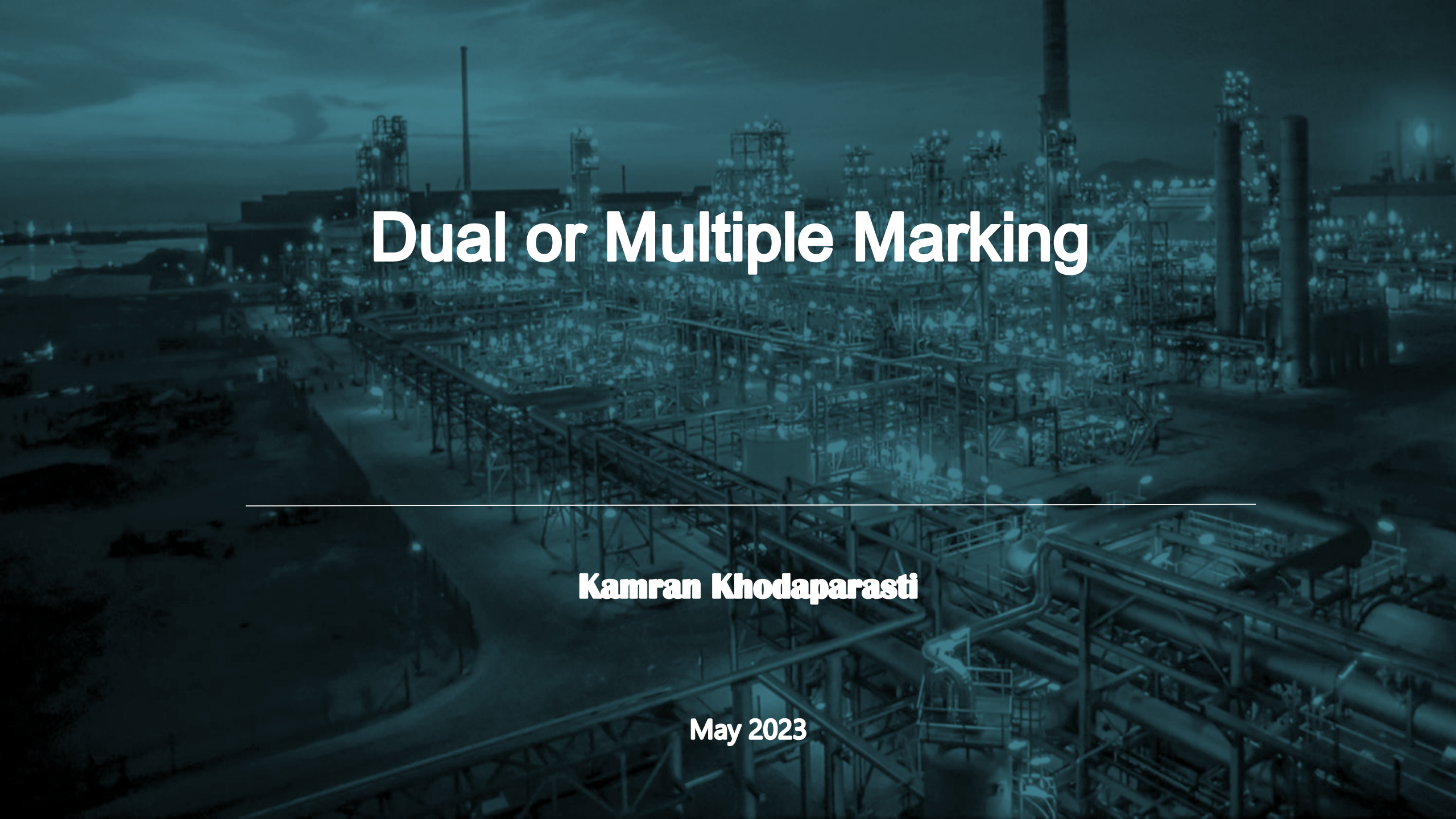

Dual or Multiple Marking

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Education

1991 - 1996 ❑ **Shiraz University**
B.Sc., Materials Engineering - Metal Forming

1998 - 2001 ❑ **Shiraz University**
M.Sc., Materials Engineering - Characterization and Selection of Materials

