FUJIFILM
I&I - Imaging & Information

instruction sheet

FUJI PRESCALE PRESSURE MEASURING FILM

LLLW - *Ultra Super Low Pressure Type* (two sheet type)

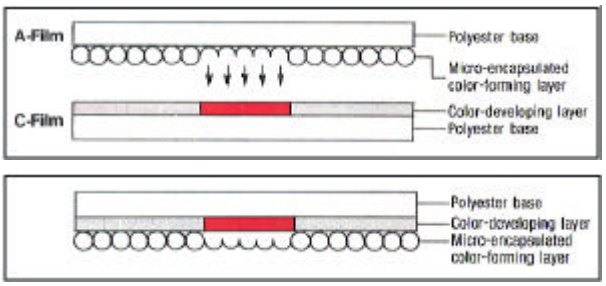
Type of Prescale film available ranges

Fuji Film manufacture up to six types of *Prescale Film*, available to cover a wide range of pressure.
On the left side is shown a list of existing ranges with related film sizes.

Film type	Pressure range[MPa] (0.2 – 0.5 0.6 – 2.5 – 10 – 50 – 130)	Product size W(mm)×L(m)
Ultra Super Low Pressure (LLLW)		270 × 4
Super Low Pressure (LLW)		270 × 5
Low Pressure (LW)		270 × 10
Medium Pressure (MW)		270 × 10
Medium Pressure (MS)		270 × 10
High Pressure (HS)		270 × 10

Structure of Prescale film - how it works

Depending from its measuring range, *Prescale Film* is available under two possible formats, one based on two sheets (A + C), and another as a single sheet.



Two sheets film - *Prescale* is composed of an A film wich is coated with a micro encapsulated color forming material, and a C film, wich is coated with a color developing material. When used, the two films should be placed with the coated (rough and opaque) surfaces facing each other.

Single sheet film - The color forming layer is coated on the poliester base of film. Micro incapsulated color forming material is layered on the top of film.

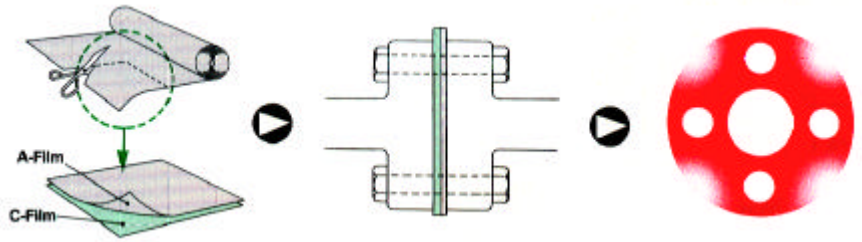
How it works - When pressure is applied on the film, microcapsules are broken with distribution and "density" of magenta color depending by true pressure distribution and magnitudo. When microcapsules are broken, their material is released and it react with the color developing material and this process will cause magenta color forming. Through PSC technology (*Particle Size Control*), microcapsules are designed to react to various degrees of pressures, releasing their color forming material at a density that correspond to specific levels of applied pressure.

Properties of Prescale Film

- typical accuracy: ±10% or better, when measured with densitometers @ 23°C (73.4 °F), 65% RH)
- accuracy: ±15%, when measured by “human eye ” on color sample table and charts basis
- recommended temperature range: from 20°C up to 35 °C (from 68°F up to 95°F)
- recommended humidity range: from 35% RH up to 80% RH

Method of use of Prescale Film

Cut *Prescale Film* into required shape and size. With the two sheets film format make sure that coated sides on both A and C films are facing each other. Insert then cutted *Prescale Film* into area to be measured and then apply pressure or force phenomenon. Remove impressed film and observe pressure distribution and magnitudo.



Typical conditions for applying under measurement pressure to Prescale Film

By mean of *Prescale Film* both extended and momentary measurement and analysis of pressure phenomenon are possible.

Extended pressure measurements - With extended pressure method, applied pressure is increased gradually up to the given level, and it will be maintained continuosly at that level. In order to get the best and accurate results (and where it is possible and applicable), prefereably pressure should be applied gradually up to its highest value by a 5 seconds time basis, and it should be maintained at the highest level for 2 minutes.

Momentary pressure measurements - If necessary *Prescale Film* could be also used for impact pressure measurements, with application time depending from application itself. When possible (and where applicable) prefereably pressure should be applied gradually up to its highest magnitudo by a 5 seconds time basis, and it should be maintained at the highest level for other 5 seconds.

