for the application(s) concerned.

This includes the user ensuring the suitability of the products for the operating pressure and temperature ranges required. In addition, BSEN10255 products are only deemed suitable for fuel, air and gas applications if supplied CE Marked to conformity system CAT3 with supporting documentation.

We encourage our members to undertake appropriate due diligence to ensure that any additional manufacturer’s product claims, above and beyond those listed within the relevant standard(s) are supported by the appropriate technical statements for the user to approve in order to confirm suitability. This is particularly relevant with regards to products supplied to Manufacturers Specifications, which may be outside the scope of the primary product standard.

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