Career Timeline

❑ **Sistan & Balouchestan University**
Laboratory Expert and Instructor, 1996 - 1998

❑ **Niroo Research Institute**
Researcher, Test Engineer and Laboratory Manager, 2002 - 2005

❑ **Moshanir Consultants**
Senior Materials and Welding Engineer, 2005 - 2016

❑ **Nargan Co.**
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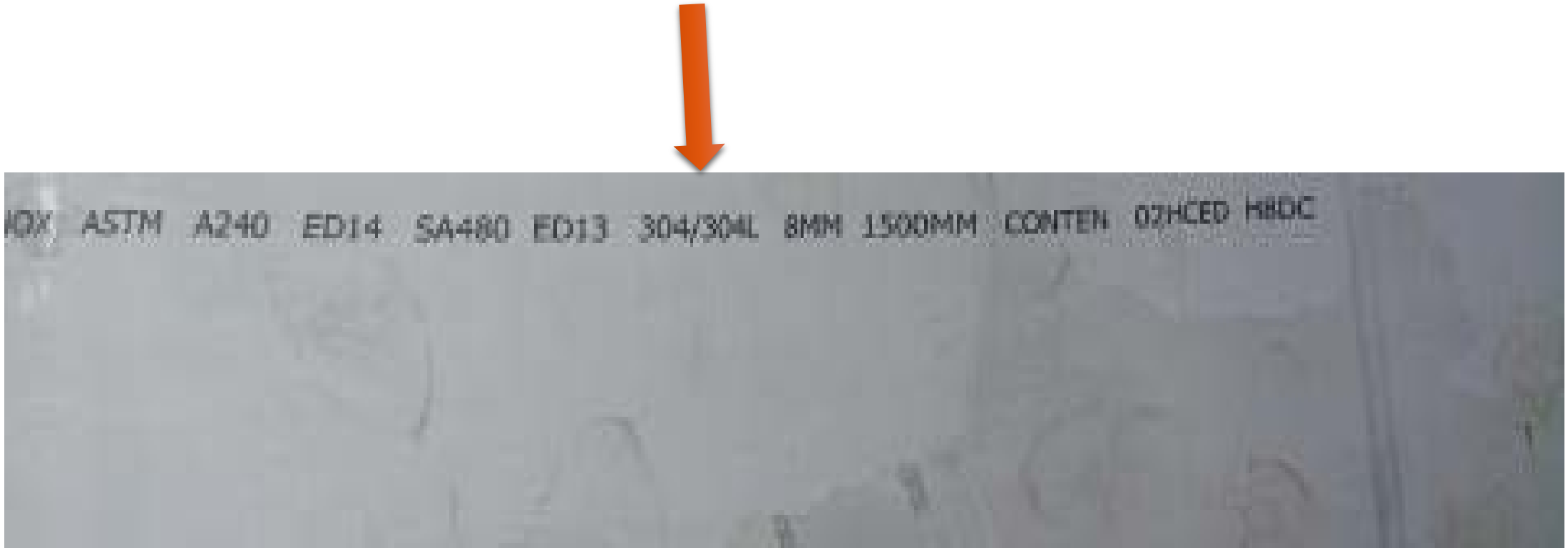
In the drawing of an equipment, 304/304L was considered as material. During construction, the inspector noticed that only 304 was used.

