Particular Material Appraisal **Grade B7 according to ASME SA-193**	**Date:** 2006-07-18 **Rev:** 4 **Page:** 1 (3)	inspecta

This PMA is established in accordance with the procedure specified in Directive 97/23/EC (AFS 1999:4). The material described is not included in a European Harmonised Standard or covered by a European Material Approval.

1 Material specification

ASME SA-193 *(Identical with ASTM Specification A 193/A 193M-98a except for differences in paras. 3.1.1 and 19.4, Note 6 of Table 1, and editorial differences in Table 2.)*

2 Material name

Grade B7

3 Product form/Dimensions according to Specification

Bolts / Maximum diameter is 180 mm.

4 Scope

This PMA specifies the conditions under which SA-193 Grade B7 can be used for pressure purposes under directive 97/23/EC (PED) for equipment classified into one of the Categories I, II, III or IV. In addition to the requirements in the specification a PMA can inflict limitations and supplementary requirements, which has to be taken into account when ordering the material. The limitations and supplementary requirements are given under 10.

5 References

ASME SA-193:2004
ASTM A 193/A 193M-98a
Directive 97/23/EC
EN 10204:2004
EN 10204:1991
ISO 9002
CR ISO 15608:2000

6 Requirements according to ASME SA-193

Properties given under 6 are an extract from ASME SA-193.

6.1 Delivery conditions (heat treatment)

Quenched or normalised and tempered

6.2 Type of manufacture (Steel making process)

Open-hearth, basic-oxygen, electric furnace or vacuum-induction melting

6.3 Deoxidisation

Killed

6.4 Chemical composition

Cast analysis

[%]	C	Mn	P	S	Si	Cr	Mo
min	0,37	0,65	-	-	0,15	0,75	0,15
max	0,49	1,10	0,035	0,040	0,35	1,20	0,25

6.5 Mechanical and technological properties

6.5.1 Tensile properties at room temperature

Diameter [mm]	Rp0,2 [MPa] min	Rm [MPa] min	A50mm [%] min	Z [%] min	Hardness [HB] max
≤ M64	720	860	16	50	321
> M64; ≤ M100	655	790	16	50	302
> M100 ≤ M180	515	690	18	50	277

6.5.2 Impact properties

ASME SA-193 does not specify any impact properties.

6.5.3 Elevated temperature properties

ASME SA-193 does not specify any hot tensile properties.
For information:
Re/t-values given in the table below are derived from other sources.

Temperature [°C]	20	50	100	150	200	250	300	350	400	425	430
Re/t [MPa]	507	499	471	454	443	430	416	398	373	358	354

6.5.4 Creep rupture values

ASME SA-193 Grade B7 is not intended for use in the creep range.

7 Verification testing, inspection and marking

As per ASME SA-193

8 Welding

N.A.

9 Qualification of material manufacturer and Inspection documents

Certificates or test reports issued by a material manufacturer can be accepted under the following conditions:

a) The material manufacturer must hold an appropriate quality-assurance system (of at least ISO 9002), certified by a competent body established within the European Community and having undergone a specific assessment for materials. (See guidelines WGP 7/2 and 7/16)
b) The material manufacturer shall (when using EN 10204:1991), in the certificate or in a separate document, verify that the delivery meets all requirements of this specification. (See guideline WGP 7/20)
c) For main pressure-bearing parts of equipments in categories II, III and IV, the inspection document shall take the form of a certificate of specific product control.

If the material manufacturer does not fulfil the requirements given under a) specific measures must be taken. E.g. through direct inspection by a competent independent third party (notified body or local inspection body). This results in the issue of a certificate type 3.2 according to EN 10204:2004 (or 3.1.C alt. 3.2. according to EN 10204:1991).

10 Limitations and supplementary requirements

Restrictions and supplementary requirements specified below are given in order to comply with the requirements of directive 97/23/EC (PED).

- Welding on ASME SA-193 Grade B7 is normally not accepted.
- This material has been used with a history of safe use. Within the temperature range specified in this PMA this material will not be subjected to a ductile/brittle transition. If the material is intended for a lower scheduled operating temperature than ±0 °C the material manufacturer has to issue a written guarantee for the relevant impact properties followed by verification testing. What relevant impact properties that shall apply will be subjected to decision from case to case.
- Requirements for material manufacturer and inspection documents are given under 9.
- The material is to be marked to ensure full traceability.
- The material shall where relevant be ordered by the equipment manufacturer with sufficient testing and inspection to ensure its soundness for the intended application. The design code used may also impose additional tests or inspections.
- For use at temperatures above 50 °C design strength values, or maximum allowable stress values, specified in the applicable design code shall be used. If the applicable design code does not specify such values they have to be provided by the equipment manufacturer. When ASME is used as design code the maximum allowable stress values in ASME apply. Values given under 6.5.3 4 are established through an assessment and previous experience. They may be used as reference values in cases where the design code does not provide such values and when affirmed by the material manufacturer. (See guideline WGP 7/24).
- To prove conformity with the PED, according to WPG 7/19, a material certificate of the original material, which the bolts are made from, is normally necessary.
- Nuts used with the above bolts shall normally conform to SA-194 Grade 2, 2H or 4.

Manufacturer: Héléns Rör	Type of equipment: Pressure Vessels and Industrial Piping
Design examination by: (Name/Signature) /	Place: Date:
PMA Issued by: Jan Wåle, Inspecta Sweden AB (NoBo no. 0409)	