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| ISO 9001:2015 | Document No. RDSO/M&C/NDT/109/2007, (Rev-2), July 2020 | Version No. 1.0 | Effective Date: |
| Specification for Magnetic Particle used in Magnetic Particle Examination | | | |



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RDSO/M&C/NDT/109/2007, (Rev-2), July 2020

**SPECIFICATION FOR MAGNETIC PARTICLE USED IN
MAGNETIC PARTICLE EXAMINATION**

Amendment History:

| S. No. | Amendment date | Version | Reasons for Amendment |
|--------|----------------|---------|--|
| 1. | 1991 | NA | First issue specification No . M&C/NDT/8/91 APPD |
| 2. | March 2007 | NA | First revision of specification No . RDSO/M&C/NDT/109/2007, Rev-I, March 2007.(Specification renumbered) |
| 3. | September 2012 | NA | Reaffirmed |
| 4. |07.2020 | 1.0 | The Specification should be generic & preferably reference to National Standard. (Reference: PED/QA (Mech)'s note no. QAM/Spl. DG/Misc., dtd. 15.06.2020). |

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1. SCOPE

This specification covers the requirements of magnetic particles used for detection of surface and slightly sub surface discontinuities in ferro-magnetic materials. These particles are intended to be used for detection of cracks, laps, seams, inclusions in raw materials, semi-finished and finished products.

2. CLASSIFICATION

The particles covered by this specification are of two types :

- i) Non - Fluorescent - for dry and wet methods
- ii) Fluorescent - for wet method only

3. LIGHTING INTENSITIES

While testing with non -fluorescent particles the intensity of the visible light at surface of the parts undergoing inspection shall be 1000 lux (100ft.candles) minimum.

While testing with fluorescent particles, the area of viewing shall be darkened and maximum ambient visible light shall be 20 lux (2ft.candles).

The black light intensity at the examination surface shall be $1000\mu\text{W}/\text{cm}^2$ minimum. For portable black light source, the intensity shall be minimum $1000\mu\text{W}/\text{cm}^2$ at 38 cm from the source.

4. MATERIALS

The particles used shall be finely divided ferromagnetic materials suitably treated to facilitate visibility. Non -fluorescent particles may be colored for use where as fluorescent particles shall be coated with materials glowing under black light.

The particles shall be designed for use as a free flowing dry powder or for suspendable application in suitable liquid or polymerizable material.

The particles shall be designed to have a high magnetic permeability and a low retentivity. The particle shall be consistent in respect of size, shape, and material quality for better results. The particle shall be non-porous and free from rust, grease, paint, dirt and other deleterious materials.

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5. SENSITIVITY OF PARTICLES

(i) Ring Test

The requirements of dry and wet particles when viewed under specified conditions of light intensity, the minimum number of hole indications shall not be less than those specified below when tested on a KETOS steel ring.

| Particle used | Central conductor full wave rectified AC amperage | Minimum No. of holes indicated |
|--------------------------|---|--------------------------------|
| Wet particles | 1400 | 3 |
| Suspension Fluorescent & | 2300 | 5 |
| Non -fluorescent | 3400 | 7 |
| Dry powder | 1400 | 4 |
| | 2500 | 6 |
| | 3400 | 7 |

(ii) **FLAW -TO-BACKGROUND TEST:** (AMS 3042B & AMS3044B)
Para3.2.5.2
(For wet method particles only).

- 6. WET METHOD VEHICLE-** The suspension vehicle for the wet method shall be a light petroleum distillate or suitably conditioned water.
- 7. PARTICLE CONCENTRATION-** Particle concentration for fluorescent particles shall be in the range of 0.1- 0.4 ml. in 100 ml. bath sample and 1.2-2.4ml. in 100 ml bath sample for non-fluorescent particles.
- 8. pH VALUE -** When water is used as a suspension vehicle, the wetting agents shall be non ionic and the pH value of the specimen shall be within 6-10. The conditioning agent should contain anti - foaming and corrosion inhibiting additives.

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9. MECHANICAL DURABILITY AND CHEMICAL DURABILITY

AMS 3042B & AMS 3044B Para 3.2.5, 3.2.6
(for wet method particles only)

10. PARTICLE SIZES:

Average particle sizes shall be :

| | |
|----------------------------|--------------|
| Dry method | 180 microns |
| Wet method non-fluorescent | 20 microns |
| Wet method fluorescent | 6-10 microns |

11. TEMPERATURE LIMITS

Dry method magnetic particles and wet method powder shall be able to withstand component (or bath) temperatures without deterioration in pigment colour on coating as under.

| | |
|---------------------------------------|-----------------------|
| Dry method particles | not less than 300 ° C |
| Wet method powders (fluorescent) | upto 43 ° C |
| Wet method powders (non- fluorescent) | upto 93 ° C |

NOTE : “Firm should comply Make in India policy and Public Procurement (Preference to Make in India) order - 2017 under this specification” and subsequent amendment done time to time.

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