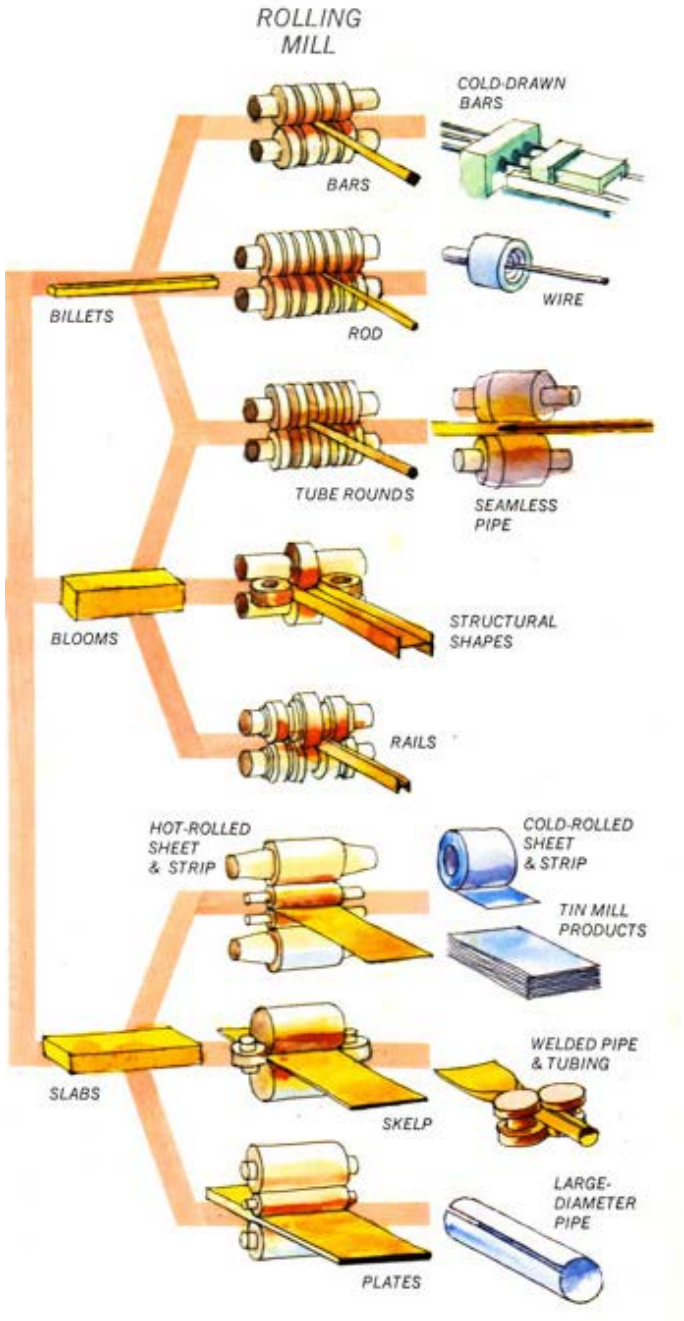
When he asked why, he heard: "I didn't do anything wrong. As you see in the drawing, **304/304**L is mentioned that means **304 or 304L** can be used, and I've used 304!"

1.2.1	Operating pressure	bar (a)	98.9
1.2.2	Design pressure	bar (a)	106.0
1.2.3	Internal diameter	mm	1,980
1.2.4	Length of cylinder (shell)	mm	9,450
1.2.5	Wall thickness of cylinder	mm	85.0
1.2.6	Center line elevation from drum bottom	mm	990
1.2.7	Total volume	m^3	33.2
1.2.8	Water volume	m^3/mm	16.6
1.2.9	Water level operating range (max/min)	mm	1,265 175
1.2.10	Water storage between normal level and minimum level	m^3	15.2
1.2.11	Steam retention time at 100% load(design point and to provide required steam purity	min	3.0
1.2.12	plate material (steam drum / mud drum)	-	304/304L

Let's first look at what 304/304L is. This material is also called **dual marking** or **dual certified** and it can simply be said that this material is both 304 and 304L.

