

Industrial Valves & Flow Control Solutions

# Casting Quality

Gate, globe and check valves



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Valves  
Company



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## Casting quality

To provide customers with the best flow control solutions and quality OVC has established a Casting Quality Control Program.

This document summits:

- Available standards
- Differences ISO, EN & ASTM
- NDT standards overview
- OVC Casting Quality Control Program





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# Casting Quality, Control and Examination Standards

- DIN1690
- ISO 4990, ISO 11971
- EN10213, EN12680, EN1370, EN1369
- MSS SP-55
- MSS SP-147
- ASME B16.34 ASTM E446, ASTM E186, ASTM E280
- ISO 4993 / 4986 / 4987 / 4352
- EN1204-3.1



# ISO11971 vs MSS-SP-55

## Visual examination



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Aspect

Title

### **ISO 11971**

*Steel and iron castings - Visual testing of surface quality.*

Scope

Steel and iron castings in general.

Acceptance method

Uses reference comparators to classify surface roughness and discontinuities.

Defects covered

Surface roughness, thermal dressing, mechanical dressing, inclusions, gas porosity, fusion discontinuities, expansion discontinuities, metal inserts.

### **MSS SP-55**

*Quality Standard for Steel Castings for Valves, Flanges and Fittings.*

Primarily steel castings used in valves, flanges, fittings, and pressure equipment.

Uses photographic reference plates showing typical casting surface defects.

Shrinkage, gas porosity, sand inclusions, cracks and other visual casting defects.



# ISO 4990 versus EN 10213

| Aspect                                 | EN 10213                                    | ISO 4990                                                |
|----------------------------------------|---------------------------------------------|---------------------------------------------------------|
| Title                                  | <i>Steel castings for pressure purposes</i> | <i>General delivery requirements for steel castings</i> |
| Steel grades                           | Yes                                         | No                                                      |
| Chemical composition limits            | Yes                                         | No                                                      |
| Mechanical property requirements       | Yes                                         | No                                                      |
| Heat treatment requirements            | Yes                                         | General provisions                                      |
| Testing and inspection                 | Yes                                         | Yes                                                     |
| Traceability                           | Yes                                         | Yes                                                     |
| Delivery requirements                  | Yes                                         | Yes                                                     |
| Pressure-service casting specification | Yes                                         | No                                                      |



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# Overview of NDT testing

| NDT Method                     | ISO Standard               | EN Standard     | ASTM Standard                              |
|--------------------------------|----------------------------|-----------------|--------------------------------------------|
| Visual Testing (VT)            | ISO 11971                  | EN 1370         | MSS SP-55, ASTM A802/A802M                 |
| Ultrasonic Testing (UT)        | ISO 4986                   | EN 12680 Series | ASTM A609/A609M                            |
| Radiographic Testing (RT)      | ISO 4993                   | EN 12681 Series | ASTM E446, ASTM E186, ASTM E280, MSS SP-54 |
| Magnetic Particle Testing (MT) | ISO 4987                   | EN 1369         | ASTM E709, ASTM A903                       |
| Liquid Penetrant Testing (PT)  | ISO 3452 Series / ISO 4987 | EN 1371         | ASTM E1417/E1417M                          |



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# MSS SP-147

*Quality Standard for Steel Castings Used in Standard Class Steel Valves - Sampling Method for Evaluating Casting Quality*

- Is currently the only standard available with a sampling methodology for standard castings
- Pilot casting qualification required
- Surface Acceptance criteria defined, refers to MSS SP-55, every casting to be examined!
- Sampling methodology is a core requirement for RT (1% for PN16 to PN40 valves)
- Acceptance criteria for Radiographic testing (RT) are defined



# OVC specifications for Standard casting



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- Standard castings are PN16 to PN40, sizes DN15 to DN350
- Comply with EN10213
- ISO9001 certified foundry
- Pilot casting qualification required to pass as per MSS SP-147
- Surface Acceptance criteria defined, refers to MSS SP-55, every casting to be examined!
- RT Sampling percentage for PN16 to PN40 globe valves is
  - DN15 to DN100 1%
  - DN125 to DN200 2%
  - DN250 to DN350 5%
- Acceptance criteria for Radiographic testing (RT) as per MSS-SP-147
- Certification to EN10204-3.1, certification includes
  - Chemical analysis of material
  - Heat treatment
  - Impact test at -20C and Hardness test
  - Hydrostatic and seat test



**THE RESULT IS A CONSTANT CONTROLLED CASTING QUALITY, GIVING A RELIABLE VALVE**

# Certificate to EN10204-3.1 Material

Orange Valves Company B.V.

De Scheysloot 52 2201GN  
Noordwijk The Netherlands

Certificate No.AD1292XJ

## Chemical analysis

(ACCORDING TO 3.1. EN 10204)

Manufacturer: Orange Valves Company B.V.

