Replaces:
RN 810-2-2:2025-01-22

Delivery Conditions for case-hardened steel

Open-die forged shafts of 18CrNiMo7-6 for rotors with peripheral speeds > 50 m/s

Content

Page

1 Scope 2
2 References 2
3 Chemical composition 3
4 Physical characteristics 3
5 Manufacturing 3
6 Other requirements 4

Changes

2026-10-09:
The following changed in comparison to RN 810-2-2:2025-01-22:

a) Chapter 6 Other requirements subitem a) changed to "two member societies"

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1 Scope

This factory standard applies to	Material no.:	1.6587
	Material designation:	18CrNiMo7-6
	Delivery conditions:	Open die forged shaft hot formed; pre-turned
	Use case:	Rotors with peripheral speeds > 50 m/s

2 References

The following documents, cited in part or in whole, shall apply for the use of this standard. In case of dated references, only the referenced edition applies; in case of undated references, the latest edition of the referenced document (including all amendments) applies. The applicable version of the standards listed below shall apply to all contents not covered by this factory standard.

DIN 50602:1985-09	Metallographic examination; microscopic examination of special steels using standard diagrams to assess the content of non-metallic inclusions
DIN EN 10204	Metallic products - Types of inspection documents
DIN EN 10250-3	Open die steel forgings for general engineering purposes - Part 3: Alloy special steels
DIN EN ISO 642	Steel - Hardenability test by end quenching (Jominy test)
DIN EN ISO 643	Steels - Micrographic determination of the apparent grain size
DIN EN ISO 683-3	Heat-treatable steels, alloy steels and free-cutting steels - Part 3: Case-hardening steels
DIN EN ISO 6506-1	Metallic materials - Brinell hardness test - Part 1: Test method
RN 1550	Material samples
RN 1567	Remanent magnetism in components
RN 1934	Test instruction; Ultrasonic testing
RN 1936	Labelling; Raw material, parts and gearboxes

3 Chemical composition

Table 1 Chemical composition in %

	C	Si	Mn	P	S	Cr	Mo	Ni	V	Cu
min	0.15	0.15	0.50		0.002	1.50	0.25	1.40		
max	0.19	0.40	0.60	0.015	0.005	1.70	0.35	1.70	0.10	0.30
	Sn	**Al**	**N**	**Ti**	**Nb**	**Sb**	**O_2**	**Ca**	**H_2**	**Al / N**
min		0.02	0.008							
max		0.04	0.012	0.006	0.05		15 ppm	0.0015	1.7 ppm	3.7

4 Physical characteristics

Table 2 Mechanical properties (Test temperature: 20° C / degree of transformation: φ ≥ 6.0)

Rm	$Rp_{0.2}$	A5 [%]		Z [%]		Av [J]	
[N/mm²]	[N/mm²]	longit.	transv.	logit.	transv.	longit.	transv.
min.	min.	min.	min.	min.	min.	min.	min.
1080	785	10	8	40	25	35	25

a) Structure, inclusions
- grain size, standard: DIN EN ISO 643 — Standard series: Table C.1; G ≥ 6
- purity degree, standard: DIN 50602 — method: K; K3 ≤ 20

b) Hardenability
- Standard: DIN EN ISO 683-3 — scatter band: +HH
- testing: DIN EN ISO 642

end distance [mm]:	5	11	25	40
hardness [HRC]:	42-48	40-47	35-43	33-41

c) Additional properties
- radioactivity: ≤ 0.10 Bq/g

5 Manufacturing

a) Casting method: ingot casting

b) Melting
- making process: E, LD, ESU (on special request)
- post-treatment: vacuum degassing (VD) for E or LD

c) Heat treatment
- treatment condition: +QT
- treatment method: liquid quenching and tempering
- anneal to: 650 to 850 N/mm² tensile strength

d) Surface condition
- defect depth: ≤ machining allowance
- unmachined: rust-, crack- and scale-free — pre-turned: max. Rz 40
- repair by welding: not permitted

e) Manufacturing tolerances: see drawing details

6 Other requirements

a)	Steel and forging plant	
	• certified acc. to:	DIN EN ISO 9001 ff.
	• approved by at least two member societies of IACS	
b)	Testing	
	• material identification check:	to be carried out
	• ultrasonic testing:	RN 1934 for rotors with peripheral speeds > 50 m/s
c)	Sample material and collection	
	•	RN 1550
d)	Remanent magnetism	
	•	RN 1567
e)	Labelling	
	•	RN 1936

f) Documentation (must be digitally available upon delivery)
- acceptance test certificate 3.1 acc. to DIN EN 10204 per melt and furnace trip or per piece or production lot with specification of primary material and forging ratio
- copy of the acceptance test certificate 3.1 from the steel manufacturer
- evidence of radioactivity and remanent magnetism
- forging schedule (on special request)