At the first glance, it may seem strange because the letter **L** indicates that stainless steel is low carbon, i.e. rather than 0.08 percent carbon in 304, we have a maximum of 0.03 percent carbon in 304L and the question arises as to how can this be achieved? Is the material both 304 and 304L?

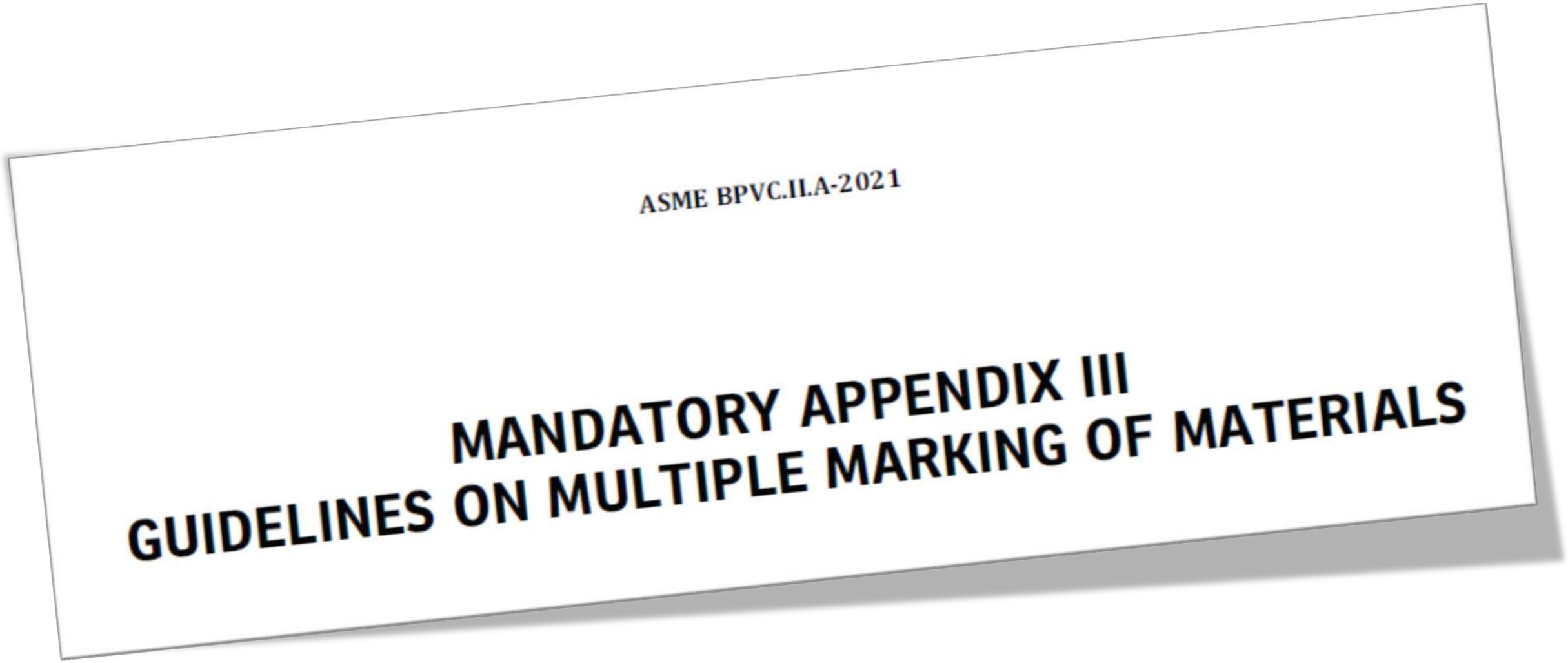




With care in annealing practice, it is possible to produce 304 with low enough carbon to meet the 304L specification yet with high enough yield strength to meet 304 requirements.

In addition to dual marking, you may also encounter **multiple marking** or see on a pipe that says: A53/A106/API 5L

If you are interested in this topic, I suggest that you look at the third appendix of the **ASME BPVC Sec. II, Part A** in which the do’s and don'ts are examined.