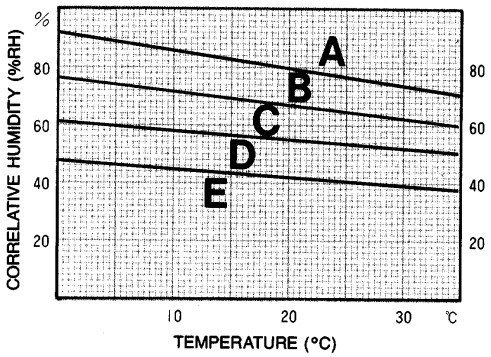
Determining the pressure level and distribution

As explained, with pressure applied, *Prescale Film* turn into a several level of magenta color, whose intensity (density), is directly proportional to the amount of pressure being applied. Where high pressure was applied, dark magenta will be shown. Conversely where low pressure was applied, a light magenta color will be on the film areas. The correct interpretation of described results will be performed by three basic steps:

Step 1 - compare exposed *Prescale* film to magenta’s sample table shown on the back side of present data sheet. Each magenta sample correspond to a specific density figure so take a note of it; if exposed film color is between samples, interpolate it.
Step 2 - with reference to below temperature and humidity smaller chart, determine the ambient condition of your experience and try to recognize the type of area (A, B, etc.) that better match your true experiment conditions; be accurate as possible since for each working area a specific density curve (A, B, etc.) will be related on next step.

Step 3 - by type of performed pressure exposition (*Extended* or *Momentary*), and using the proper curve recognized as the closest to experiment ambient condition (see step 2), it should be possible to locate point corresponding to where recordered density intersects the curve previously determined. From this point of intersection and following the line down to X axis where is possible to obtain the actual pressure value in *Mpa*.