| HEAT NO. | PARTS       | Q'ty | MATERIAL | C (%) | Si (%) | Mn (%) | P (%) | S (%) | Cr (%) | Ni (%) | Mo (%) | Cu (%) | W (%) | TENSILE STRENGTH | YIELD POINT | ELONGATION | REDUCTION OF AREA | Brinell (HB) | Impact (-20°C) |
|----------|-------------|------|----------|-------|--------|--------|-------|-------|--------|--------|--------|--------|-------|------------------|-------------|------------|-------------------|--------------|----------------|
| V018     | BONNET      | 100  | 1.0619   | 0.204 | 0.411  | 0.819  | 0.015 | 0.012 | 0.045  | 0.0001 | 0.0001 | 0.012  |       | 529              | 253         | 36         | 3                 | 159          | 30/35/33       |
| V032     | BODY        | 100  | 1.0619   | 0.204 | 0.411  | 0.819  | 0.015 | 0.012 | 0.045  | 0.0001 | 0.0001 | 0.012  |       | 529              | 262         | 31         | 3                 | 159          | 30/33/32       |
| V037     | BODY/BONNET | 60   | 1.0619   | 0.226 | 0.472  | 0.89   | 0.024 | 0.019 | 0.107  | 0.0001 | 0.007  | 0.055  | /     | 532              | 258         | 33         | 3                 |              |                |
| V238     | BODY/BONNET | 200  | 1.0619   | 0.217 | 0.466  | 0.928  | 0.023 | 0.019 | 0.109  | 0.0001 | 0.01   | 0.058  | /     | 535              | 266         | 32         | 3                 |              |                |
| V268     | BONNET      | 100  | 1.0619   | 0.180 | 0.366  | 0.754  | 0.017 | 0.010 | 0.038  | 0.0001 | 0.0001 | 0.031  | /     | 542              | 282         | 37         | 3                 |              |                |
| V483     | BONNET      | 100  | 1.0619   | 0.218 | 0.479  | 0.823  | 0.022 | 0.019 | 0.108  | 0.0001 | 0.006  | 0.05   | /     | 551              | 268         | 33         | 3                 |              |                |
| V542     | BODY        | 150  | 1.0619   | 0.200 | 0.399  | 0.958  | 0.024 | 0.019 | 0.114  | 0.0001 | 0.009  | 0.054  | /     | 537              | 266         | 33         | 3                 |              |                |
| V560     | BODY        | 200  | 1.0619   | 0.180 | 0.366  | 0.754  | 0.017 | 0.010 | 0.038  | 0.0001 | 0.0001 | 0.031  | /     | 542              | 282         | 37         | 3                 |              |                |



## Heat treatment

|                |        |    |          |       |               |       |         |       |                  |        |
|----------------|--------|----|----------|-------|---------------|-------|---------|-------|------------------|--------|
| 7386           | BODY   | 10 | 1.0619   | 0.195 | 0.433         | 0.854 | 0.024   | 0.02  | 0.071            | 0.0001 |
| 8888           | BONNET | 10 | 1.0619   | 0.208 | 0.409         | 0.752 | 0.023   | 0.018 | 0.078            | 0.0001 |
| 9868           | BONNET | 20 | 1.0619   | 0.192 | 0.414         | 0.92  | 0.021   | 0.017 | 0.051            | 0.0001 |
| HEAT TREATMENT |        |    | TEMP (℃) |       | HOLD TIME (H) |       | COOL    |       | FURNACE          |        |
| NORMALIZED     |        |    | 920      |       | 4             |       | AIR     |       | Liquefied gas    |        |
| ANNEALED       |        |    | /        |       | /             |       | /       |       | /                |        |
| TEMPERED       |        |    | 630      |       | 4             |       | Furnace |       | Electric Furnace |        |

| Brinell (HB) | Impact (-20°C) |
|--------------|----------------|
| 159          | 30/35/33       |
| 159          | 30/33/32       |
| 158          | 32/33/35       |
| 164          | 35/37/33       |

Impact and hardness test

# Certificate to EN10204-3.1 Test



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**Orange Valves Company B.V.**

De Scheysloot 52  
2201GN Noordwijk  
The Netherlands



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TEST CERTIFICATE  
(ACCORDING TO 3.1. EN 10204)

Certificate No.:AD1290XJ

Manufacturer: Orange Valves Company B.V.

| Item No. | Q'ty (PCS) | Description | Rating (PN) | Size | Material    |      |         |             |         |            | Hydrostatic Test |                  |                      |                  | Air Test   |                  | Type       | Temp (°C) | Result |
|----------|------------|-------------|-------------|------|-------------|------|---------|-------------|---------|------------|------------------|------------------|----------------------|------------------|------------|------------------|------------|-----------|--------|
|          |            |             |             |      | Body/Bonnet | Disc | Stem    | Seat        | Disc    | Bolts/Nuts | Body (MPA)       | Duration time(s) | Seat/Back Seat (MPA) | Duration time(s) | Seal (MPA) | Duration time(s) |            |           |        |
| 1        | 10         | GLOBE       | PN40        | DN15 | 1.0619      | /    | X20Cr13 | 1.0619+13Cr | X20Cr13 | B7 2H      | 6.00             | 15               | 4.40                 | 15               | 0.6        | 15               | EN 12266-1 | 20        | OK     |
| 2        | 10         | GLOBE       | PN40        | DN20 | 1.0619      | /    | X20Cr13 | 1.0619+13Cr | X20Cr13 | B7 2H      | 6.00             | 15               | 4.40                 | 15               | 0.6        | 15               | EN 12266-1 | 20        | OK     |
| 3        | 10         | GLOBE       | PN40        | DN25 | 1.0619      | /    | X20Cr13 | 1.0619+13Cr | X20Cr13 | B7 2H      | 6.00             | 15               | 4.40                 | 15               | 0.6        | 15               | EN 12266-1 | 20        | OK     |
| 4        | 3          | GLOBE       | PN40        | DN32 | 1.0619      | /    | X20Cr13 | 1.0619+13Cr | X20Cr13 | B7 2H      | 6.00             | 15               | 4.40                 | 15               | 0.6        | 15               | EN 12266-1 | 20        | OK     |

P.O.No:12352

| Hydrostatic Test |                  |                      |                  |
|------------------|------------------|----------------------|------------------|
| Body (MPA)       | Duration time(s) | Seat/Back Seat (MPA) | Duration time(s) |
| 6.00             | 15               | 4.40                 | 15               |
| 6.00             | 15               | 4.40                 | 15               |



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**Curious about us?**

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