III-100 BACKGROUND

A common inquiry topic is the permissibility of using material that is identified with two or more specifications (or grades, classes, or types), even if they have different strengths, or even if one of them is not permitted for use in the construction code of application. The Committee has addressed variants of these questions in several interpretations: I-89-11, IIA-92-08, VIII-1-89-269, and VIII-1-89-197.

III-200 GUIDELINES

The construction codes individually define what materials may be used in boilers, vessels, and components constructed in compliance to their rules. If a material meets all of the requirements for a specification for which it is marked, including documentation, if any, and if it meets all requirements for use imposed by the construction code, it may be used. The construction codes, in general, do not address the case of materials marked with more than one specification, grade, class, or type, so these guidelines are offered for clarification.

III-210 ACCEPTABILITY OF MULTIPLE MARKING

Dual or multiple marking is acceptable, as long as the material so marked meets all of the requirements of all the specifications, grades, classes, and types with which it is marked.

All of the measured and controlled attributes of the multiply marked grades or specifications must overlap (e.g., chemistry, mechanical properties, dimensions, and tolerances) and the material so marked must exhibit values that fall within the overlaps. Further, the controlled but unmeasured attributes of the specifications or grades must overlap (e.g., melting practices, heat treatments, and inspection).

Many specifications or grades have significant overlap of chemistry ranges or properties. It is common for material manufacturers to produce materials that satisfy more than one specification, grade, class, or type. Examples are SA-53 and SA-106 (some grades and classes), SA-213 TP304L and TP304, SA-213 TP304 and TP304H, and SA-106 B and C.

III-220 PROHIBITION ON MULTIPLE MARKING

Dual or multiple marking is not acceptable if two or more specifications to which the material is marked have mutually exclusive requirements.

This prohibition includes more than just chemistry and property requirements. One example is SA-515 and SA-516; the former requires melting to coarse grain practice while the latter requires melting to fine grain practice. Another example is SA-213 TP304L and TP304H; the carbon content ranges of these grades have no overlap.

III-230 GRADE SUBSTITUTION

Grade substitution is not permitted. Grade substitution occurs when

(a) the material contains an element (other than nitrogen) that is unspecified for one of the grades marked

(b) the amount of that element present in the material meets the minimum and maximum composition limits for that element in another grade of a specification contained in Section II, Part A or Part B, whether or not it is also so marked

For example, a material meets all of the composition limits for SA-240 304, contains 0.06C and 0.02N, but also contains 0.45% Ti. This material cannot be marked or provided as meeting SA-240 304 because the Ti content meets the requirements of SA-240 321 [which is Ti greater than 5× (C + N) but less than 0.70].

Another material, with identical composition, except 0.35% Ti, may be marked SA-240 304 because the Ti content does not meet the minimum requirement for 321. The Ti content is just a residual.

III-240 MARKING SELECTION

If a material is marked with specifications, grades, classes, or types, it may be used with the allowable stresses, design stress intensities, or ratings appropriate for any of the markings on the material, as long as the material specification, grade, class, and type is permitted by the code of construction governing the boiler, vessel, or component in which the material is to be used. However, once the designer has selected which marking applies (specification, grade, class, type, etc.), the designer must use all the design values appropriate for that selection and may not mix and match values from any other specifications, grades, classes, types, etc., with which the material may be marked.

III-250 OTHER MARKINGS

Any other markings, such as marking of non-ASME or non-ASTM material specifications, have no relevance, even if those markings are for materials explicitly prohibited by the construction code being used. That is, as long as the *one* marking, and the documentation required by the material and by the construction code, shows that it meets all the requirements for use of that material in that construction code, any additional markings are irrelevant.

This presentation was developed by Kamran Khodaparasti.

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References:

ASME BPVC Sec. II, Part A, 2021
Personal experience