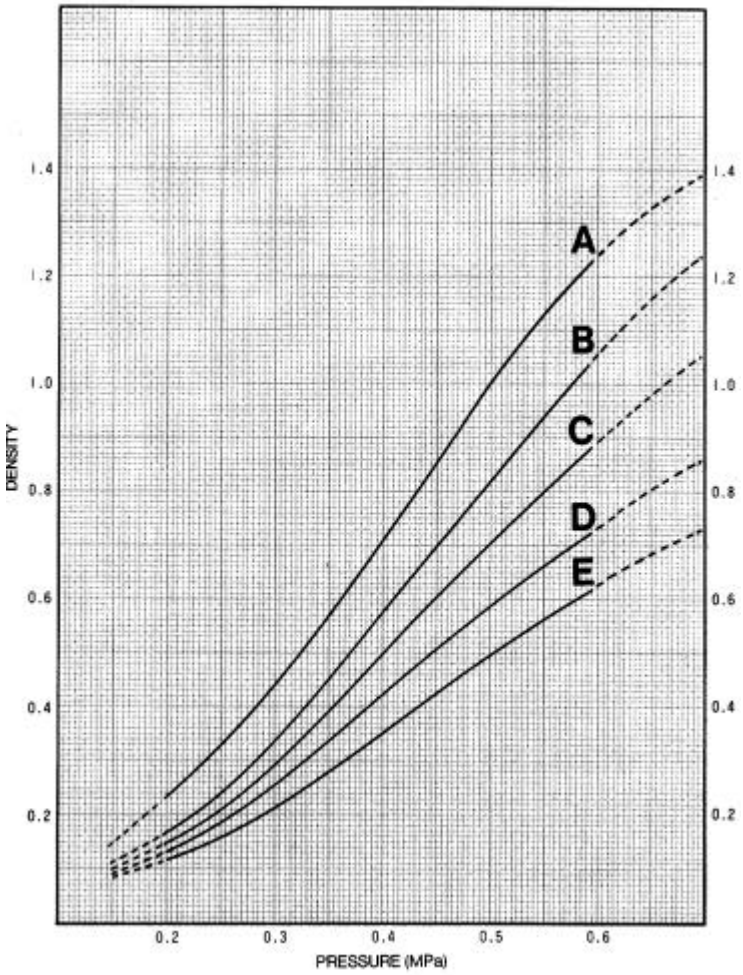
Graph of temperature and humidity *(*)*



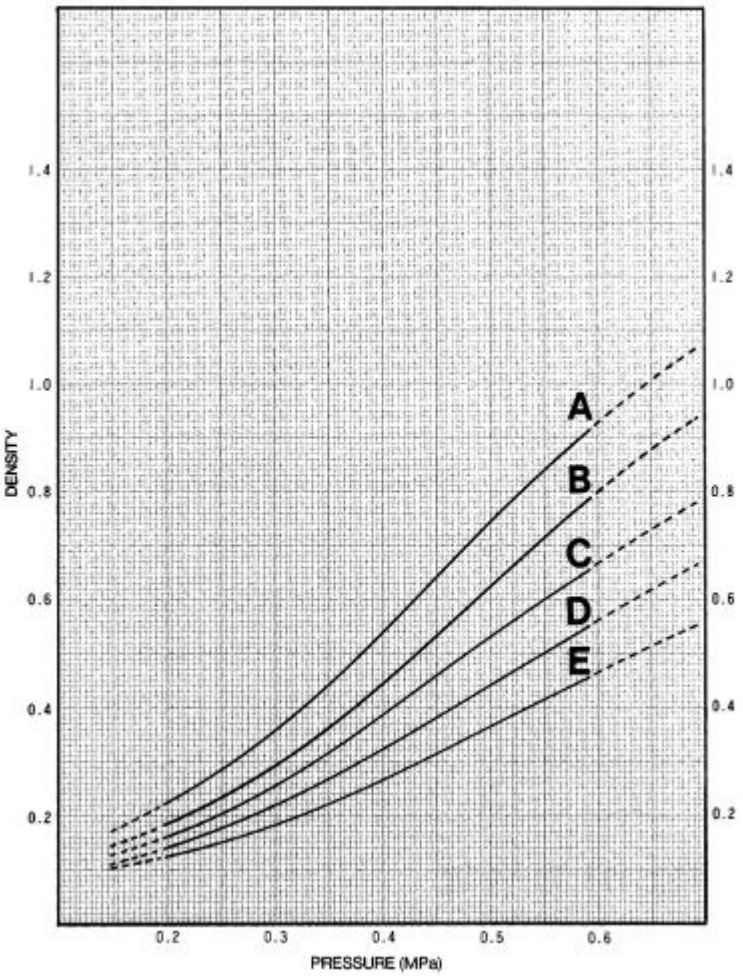
Magenta's samples table

Even if *Prescale* can offer a "visual" direct imaging of pressure distribution and magnitudo, better results are achievable by mean of shown standard charts and magenta's colour table. In choosing the proper curve *(*)*, check for ambient temperature and humidity conditions and make sure which area is the closest to your experiment (see side chart). For example, if the room temperature is 25°C and the humidity factor is 60% RH, acquire the pressure using the B curve in standard chart.

LLLW (0.2÷0.6 MPa) - *Extended* pressure chart



LLLW (0.2÷0.6 MPa) - *Momentary* pressure chart



As the pressure ranges indicated by the broken lines in the above graphs may exceed the permissible error range, they should be used for reference only.

Precautions on use and storage

A film (on two sheets film format) react with high sensitivity even to minute pressure. Do not hold or rub it before use. Wipe the surfaces to be measured before use. Water or oil, if present on coated surfaces of films, will hinder proper color development. Avoid friction between A and C films. The films should be bound together at the edge before to start the test and not shifted later. Use *Prescale Film* at temperatures within 20 °C to 35 °C, and an humidity range of 35% RH up to 80% RH. Measurements performed outside this region could be not accurated. *Prescale Film* is not reusable. It should be also utilized within the given shelf life. Be particularly careful in handling single sheet *Prescale Film* type as they are self color developing and could easily develop on their own. Avoid film exposure to sunlight or in location close to fire or excessive heating. During storage avoid film contact with carbon paper, Diazo copying paper, solvents, water, oil or other chemicals, vinly plastic or adhesive tapes, rubber products or inside documents subjected to any marking pen writing on them. Unusued films should be placed in the original polyethylene bag and stored in the original box. After development, avoid storing of the C film with the color developer material sides making contact with each other.

Please be aware that Fuji Prescale film could be also "measured" by more capable and repeteable means like color densitometers and specific software facilities based on a calibrated A4 format scanner (with accuracies up to 6÷5%). Please contact our sales department for any further detail. Spare can also offer you several further diagnosis tools and instrumentation. Please submit us your application details as we will check the more cost effective and the best "requirements tailored" solution.

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