1 Target/Objective

This method is based on DIN 53521 with an appropriate modification to adapt this procedure as close as possible to field application. The target of this procedure is to evaluate the sorption- and/or swelling characteristics from plastic parts in general exposed to fountain solution. Plastic parts in presses comprise all non-metal materials used in web presses from MAN Roland Druckmaschinen AG and respective aggregates linked to that. This means in detail all non-metal materials used like rigid tubes, flexible hoses, fittings, seals, roller materials etc. Metal back blankets, blankets and coatings in presses from MAN Roland Druckmaschinen AG web presses are evaluated in a separate procedure.

This method is based on a model system to predict the sorption- and/or swelling potential of plastic parts in the field application. This method does not investigate the influence of mechanical stress nor does this method correlate mechanical and chemical interactions.

2 Test Bodies

2.1 Plastic Parts

PVC-U (Hard-PVC, dark grey) tube with about 20 mm outer diameter and wall thickness of about 2 mm (supplier: Fa. Georg Fischer, order number 161 017 106). The length of the cut test coupon should be 10 mm.

2.2 Preferred Roller Materials

The test bodies are available in discs with a diameter of 36,6 mm and a thickness of 6 mm ± 0,5 mm or 2 ± 0,5 mm (V~6 ml). The age of the test bodies should be not greater than 6 months and preferentially stored in dry and dark places at room temperature (about 23°C).

Ink- / Dampening roller from respective suppliers		thickness
Westland GmbH & Co. Westlandstr. 6 D-49324 Melle Germany	NBR (N2004-1) C304-12 EPDM (E2005-1)	6 mm 6 mm 2 mm

3 Test Liquids

Prepare in advance a water with a defined hardness of 10 °dH. One start with deionised water with recommended conductivity between 30-60 µS/cm at 25°C. Dissolve the following salts in 1 liter to achieve the hardness of 10 °dH.

128,3 mg	Magnesiumsulfat	$MgSO_4 \cdot 7\ H_2O$
51,9 mg	Calciumchlorid	$CaCl_2 \cdot 2\ H_2O$
38,1 mg	Calciumnitrat	$Ca(NO_3)_2 \cdot 4\ H_2O$
41,5 mg	Magnesiumacetat	$Mg(C_2H_3O_2)_2 \cdot 4\ H_2O$
93,5 mg	Calciumacetat	$Ca(C_2H_3O_2)_2 \cdot x\ H_2O$

This solution called "synthetic water" contains about 25 mg/l Chloride, 50 mg/l Sulphate und 20 mg/l Nitrate at a hardness of 10°dH (9.8 to 10.2) and a mol relation between Calcium to Magnesium Ions of 1.5 normally found in water. The conductivity of the "synthetic water" is between 300 µS/cm und 330 µS/cm. In the next step you should dilute 6 wt% of dampening concentrate in 1 liter of the "synthetic water" to get an exact solution.

4 Test Devices

Balance with a precision of minimum of ± 0,1 mg
Room temperature: 23± 1° C is test temperature

5 Test Procedure

For all tests it is worthwhile to use an inert glass bottle with an inert lid (e.g. a jam jar – with a max. volume of 250 ml). The amount of test liquid should be greater by a factor of 15 compared to the volume of the test body. According to Chapter 2.2 100 ml per test coupon is used.
Alternatively all test bodies can be immersed in one greater jam jar (max. volume 500 ml) and a total volume for the test liquid of 400 ml. In this case we strongly recommend storing each test body with a maximum contact to the test liquid during the exposition in the jam jar.

The exposure of the plastic parts will be done as mentioned in the following table:

Nr.	Time/data point
1	3h
2	1d
3	3d
4	7d
5a	14d
	drying
5b	48h

After each step the plastic parts are dried with a tissue to remove any access liquid from the test body. Afterwards the weight is measured and documented as mentioned later on. After each weighing step the media in the jam jars is replaced by a fresh one. After the step “drying” the controlled drying is monitored of the test bodies under defined conditions.

For the exposure the test bodies are stored at 23± 1°C and for the drying step at 23± 1°C. For the drying steps the test body is stored without the jam jar. After 7 days exposure there is an option for a short cut. If the measured weight percent changes for the last 7 days are lower than half of the threshold defined for 14 days exposure, you have the option to continue immediately with the drying step.

6 Determination of Test Values

Determination of mass
The mass of the test body is determined before and after exposure with the test fluid with a balance.
m_0: Mass before exposure with the test fluid
m_1: Mass after exposure with the test fluid
$\Delta m[\%] = (m_1-m_0)/m_0*100\%$

7 Threshold Values – Determination of Approval

In general the higher the amount of data points, the higher the reliability to estimate the swell trend and/or sorption behaviour. In contradiction the time necessary to measure all this data points grow with the number of data points. To achieve an optimum the number of measured data points is limited to an optimum to estimate the behaviour. According to our experience the minimum of acceptable data points is 6 with one drying step to check the release behaviour.

The threshold values for a 14 days exposure of the individual materials are listed in following table:

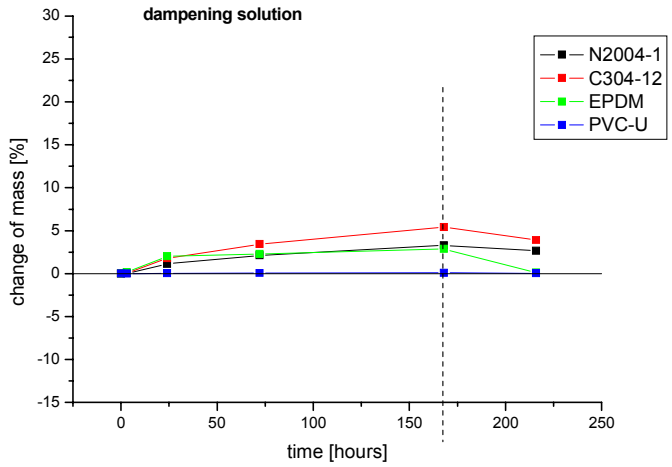
NBR (N2004-1)	< 5 wt%
C304-12	< 10 wt%
EPDM (E-2005-1)	< 3 wt%
PVC-U	< 2 wt%

As mentioned before, if the measured values are low you can check if you can benefit from the short cut method. To evaluate the thresholds for the short cut method the following requirements have to be taken into account:

Requirement	Result/Action
Δm_{max}[%] (0-7d) < threshold-value$_{14d}$ * 0,5	successful resistant
threshold-value$_{14d}$*0,5 < Δm_{max}[%] (0-7d) < threshold-value$_{14d}$*0,75	Measure Δm[%] (14d) and Δm[%] (14d) < threshold-value$_{14d}$ – successful resistant
Δm_{max}[%] (0-7d) > threshold-value$_{14d}$ * 0,75	Not accepted - failed

8 Documentation

The results should be plotted similar to the following example.
We recommend using numeric axis with a unique scale for every plot.



9 Contact person

Dr. Hartmann Th. // Ms. Ch. Demmel (thomas.hartmann@mra.man.de; christine.demmel@mra.man.de) fon: +49 821 424 2970 // -2974